WP11 - Management, communication, dissemination, and exploitation

D11.3: Data Management Plan

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EUROPEAN PARTNERSHIP

Executive summary

This document consolidates the public "Data Management Plan - DMP" for the European funded project HECATE (deliverable D11.3).

The purpose of the DMP is to provide an overview of all open access datasets to be collected and generated by the project and to define the consortium's data management policy that is used with regard to these datasets. The HECATE DMP follows the structure of the Horizon Europe's DMP template. It reflects the status of the data that is collected, processed or generated and following the methodology and standards used. It also defines whether and how this data will be shared and made open, and how it will be curated and preserved.

This DMP defines the general policy and approach to open data management in HECATE, which handles data management related issues on the administrative and technical level. This includes for example topics like data and metadata collection, publication and deposition of open data, as well as the data repository infrastructure and compliance with the Open Access Infrastructure for Research in Europe (OpenAIRE).

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Coordinator	Ignacio Castro Álvarez	CAI	30/06/2023
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Glossary

Acronym	Signification
API	Application Program Interfaces
CAJU	Clean Aviation Joint Undertaking
CC	Creative Commons
CERN	Conseil Européen pour la Recherche Nucléaire
DMP	Data Management Plan
DoA	Description of the Action
DOI	Digital Object Identifier
DT	Digital Twin
EASA	European Union Aviation Safety Agency
EC	European Commission
EMDESK	HECATE internal platform used
EMI/EMC	Electromagnetic (Interferences/ Compatibility)
EUROCAE	The European Organisation for Civil Aviation Equipment
FAIR data	Findable, Accessible, Interoperable and Reusable data
FMU	Functional Mock-up Units
F&T portal	Funding & Tender portal of the EC
GA	Grant Agreement

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GHM	Global Health Monitoring
HW/SW	Hardware/Software
IPR	Intellectual Property Rights
ISSN	International Standard Serial Number
JSON	JavaScript Object Notation
(KV)(HV)(LW)DC	(Kilovolt) (High Voltage) (Low voltage) Direct Current
LCA	Life Cycle Assessment
LRU	Line Replaceable Unit
OEM	Original Equipment Manufacturer
OpenAIRE	Open Access Infrastructure for Research in Europe
ORCID	Open Researcher and Contributor ID
PID	Persistent Identifier
PII	Publisher Item Identifier
PMC	Project Management Committee
PU	Public
PURL	Persistent Uniform Resource Locator
RTO	Research and Technology Organisation
SC	Steering Committee
SEN	Sensitive
SME	Small and medium-sized entreprise
SRIA	Strategic Research and Innovation Agenda
TRL	Technological Readiness Level
WP	Work Package
Zenodo	Open access repository used for HECATE open access data

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1. Data Summary

1.1. HECATE in brief

Aviation needs to meet the ambitious targets of the European Green Deal. This means a step change is needed towards hybrid electric regional aircraft to significantly reduce the fuel burn. This can only be accomplished with power distribution networks that can safely handle the high power and high voltage levels, ultimately up to several Megawatt. The HECATE project will address the associated challenges of system weight and power density, high voltage challenges with lightning, arcing and electromagnetic interference as well as optimized thermal management, in addition to digitizing the design process with digital twins. This will lead to transformative technology bricks, which are holistically optimized at system integration architecture level. The HECATE project will demonstrate a >500 kW architecture in a copper bird at TRL5. This will provide a clearer understanding of high voltage challenges and how to mitigate them, with a scalability roadmap towards CAJU Phase 2 flight demonstration and exploitation in a 2035 new built Hybrid Electric Regional aircraft. Also, environmental impact and LCA will be assessed. For optimal alignment and ensuring certifiability, HECATE will establish relationships with other Clean Aviation projects (e.g. HER-01 for MW propulsion, HER-02 for thermal, TRA-01 for architecture, TRA-02 for certification) and authorities and standards groups (e.g. EASA, EUROCAE).

As a set of key enabling technologies that are well integrated, HECATE will contribute to the Clean Aviation SRIA and its expected impacts, and fully fulfill the call's expected outcomes. The consortium mobilizes key EU based industries throughout the entire existing supply chain: from aircraft OEMs to system integrators, to system and subsystems suppliers, 5 of which are SMEs. 17 RTOs, complement and reinforce the industries, which also ensures knowledge gained is embedded in future research and education programs.

