



REED

Responsive and Reconfigurable value network for the manufacture of bulky parts

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Deliverable 2.1 Data Management Plan

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Type		
R	Document, report excluding the periodic and final reports	
DMP	Data Management Plan	X
DEM	Demonstrator, pilot, prototype	
OTHER	Software, technical diagram, etc.	
Dissemination level		
PU	PUBLIC Information	X
SEN	SENSITIVE, restricted under conditions set out in Model Grant Agreement	

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Glossary

Table 1. Glossary

Abbreviation / Acronym	Meaning
CA	Consortium Agreement
D	Deliverable
DOI	Digital Object Identifier
DMP	Data management plan
FAIR	Findable, Accessible, Interoperable and Reusable
GA	Grant Agreement
GDPR	General Data Protection Regulation
IDSA	International Data Spaces Association
IPR	Intellectual Property Rights
ISO	International Standard Organisation
JSON	JavaScript Object Notation
MaaS	Manufacturing as a Service
MDS	Manufacturing Data Space
REED	REsponsive and REconfigurable value network for the manufacture of bulky parts
WP	Work Package
XML	eXtensible Markup Language

1. Executive Summary

Executive Factsheet

Who should read this deliverable? Who are the stakeholders concerned by this deliverable? (distinguish different types of organisations, roles in organisations and interest focus)	Why should s/he read this deliverable? What will s/he learn from this deliverable?	Which part of the content is most relevant for him / her?
All the partners in the REED project consortium	An overview of the data collected in the project, detailing how it is processed, stored, and made accessible	All
External Audiences	Insights into quality and MaaS activities, research topics, and an overview of data collection, access, and sorting	Data Management section

Executive Summary

In the context of REED project, in line with the European data strategy, we **define a Data Management Plan (DMP) to manage the data collected, processed and generated by the project.** Contributing to appropriate data management throughout the project is the aim of REED's DMP. It explains what data will be produced by the project, how datasets will be handled and stored, if and how they can be utilised or made available for reuse and verification, and how they will be curated and maintained. The DMP has been defined early, by month 4, and documented in this Deliverable D2.1.

The objective of the DMP is to guarantee the data sharing functionalities for all stakeholders while managing the data under the **FAIR principles**: the digital assets must be **F**indable, **A**ccessible, **I**nteroperable and **R**eusable. One of the main work packages in REED is WP5, which ensures data is not only collected, exploited and shared correctly between stakeholders in a secure and reliable way, but also made accessible as a service to generate strategic value through the REED platform. Assuring that data on the REED platform is transferred in a regulated way to maintain data owner autonomy and agency over data, this DMP will be continuously updated to be in line with the work in WP5 on how to use the standardised framework provided by the IDSA and GAIA-X for secure and sovereign data sharing.

The REED's DMP is a public, live document that is evolving throughout the REED project duration. During the project the DMP will be **continuously updated** in case any change occurs in the consortium policies, and by the end of the project duration the final version of the DMP will be released.

2. Introduction

The purpose of REED's Data Management Plan (DMP) is to contribute to good data handling during the project. It describes what data the project will generate, storing and handling of datasets, whether and how it will be exploited or made accessible for verification and reuse, and how it will be curated and preserved. We develop REED's DMP based on the requirements of REED as well as by following the requirements and suggestions of the Guidelines on Data Management in Horizon Europe projects that are provided in the template "Horizon Europe Data Management Plan"¹ (1).

2.1 Intended readership

The DMP is made firstly for internal use, as well as publicly available to external audiences.

Internal Use:

- All participants in the REED project who are responsible for or involved in data collection and handling can refer to this document for guidelines on data handling, storage, and processing.
- This document provides an overview of the data collected in the project, detailing how it is processed, stored, and made accessible.

External Audiences:

- The Data Management section is available to all relevant stakeholders interested in product and manufacturing process data between stakeholders and the Manufacturing as a Service (MaaS) platform in the REED project.
- It offers insights into quality and MaaS activities, research topics, and an overview of data collection, access, and sorting.
- Guidance on reusing data in other activities will be provided at the project's conclusion.
- The document also addresses ethics and security issues, including intellectual property rights (IPR).

2.2 Relationship to the other project outcomes

This document is the first release of the DMP for the REED project. The DMP provides the key data management aspects of all the data used in the project, compliance with GDPR (2) and the FAIRness principles (3). This is a live document that is evolving throughout the project. The final version of this document will be released by the end of the project in Deliverable D5.2 – Revised Data Management Plan.