1.2. HECATE data definition and purpose

The HECATE project objectives and actions are the following:

- Definition of the electrical distribution architecture and specifications.
- Development and maturation of transformative technologies in the electrical distribution.
  - Supported by transversal activities: Digital Twins and EMI/EMC
- Demonstration and integration at COPPER bird ground test.
- Road mapping, impact, scalability to future platforms based on acquire know-how and LCA.
  - Readiness of technologies toward CA Phase 2 and commercial exploitation.

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The below tables give the HECATE data to be generated / collected on work package basis, in adequation with the objectives of the project. They respond also to the following questions:

- Will the data be included in full or partial open access?
- What is the origin of the data?
- Will you re-use any existing data and how?
- What are the methodology and standards (type / format of data) applied?
- What is the expected size of the data?
- What are the means of exploitation / share / access for verification, and re-use?
- What are associated rights?
- To whom (target groups) might it be useful ('data utility')?
- How data will be managed & preserved (including after the end of the project)

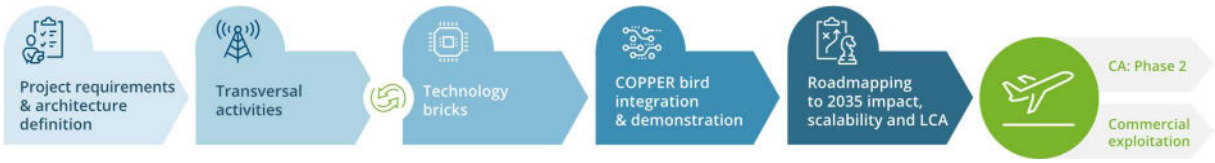

Figure 1: HECATE project outline

Table 1: HECATE open access data.

WP	Description of what data will be collected, processed and/or generated that is interesting in open access
WP1	Relative contribution of each component/sub-system in relation life cycle phases, scalability
WP2	At this stage, no open access data has been identified for the WP2 (primary distribution), this will be updated during the project as required
WP3.1	Architecture of secondary power distribution
WP3.2	Detailed specification of the secondary power distribution system
WP3.3	Modelling and simulation of a digital twin
WP3.4	Control and management of secondary power distribution system
WP3.5	Design and development of the system (electrical and mechanical)
WP3.6	Testing of the secondary distribution system
WP3.7	Sub-system Integration of the secondary distribution system
WP3.8	Predictive health monitoring of the secondary distribution system
WP4.2	Methods for magnetic component optimisation, advances in semiconductor packaging and integration.
WP4.4	Data related to the simulation and performance of the power converter for battery connection to the KHVDC network
WP4.7	Investigation by experimentation of the effect of high voltage in aerospace conditions and the development of test methods and guidelines to support industry.
WP5	Architecture of the global health monitoring (GHM) of a regional aircraft

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WP6	At this stage, no open access data has been identified for the WP6 (design of cable, connector and arc detection system), this will be updated during the project as required
WP7.1	EMI/EMC requirements linked to the architecture of the electrical power distribution network, grounding and bonding, definition of limits and lightning requirements and interaction of parasitic components. EMI (Electromagnetic Interference) related power converter requirements will be collected.
WP7.2	Simulation data of compatibility analysis between HV networks and existing aircraft networks.
WP7.3	Simulation data of arcing and transients in the HV networks.
WP7.4	Definition of protections for grounding and lightning. Simulation data for validation of protections.
WP7.5	Data related with simulations to validate the models including test cases definition and simulation results for reproducibility. Black box converter models will be provided to the consortium, if needed. Executable version of the solvers including the new bidirectional MTLN model will be provided to the consortium, if needed.
WP7.6	Definition of the adaptations or upgrades of the EMI/EMC certification normative and tests. Simulation data supporting those adaptations and upgrades.
WP8.1 &WP8.2 &WP8.3	Design of the DT: architecture of the DR, co-simulation of physical models, AI agent
WP9	At this stage, no open access data has been identified for the WP9 (integration and demonstration), this will be updated during the project as required
WP10.1	Relative contribution of each component/sub-system in relation life cycle phases, scalability
WP10.2	Primary distribution technologies scalability evaluation in the context of TRA-01.
WP10.3	Secondary distribution system scalability evaluation in the context of TRA-01.
WP10.4	Power converters for a high distribution system scalability evaluation in the context of TRA-01.
WP10.5	Life Cycle Assessment for the technologies developed on primary distribution, cables and energy management, in the context of TRA-01.
WP10.6	Life Cycle Assessment (LCA) and Life Cycle Cost (LCC) analysis for the technologies developed in the secondary distribution and power conversion.

Table 2: HECATE open access principles in a nutshell.

Principle	HECATE measure
Will the data to be included in full or partial open access ?	Partial open access will be given to the above data. The data to be classified during the execution in accordance with the principle “as open as possible, as closed as necessary”.
What is the origin of data? Will you re-use any existing data and how?	In general, no background IP will be needed while providing the HECATE open data, and only technologies developed within HECATE will be disclosed. In the event background IP is needed, these datasets will not be made openly available unless a specific agreement is reached. Counter example

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	from WP8: Existing data provided by partners will be re-used to train an agent for Health Monitoring.
What are the methodology and standards (type / format of data) applied?	A DOI/PID will be provided for all the open-access publication/ data in ZENODO. The project related working data (to enable collaboration among partners) will be identifiable and locatable by file names with identifiers such as the project name, the WP number, the specific task and topic and a clear version number in line with the guides defined in the HECATE D11.2 Project and Risk Management Plan. Main dataset extensions are: TXT (PLAIN TEXT), .DOCX (WORD EDITABLE DOCUMENT), .PDF (DOCUMENT), .PPT (POWERPOINT), .CSV(DATASET), .XLSX (DATASET). Other dataset extensions can be: JSON (JavaScript Object Notation), and FMU (Functional Mock-up Interface).
What is the expected size of the data?	Tens of MB and even GB per topic.
What are the means of exploitation / share / access for verification, and re-use? **What are associated rights?**	Open access material will be available for HECATE partners during project execution. Open access data could be used for future research in/outside regional aircraft scope and policy purposes. Scalability report and analysis can be used as input for strategic research agendas and standardization/ regulation bodies (e.g. from WP1, and from WP10).
To whom (target groups) might the data be useful ('data utility')?	: Consortium partners, researchers, industry and SMEs, policy makers and regulation bodies, CAJU stakeholders.
How data will be managed & preserved (including after the end of the project)	The WP working data (to be exchanged among partners) and to be used within consortium scope will be shared using the internal communication platform EMDESK LINK. Any open access data will be published mainly in Zenodo (see 3.1-2)

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2. Open science requirements

2.1. Open access on peer-reviewed scientific publications

According to Annex 5 of the Grant Agreement, each partner must ensure open access, with no restrictions, to all peer-reviewed scientific publications relating to its results.

To meet this requirement, partners must, at the very least, ensure that any scientific peer-reviewed publications can be read online, downloaded and printed. No embargo periods are accepted for self-deposited open access articles.

The dominant type of peer-reviewed scientific publications are journal articles and conference proceedings (full paper). Only publication fees in full open access venues for peer-reviewed scientific publications are eligible for reimbursement.

The Open Access mandate comprises 3 steps:

- Depositing publications in trusted repositories for scientific publications
- Providing open access to them under the appropriate licence (CC BY or a licence with equivalent rights, see Annex 5 of the Grant Agreement)
- Ensure open access - via the repository - to the bibliographic metadata that identify the deposited publication

These steps are detailed in Annex 5 of the Grant Agreement and explained in the Horizon Europe Annotated Model Grant Agreement. Partners must also aim to deposit at the same time of the publication the research data needed to validate the results presented in the deposited scientific publications ('underlying data'), ideally in a data repository (see 2.1).

Partners are strongly encouraged to provide open access to non peer-reviewed scientific publications as well.

2.2. Research data management

Open Access to Research Data refers to the right for third parties to access and re-use digital research data under the terms and conditions set out in the Grant Agreement.

The beneficiaries must manage the digital research data generated in the action responsibly, in line with the FAIR principles (Findable, Accessible, Interoperable and Reusable data) and by taking all of the following actions:

- Establish a Data Management Plan (DMP) (and regularly update it)
- As soon as possible and within the deadlines set out in the DMP, deposit the data in a trusted repository

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- As soon as possible and within the deadlines set out in the DMP, ensure open access — via the repository — to the deposited data, under CC BY, CC 0 or a licence with equivalent rights, following the principle 'as open as possible as closed as necessary'
- Provide information via the repository about any research output or any other tools and instruments needed to re-use or validate the data

The above obligations are further detailed in Annex 5 of the GA.

2.3. Favoured open science policy in HECATE

As explained in 3.2, the main permanent tool for centralised Open Access to research results and data in HECATE is the project's Zenodo Community (https://zenodo.org/communities/hecate/). This chosen repository is fully OpenAIRE agreed, and free of charge. In some cases, the journal's copyright (fees and embargo period) can be overcome by depositing pre- or post-print of the publication. Each author stays responsible, however, for verifying that both the journal editors' and the EC's requirements are respected.