We also would like to highlight the relationship between this document and D5.5 – REED Data Space Design that reports on how to ensure that data is not only collected, exploited and shared correctly between stakeholders in a secure and reliable way, but is also made accessible as a service to generate strategic value through the REED platform. This DMP will be aligned with the work reported in D5.5 on how to leverage the standardised framework provided by the IDSA and GAIA-X for secure and sovereign data

¹ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/temp-form/report/data-management-plan_he_en.docx

sharing, ensuring that data on the REED platform is exchanged in a controlled manner to ensure data owner's autonomy and agency over data.

2.3 Structure of this document

This document has the following structure:

- Section 2: Introduction

Describes the main purpose, structure, and intended readership of the Data Management Plan (DMP), as well as its relationship to project deliverables.

- Section 3: Data description

Provides details on the types, formats, origins, and metadata provisions of the research data generated in the REED project.

- Section 4: Technical information

Describes data types, size of data, data format, sources and methods for data collection.

- Section 5: Data Management

Explains how the project adheres to the data management principles outlined in the Horizon Europe framework. Outlines the resources allocated to making as much data as possible openly accessible.

- Section 6: Data Sharing

Gives some main aspects of data sharing in the project.

- Section 7: Data Security

Offers a detailed description of data security arrangements, addressing requirements for confidentiality, integrity, and availability.

- Section 8: Ethical and legal aspects

Discusses the ethical aspects related to data management, including compliance with relevant ethical standards.

- Section 9: Conclusions

Concludes the key points of this document.

3. Data description

This Data Management Plan (DMP) provides the description of data used in the whole project, that can help the internal users and external audiences to answer their questions such as:

1. What is the purpose of the data collection/generation and its relation to the objectives of the project?
2. What types and formats of data will the project generate/collect?
3. Will you re-use any existing data and how?
4. What is the origin of the data?

5. What is the expected size of the data?

3.1 Purpose of data collection

The REED project will work according to the principles of FAIR data (Findable, Accessible, Interoperable and Reusable). The project will collect and generate new research data while also use existing datasets.

The purposes for collecting or generating data are:

- Make assessments and learning easier.
- Assessing outcomes, technology, and solutions
- Verifying the outcome, technology, or solution
- Getting input to enhance outcomes, technology, or solutions.
 - Boost user approval.
 - Promote a change in behaviour.

Only the information required for the action of collecting or generating data and its activities has been gathered and kept on files. Personal information has only been requested in agreements and to grant access to tools, and it is kept in accordance with GDPR requirements.

Results dissemination and free access raise awareness of EU funding and the project's valid outcomes. IPR and background are protected by the Consortium Agreement (CA).

3.2 Data

In REED we expect to create/generate the following types of data:

- Technical data
- Measurement data
- Simulation data
- Interviews
- Others, if necessary.

We keep this on an aggregated level in the first version of the DMP and add more detailed description in later versions.

3.3 Metadata

The metadata contains the key information that is needed to be able to reuse data sets from the project. Each data component's owners should be sure of adhering to the correct naming and tagging rules so that the corresponding metadata information may be readily stored, extracted, and referred to for all project-related data handling and utilisation needs. Metadata of deposited data must be open under a Creative Commons Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (see Section 5, in particular machine-actionable) and provide information at least about the following:

- a) datasets (description, date of deposit, author(s) and embargo)
- b) Horizon Europe funding
- c) grant project name, acronym and number
- d) licensing terms
- e) persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organisations and the grant

Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

Data interoperability within the project will be enabled and maximised by using well-established and appropriate data/file name conventions, file tagging, and advanced search capabilities.

These metadata will be provided for each data set:

- Grant project name
- Project ID (Project code)
- Horizon Europe funding
- Data Owner
- File name
- Version
- WP number
- File type
- Date/time
- Dissemination level
- Keyword
- Language
- Licensing term(s), if any
- Persistent identifier(s), if any

The Metadata schema will be stored as a SharePoint list or Excel workbook.

3.4 Data utility

Data from this project could be useful for firstly internal usage and secondly external audiences of interest as described in Section 2.1.

4. Technical information

4.1 Data types and collection period

The project has various types of data:

- Data gathered manually (from questionnaires and interview surveys)
- Data that is automatically gathered (from software/applications)
- Contact details (both inside project repository and external stakeholders/participants in workshops, pilots, and assessment activities, for example)
- Pre-existing data from sources such as databases, literature reviews, and statistics

Datasets are arranged based on their kind and content. Some of the information gathered is categorised as personal information, including participant names, IP addresses, and residences, must be kept private with the right access level. Prior to being made public, this data—which is particularly relevant to interviews, surveys, and questionnaires—must be irrevocably anonymised.

Data that had to be kept private must only be handled by the project's coordinator and data controllers alone. The coordinator evaluated if a partner lacked a Data Controller and required access to handle personal data (Data Processor); if approved, a special Data Processing Agreement to be established

between the partner and the sought access. Even while non-anonymous data is not publicly disclosed within the project or outside of it, it can nevertheless influence publications and deliverables. The only information released to the public will be anonymised data or an analysis of the aggregated data that does not include any information that may be used to identify specific participants.