Non-public research data will be archived at the project internal platform EMDESK (https://hecate.emdesk.com) or at the Zenodo repository using a restricted access option (see 3.1).

Any result to be published in HECATE need to go through the review and approval procedure before dissemination, as specified in the Consortium Agreement (article 8.3.1), and in the HECATE D11.2 "Project and Risk Management Plan" sections 4.3 and 4.4 (internal document – see HECATE's EMDESK > WP11).

See also the HECATE public deliverable D11.4 Plan for communication and dissemination of results.

3. FAIR data

3.1. Making data findable, including provisions for metadata

3.1.1. Will data be identified by a persistent identifier?

All open data, publications and open source software produced in HECATE ("open HECATE results") will be identifiable and locatable by means of a persistent identifier (PID) like persistent Uniform Resource Locator (PURL).

When possible, open HECATE results will be assigned a Digital Object Identifier (DOI), in order to make the content easily and uniquely citable. For that, HECATE relies on external

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services, since DOIs can only be assigned by DOI registrants through a DOI registration agency .

Open HECATE results that are deposited in the HECATE default Open Access repository (Zenodo Community, see 3.2) will be assigned a DOI automatically and will benefit also from Zenodo's DOI versioning support. Open HECATE results that are deposited in institutional repositories, repositories of scientific publishers or other data and research repositories will be at least defined by a persistent URL. If the institution is a DOI registrant that has an agreement with a DOI registration agency, a DOI will be assigned, too.

Whether scientific publications will be assigned a unique identifier like DOI, Publisher Item Identifier (PII), International Standard Serial Number (ISSN), etc. depends on the open access strategy chosen by the editors and thus also on the respective scientific publisher and the chosen research repository.

3.1.2. Will rich metadata be provided to allow discovery? What metadata will be created? What disciplinary or general standards will be followed? In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.

Rich metadata significantly improves the data's findability and re-usability. Metadata for describing the data that is collected and generated by the HECATE project is not only needed for facilitating open access to the data, it is also needed when searching or accessing data. There are many different meta-data standards for many different types of data and it may not be possible to find one that fits all purposes. Therefore, a pragmatic and feasible approach is to agree on a common and a minimal metadata scheme for those datasets that are published in public catalogues and data repositories and to use specific supplementary scheme, if necessary.

Default scheme of metadata for open data generated by the project

In general, the minimum and recommended terms of the Zenodo metadata's deposition domain model (http://developers.Zenodo.org/#representation)[1], will be used for open data generated by the project and deposited in an appropriate repository (see 3.2).

For HECATE, the following deposition metadata fields are mandatory:

[1] This model is based on DataCite's metadata schema (https://schema.datacite.org/)

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Table 3: Zenodo metadata fields

Item	Precision
Files	Deposition files identifiers, filenames, size of the files in bytes
Communities	HECATE community: https://zenodo.org/communities/hecate, OpenAIRE of the European Commission
Grant Agreement	HECATE GA 101101961
Upload type	Type of the deposition from a controlled vocabulary (publication, poster, presentation, dataset, image, video/audio, software, lesson, other…).
DOI	Digital Object Identifier assigned by the DOI registrant (e.g. Zenodo), also used for versioning
Publication date	Date of publication in ISO8601 format (YYYY-MM-DD).
Title	Title of the deposition
Contributors / Authors	The names, organisations and ORCID reference of the authors/contributors
Description	Abstract or description for deposition
Version	Version numbering of the document(s)
Language	Language of the document(s) – by default English
Keywords	Free form keywords for this deposition
Access rights	Open access, Embargoed access, Restricted access, Closed access
License	The default license is “Creative Commons Attribution 4.0 International. Additional Open licenses are possible from controlled vocabulary “Open Definition Licenses Service” (see 3.2, 3.3, 3.4).
Related identifiers/ references	Persistent identifiers/ references of related publications, datasets, software,.. (see 3.1)
Other details	Conference venue, internet site,..

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This minimal metadata schema can be extended following the particular technical subject in question.

3.1.3. Will search keywords be provided in the metadata to optimize the possibility for discovery and then potential re-use?

All HECATE open results deposited in a repository will provide search keywords together with their metadata (see 3.1.2). Keywords for open data will be selected from controlled vocabularies that are suitable for the specific type of the data (see 3.3). In addition, the HECATE website (https://hecate-project.eu/) gathers a glossary on the most commonly used keywords, and acronyms.

3.1.4. Will metadata be offered in such a way that it can be harvested and indexed?

Indeed, metadata will be offered in such a way that it can be harvested and indexed. HECATE will use standard formats and standard vocabularies for describing metadata (see 3.1, 3.3) so that the use of standard protocols for harvesting and indexing metadata apply.

3.2. Making data accessible

3.2.1. Repository

Will the data be deposited in a trusted repository?

To ensure that data management procedures are unified and centralised across the project, a common default HECATE Open Access repository for both publications and open data within the project has been created (however, if the owner of the data / publications wants to use also an institutional repository, this repository need to be OpenAIRE-compliant and issue a DOI.

Zenodo

The default repository of the HECATE project is Zenodo (http://www.zenodo.org), where a HECATE project page (Community) has been set up at https://zenodo.org/communities/hecate. Zenodo is an EC-co-funded, multidisciplinary repository, for publications and data. Data is stored in the CERN cloud infrastructure. Zenodo is compliant with the requirements of Horizon Europe, and is connected to OpenAIRE.

The advantages of Zenodo are numerous:

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- The Community permits to centralise all open access diffusion of data, publications, presentations, etc. emerging from HECATE
- It fully satisfies the EC requirement of Open Access of peer-reviewed publications, and research data
- It is easy to use and permanent repository (vs. website that is limited in time). There is no expiration date for the availability of the data.
- It is administrated by L-Up for the project, but all partners can (and need to) update contents (following the agreed procedure)
- It permits to deposit publications but also at the same time required bibliographic metadata, and reseach data linked to the publication (graphs, excel files etc.)
- It permits to automatically assign a DOI for data in any file format (also for presentations, posters etc. asked for EC reporting)
- It is integrated via OpenAIRE into reporting lines of the European Commission. This permits an automatic filling of reporting tables online when HECATE grant agreement is quoted

The procedure for uploads in ZENODO is described in the HECATE's EMDESK > WP11.

For more information: https://www.openaire.eu/zenodo/.

Have you explored appropriate arrangements with the identified repository where your data will be deposited?

Currently, there is no need for such an arrangement. Zenodo is OpenAIRE's recommended "catch-all" repository for projects like HECATE without ready access to an organized data centre.

Does the repository ensure that the data is assigned an identifier? Will the repository resolve the identifier to a digital object?

Indeed, Zenodo permits to automatically assign a DOI for data in any file format. All open data, publications and open source software deposited in the Zenodo repository will use DOI versioning (see 3.1). DOI versioning allows for updating a dataset after it has been published and to cite either a specific version of a dataset or all versions of a dataset.

3.2.2. Data

Will all data be made openly available?

As seen in Table 2, most of the datasets in Table 1 will be put partially available. These restrictions will be based on legal and contractual reasons.

More generally speaking, the following types of data will be excluded from the Open Access requirements:

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Data sets including copyright or needing permissions from third-party

- Processing and combining input data from many different sources may lead to unclear IPR situations regarding the generated output data, therefore such repurposed data can only be made open if any of the underlying data is open, too.

Personal and confidential data

- Datasets referring to the quality and quantity of certain elements at risk, such as people and critical infrastructures, are not open by default as their publication may pose privacy, ethical or security risks.

In multi-beneficiary projects it is also possible for specific beneficiaries to keep their data closed if opening their data goes against their legitimate interests or other constraints as per the Grant Agreement.

Currently, all beneficiaries are bound by the open data requirement of the HECATE Grant Agreement.

If an embargo is applied to give time to publish or seek protection of the intellectual property (e.g. patents), specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.

Research data needed to validate the results of the scientific publications shall be made available as open access at the same time as the publication reminder (after having followed the HECATE standard publication procedure (see EMDESK > WP11).

If an embargo period is imposed by the publisher, the publication and the related data are not made openly accessible until the embargo period has expired. As indicated in 2.3, in some cases, the journal's embargo period can be overcome by depositing pre- or post-print of the publication. Each author stays responsible, however, for verifying that both the journal editors' and the EC's requirements are respected. Information (metadata) about the publication and the related data will be made available at the same time as the publication, regardless of whether an embargo period has been imposed. Details of when the publication and the data will become available will be in included in the metadata as described in 3.1.

The embargo period needed for filed intellectual property (e.g. patents) will be respected.

Will the data be accessible through a free and standardized access protocol?

Regarding the mere access to open data deposited as data files in a data repository, there are no special methods or software tools needed. The files can be downloaded from the data repository via HTTP protocol using a standard web browser. This implies, however,

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that open data that is originally stored in a database or another type of data store, has to be exported ("dumped") to a file before it can be deposited in a repository. Zenodo's repository (see 3.2) application program interfaces (API), DOI versioning and the respective database tools can help to automate this export tasks. Regarding software and tools for offline viewing, interpreting, processing and editing of data files downloaded from the data repository, it heavily depends on the type and format of the data.