4.2 Size of data

Although the quantity of the data varies from case to case, it is typically moderate and shouldn't pose any problems in terms of processing or storage capacity.

- Less than 1GB
- 1 GB – 100 GB
- 100 GB – 1 TB
- 1 TB – 100 TB
- More than 100 TB

Comprehensive dataset and accessibility listings will be updated in this document during the project. Depending on the size of each dataset classified in the size groups above, we will define a suitable storage and processing solution.

4.3 Format

The project has only been using widely accepted format for data generation.

- Documents/Reports/Publications: .PDF/A, txt, doc/docx, .hfm, .tex
- Spreadsheets: .xls/.xlsx
- Databases: .cvs, .sql
- Webpage: .html
- Pictures: jpg, png
- Video: avi
- 3D point cloud and mesh data: .ply, .stl, .pcd
- Models: .json, .mat

Various formats are frequently included in datasets. An example of this would be a manually gathered dataset on user approval, which may include survey results, audio recordings of interviews, written interview notes, and images from trial locations. In many situations, only portions of a dataset may be made publicly available because some of this data—such as audio recordings and interview transcripts in local languages—cannot be anonymised within the scope of the project.

4.4 Sources and methods for data collection

Data will be collected/generated by, for example:

- Tests in laboratory
- Measurements
- Datasets from project partners/client
- Direct access to project partners/client's internal systems/platforms
- Interviews
- Case studies

Depending on the kind of data, different procedures, and the source of the data from each partner site, we further categorise the methods for data collection as manual or automatic as follows..

- The primary sources of manually gathered data will be:
 - Literature review, analysis, test, and research datasets (repurposing preexisting data), measurements
 - Stakeholder input during workshops, interviews, case studies.

- The primary sources of automatically gathered data will be:
 - Recorded seminars and team meetings
 - Applications in systems/platforms that participants willingly utilise for the project.

5. Data management

The following roles and duties were developed by REED to guarantee adherence to all the data management guidelines and concepts that were outlined in the early project stages:

- WP leaders monitor the DMP guidelines' implementation in the work packages under their supervision.
- Each partner's project manager/main contact oversees the DMP activities pertaining to the tasks and deliverables that their organisation is engaged in and serves as a resource for the partner team if DMP-related issues arise.
- Data owners, who are ultimately in charge of making sure that the REED DMP's details and the applicable GPDR regulations are followed.

SINTEF is responsible for monitoring and ensuring consortium adherence to the project's DMP. The project manager and each partner's main contact make sure that all project staff have read the DMP and are following and practicing all the guidelines outlined in it.

REED will follow the Horizon Europe Programme Guide, especially regarding Open science in Horizon Europe (4): "Horizon Europe moves beyond open access to open science for which it features a comprehensive policy implemented from the proposal stage to project reporting". As soon as possible and within the deadlines set out in each WP, ensure open access —via the repository— to the deposited data, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence/dedication with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would in particular:

- be against the beneficiary's legitimate interests, including regarding commercial exploitation, or
- be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under this Agreement; if open access is not provided (to some or all data), this must be justified.

Provide information via the repository about any research output or any other tools and instruments needed to re-use or validate the data.

In accordance with the guidelines outlined in the project's DMP and Communication and Dissemination strategies, all REED publications must be accessible to the public and the larger research community while guaranteeing the preservation of the project's intellectual property and confidential company data. Since all pertinent uploads are connected to the European Commission Funded Research (OpenAIRE) community for optimal findability, the REED project has established and maintained an account (i.e., community) at the Zenodo public file repository (see Figure 2). Finally, all content posted to the REED community on Zenodo is protected by Creative Common licenses, which allow anybody to reuse it without any limitations if they provide credit to the original author.