If there are restrictions on use, how will access be provided to the data, both during and after the end of the project?

Where a restriction on open access to research data is necessary, attempts will be made to make data available under controlled conditions. In the case where restricted or embargoed data is stored in the Zenodo repository, information about the restricted data will be published in the repository, and details of when the data will become available will be included in the metadata.

Data files and data sets for restricted access records are only visible to their owners and to those the owner grants access. Restricted access allows a researcher to upload a dataset and provide the conditions under which he/she grants access to the data. Researchers wishing to request access must provide a justification for how they fulfil these conditions. The owner of the dataset gets notified for each new request and can decide to either accept or reject the request. If the request is accepted, the requester receives a "secret" link.

How will the identity of the person accessing the data be ascertained?

The identity of the person that intends to gain access to restricted data stored in HECATE's default repository (Zenodo, see 3.1-2) will be ascertained according to the mechanism described in 3.2.

Is there a need for a data access committee (e.g. to evaluate/approve access requests to personal/sensitive data)?

In case there are any issues regarding the restricted access to research results, HECATE's Project Management Committee (PMC) and Steering Committee (SC) can act as data access committee and seek clarification.

3.2.3. Metadata

Will metadata be made openly available and licenced under a public domain dedication CC0, as per the Grant Agreement? If not, please clarify why. Will metadata contain information to enable the user to access the data?

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The license for open data as well as the conditions for access and possible embargo periods are distributed in machine-readable format as part of the metadata (see 3.1). Moreover, the license for open data will be selected from the list of licenses conformant with the principles of the Open Definition (http://opendefinition.org/licenses/).

How long will the data remain available and findable? Will metadata be guaranteed to remain available after data is no longer available?

According to Zenodo's general policies (http://about.zenodo.org/policies/), "Items will be retained for the lifetime of the repository. This is currently the lifetime of the host laboratory, CERN, which has an experimental programme defined for the next 20 years at least." However, the HECATE consortium keeps the liberty to decide otherwise for any economic or other reason.

Will documentation or reference about any software be needed to access or read the data be included? Will it be possible to include the relevant software (e.g. in open source code)?

Documentation of (open source) software needed to access the data and developed by HECATE will be made available either on the HECATE Zenodo Community, on the HECATE website and/or on the respective source code and release repositories.

3.3. Making data interoperable

What data and metadata vocabularies, standards, formats or methodologies will you follow to make your data interoperable to allow data exchange and re-use within and across disciplines?

See Tables 1&2, 3.1and below.

Will you follow community-endorsed interoperability best practices? Which ones?

The following standard vocabularies will be used in the default metadata schema (see 3.1.2) for all types of open data:

- License: Open Definition (http://opendefinition.org/)
- Grants: OpenAIRE (http://api.OpenAIRE.eu/).

The exchange of information involving physical quantities shall be performed using SI units.

In case it is unavoidable that you use uncommon or generate project specific ontologies or vocabularies, will you provide mappings to more commonly used

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ontologies? Will you openly publish the generated ontologies or vocabularies to allow reusing, refining or extending them?

Currently, HECATE does not intend to introduce new project specific ontologies or vocabularies.

Will your data include qualified references[2] to other data (e.g. other data from your project, or datasets from previous research)?

3.4. Increase data re-use

How will you provide documentation needed to validate data analysis and facilitate data re-use (e.g. readme files with information on methodology, codebooks, data cleaning, analyses, variable definitions, units of measurement, etc.)?

File naming will follow as much as possible the documents nomenclature agreed in the D11.2 "Project and Risk Management Plan" (internal document – see HECATE's EMDESK > WP11), and will include at least a short title, the author organisation, a version number and/or a date stamp. Any data modification shall indicate a new version to preserve raw data. In general, data will be accompanied by a README file that describes the directory/subdirectories organization, and any other needed information like data provenance (see below). Subdirectory README files will describe the files contained there and will be updated whenever files are added. Complete references from literature are included in the document.

Will your data be made freely available in the public domain to permit the widest re-use possible? Will your data be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement?

As seen in 1.2 and 2.2.2 the data will be put in partial open access. According to the Grant Agreement (Article 16, Annex 5), data is owned by the beneficiary that generates them. Notwithstanding the above owners of open results arising from the HECATE project are encouraged to release their work under a Creative Commons license, preferably Creative Commons Attribution 4.0 (CC-BY-4.0, http://opendefinition.org/licenses/cc-by/).

Authors of scientific publications arising from the HECATE project are encouraged to seek an agreement with the scientific publisher of the publication that allows the authors to

[2] *A qualified reference is a cross-reference that explains its intent. For example, X is regulator of Y is a much more qualified reference than X is associated with Y, or X see also Y. The goal therefore is to create as many meaningful links as possible between (meta)data resources to enrich the contextual knowledge about the data. (Source: https://www.go-fair.org/fair-principles/i3-metadata-include-qualified-references-metadata/)*

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retain the ownership of the copyright for their work, and to deposit the publication in an Open Access repository.

Will the data produced in the project be useable by third parties, in particular after the end of the project?

Open results produced by the project and deposited in a respective repository are usable by third parties after the end of the project. If confidentiality, security, personal data protection obligations or IPR issues related to specific research data that is needed to validate a scientific publication forbid open access, the data may be deposited with restricted mode and access may be granted upon request and under the conditions of a restricted license (see 3.1).

Will the provenance of the data be thoroughly documented using the appropriate standards?

The data provenance metadata (why and how the data was produced, where and when and by whom) will be thoroughly documented in the README file, or in the core document, using the appropriate standards, ranging from generic to discipline- or topic-specific.

Describe all relevant data quality assurance processes.

Quality assurance concerning accuracy and completeness of metadata will be performed by the actors mentioned in 5.1 according to the quality control procedures described in D11.2 “Project and Risk Management Plan” (internal document – see HECATE’s EMDESK > WP11).

4. Other research outputs

In addition to the management of data, beneficiaries should also consider and plan for the management of other research outputs that may be generated or re-used throughout their projects. Such outputs can be either digital (e.g. software, workflows, protocols, models, etc.) or physical (e.g. new materials, antibodies, reagents, samples, etc.).

Beneficiaries should consider which of the questions pertaining to FAIR data above, can apply to the management of other research outputs, and should strive to provide sufficient detail on how their research outputs will be managed and shared, or made available for re-use, in line with the FAIR principles.

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In general, the same management principles than for data will apply to the other research outputs identified in the D11.5-7 "Plan for the exploitation of results" (internal document – see HECATE's EMDESK > WP11).

5. Allocation of resources

5.1. Costs and responsibilities

What will the costs be for making data or other research outputs FAIR in your project (e.g. direct and indirect costs related to storage, archiving, re-use, security, etc.) ?

No costs are foreseen for storing open results in the project's default repository (Zenodo, see 3.1-2). Any additional costs will be dealt with at partner level, or in PMC/SC level if needed.

How will these be covered? Note that costs related to research data/output management are eligible as part of the Horizon Europe grant (if compliant with the Grant Agreement conditions).

Costs directly related to open access to HECATE research data can be eligible for reimbursement during the duration of the project, upon conditions in the Grant Agreement (Article 17, Annex 5). However, it should be noted that costs for hybrid journals (i.e. journals in which only some of the articles are in open access) are not reimbursable under Horizon Europe.

Who will be responsible for data management in your project?

Data management activities concern the whole project and needs to be coordinated and monitored both at project and work package level. Data management is also linked to publication of project results and thus dissemination activities. Therefore, the following roles and responsibilities can be identified:

The Project Coordinator and the WP11.3 Project Data Management Plan leader CAI is responsible with the help of L-UP for:

- Developing the data management plan and policy for HECATE in conformity with the Horizon Europe Open Access requirements
- Monitoring data management activities in WP1 to WP10 led by work package leaders, including definition, collection and publication etc.
- Providing support, and sending reminders to WP leaders

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- Coordinating the writing the data management plan (D11.3) and updates with the WPleaders coordinating the reporting on the EC F&T Portal linked to Open Research Data and Results
- Providing solutions for specific issues in accordance with project management

The work package leaders are responsible for :

- The implementation of the data management policy in their respective WPs (see also HECATE D11.2 "Project and Risk Management Plan" at HECATE's EMDESK > WP11)
- Monitoring data management activities and deadlines and sending reminders to partners
- Offering customized help and further guidance for filling out any WP data surveys
- Asking partners for missing information or clarifications
- Providing input to the data management plan by analysing and summarising the WP-specific data surveys
- Monitoring that open data is deposited in the default repository Zenodo (or a complementary OpenAIRE-compliant repository) with reference to HECATE, and sending reminders to partners
- Contacting the Project Coordinator and the Project Management Committee/ Steering Committee in case of questions and ethical and privacy issues that may forbid a publication of the data

Regarding Open Access to publications, the WP11.3 leader CAI and Dissemination Manager L-UP are responsible for:

- Offering customized help and further guidance for publishing scientific publications, or other dissemination items
- Offering assistance in Open Access policies
- Monitoring that bibliographic metadata and research data related to a publication are made available in repositories and linked to respective publication, and that a reference to HECATE is made correctly
- Coordinating the reporting on the EC F&T Portal linked to Open Access to publications

Each Partner (=Data / Publication Provider) is responsible for

- Informing the WP leaders & Dissemination manager/L-UP when new open data / publication ready for diffusion are available, and follow the publication procedure agreed in HECATE the Consortium Agreement article 8.3.1.
- Describing the data (by means of appropriate metadata) or publication in accordance with the HECATE data management policy (e.g. according to the chosen metadata standard) and with help of the tools (e.g. template, web form, ...) provided by the project

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- Depositing (publishing into a repository) the data or publication in accordance to the HECATE data management policy and with help of the tools (catalogue, repository, …) provided by the project
- Being responsible for the data or publication follow-up, notably linked to possible embargo periods or restricted access

The designated persons for the roles are listed in D11.2 "Project and Risk Management Plan" (internal document – see HECATE's EMDESK > WP11).

How will long term preservation be ensured? Discuss the necessary resources to accomplish this (costs and potential value, who decides and how, what data will be kept and for how long)?

No immediate costs are anticipated for open data that is stored for long-term preservation in the Zenodo repository. Any additional costs/ needs will be dealt with at partner level, or in PMC/SC level if needed.

6. Data security

6.1. Data security provisions

What provisions are or will be in place for data security (including data recovery as well as secure storage/archiving and transfer of sensitive data)?

The data security measures regarding the open results deposited in the Zenodo repository (see 3.1-2) are detailed in the link: http://about.zenodo.org/infrastructure/.

Will the data be safely stored in trusted repositories for long term preservation and curation?

Open results deposited in the Zenodo repository are safely stored for long time preservation, see : http://about.zenodo.org/infrastructure/.

7. Ethics

7.1. Ethical provisions

Are there, or could there be, any ethics or legal issues that can have an impact on data sharing? These can also be discussed in the context of the ethics review. If

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relevant, include references to ethics deliverables and ethics chapter in the Description of the Action (DoA).

Ethics clearance was obtained during the Grant Preparation Phase for HECATE, and currently there is no particular ethical issues detected for HECATE that would have an impact on data sharing. Any ethical and legal issues are covered and will be managed in compliance with the provisions of Grant Agreement, Consortium Agreement, and the Cooperation Agreement (see HECATE's EMDESK > Contractual information).

Will informed consent for data sharing and long term preservation be included in questionnaires dealing with personal data?

In order to protect the values, rights and interests of the research participants, privacy procedures are put in place in HECATE for the free and fully informed consent of the participants – notably related to the use of images, to the possibly interviews data on the website, etc. The website policy will be included in the project website (as soon as released) at the address: https://hecate-project.eu/.

8. Other issues

8.1. Any other issues

Do you, or will you, make use of other national/funder/sectorial/departmental procedures for data management? If yes, which ones (please list and briefly describe them)?

Currently, the project does not make use of procedures for data management other than those described in this data management policy.

Note: *Public/governmental institutions and other HECATE partners may have their own obligations / policies for data management, but in the project (for data collected and produced by the project) we currently only follow the EC procedure (guidelines on FAIR data management ….).*

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9. Conclusions

The Data Management Plan (D11.3: DMP) of the HECATE project introduces a detailed data management policy in line with Horizon Europe open data requirements and guidelines on FAIR (Findable, Accessible, Interoperable and Reusable) data management.

The FAIR policy defines comprehensible and easy to follow administrative and technical procedures and clear responsibilities for embedding data management activities in the complete project lifecycle. HECATE's DMP relies on state-of-the-art technical solutions and standards like Digital Object Identifiers, the OpenAIRE initiative and the Zenodo research data repository / metadata definition for the implementation of these procedures in the project. This will ensure that the results of the HECATE project, including open data, open science publications and open source software, are preserved and stay accessible and usable after the end of the project.

The DMP furthermore summarises the anticipated results of the ongoing HECATE data survey from all technical workpackages and thus provides an overview on the open data that is collected, processed or generated following the methodology and standards set out in the data management policy.

Any updates in the Open Science aspects of the project will be given in the periodic reporting of HECATE project at M6, 12, 24 and 36 of the project.

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