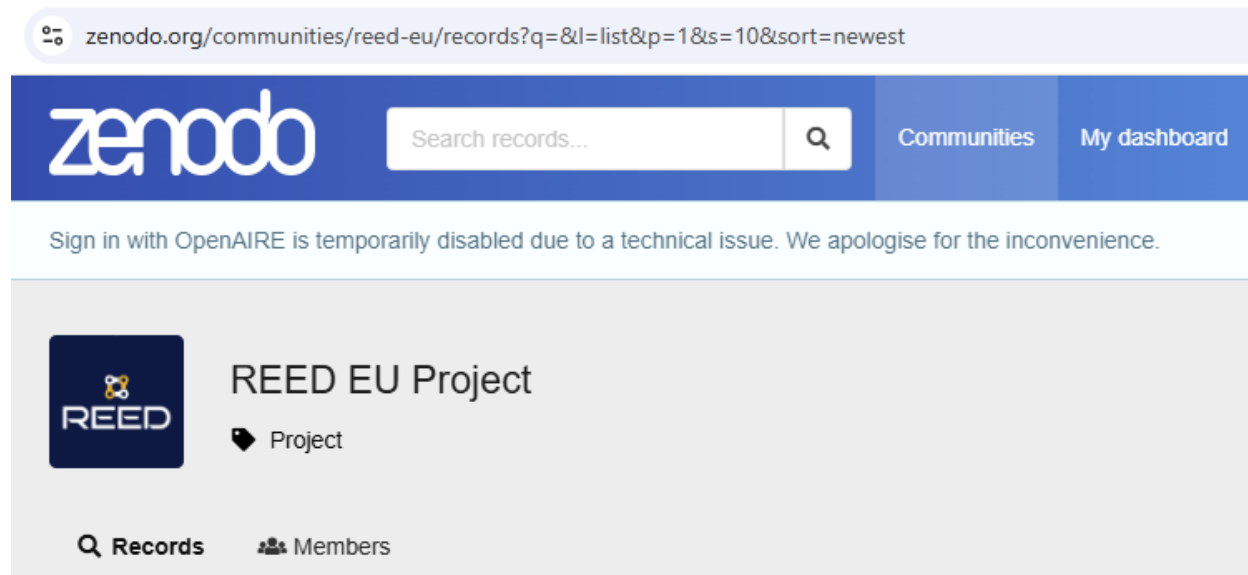


Figure 2. REED EU Project Community in Zenodo

According to Zenodo General Policies, Zenodo has a 20-year lifespan⁴, and items deposited at REED Zenodo community will be kept for their lifetime. It should be mentioned that non-confidential data is utilised to create publications, advertising materials, and other public deliverables that are distributed and shared with specific Zenodo communities or stakeholder groups. Lastly, by taking this step, the project complies with the concepts of discoverability, accessibility, and availability after the project is over and accomplishes sustainable archiving and knowledge management.

Anyone may access REED Community in Zenodo and its data collection by clicking on this link.

<https://zenodo.org/communities/reed-eu>

A new record can be added to the REED community collection using this link.

<https://zenodo.org/deposit/new?c=reed-eu>

⁴ <https://about.zenodo.org/policies/#:~:text=Retention%20period%3A%20Items%20will%20be,next%20%20years%20at%20least>

Uploads must have a direct connection to the REED project that was supported by grant agreement ID 101178405.

5.1.2 Metadata in Zenodo

Metadata associated with each published data set in Zenodo is by default be as follows:

- Digital Object Identifiers
- Version numbers
- Bibliographic information
- Keywords
- Abstract/description
- Associated project and community
- Associated publications and reports
- Grant information
- Access and licensing info
- Language

In addition, we add the project name and GA number.

5.1.3 Versioning and Digital Object Identifiers (DOI)

Standard Zenodo information, such as the Grant Number and Project Acronym, are included to every upload. To make it easier to locate and reuse data, Zenodo offers version control and gives each submitted item a Digital Object Identifier (DOI).

5.1.4 Naming conventions

Data sets will be named using the following naming convention:

Project code_Project acronym_Descriptive text_Unique data number

- Example: 101178405_REED_Measurement_data_027

5.2 Making data accessible

The use of Zenodo, an open access and free repository hosted at CERN's servers, and the European Open Science Cloud will guarantee the **accessibility** of the research data by downstream or ongoing investigations. When the data sharing involves any ethical or legal issue, dataset anonymisation through AMNESIA service will be applied. The use of FAIR Data Point will permit potential external groups access to the shared data and retrieve information.

The list of datasets is going to be created and updated during the project. For each dataset, the DMP will provide the detailed information on its accessibility.

The REED project is using Teams with connection to SharePoint as project repository and platform storing. Throughout the project, this has also served as the online collaborative space. Every partner had access, and it was their duty to submit the datasets they had created or gathered over the project.

Every dataset will be uploaded to a specific research data folder on the SharePoint site and listed in a list that gives a summary of all the datasets used in the project. Case-by-case, confidential information will be kept apart.

Standard Share Point version control will be used for all datasets, and access control may be used to grant restricted access to certain data types. Special data set provided by Tech Provider's has been handled directly by the provider and EC.

5.3 Making data interoperable

Data are presented in broadly recognized standard formats, vocabularies, and languages to be interoperable. The REED project places great importance on the **interoperability** of data and research findings. Therefore, REED will ensure that the data and research outputs adhere to the Gaia-X⁵ and International Data Spaces Association (IDSA)⁶ architecture principles and technical standards. In addition, widely used formats such as JSON and XML will be used to make the data machine readable and easily convertible to human-readable form. For sensor data, an open-source Universal File Format such as Open Sensor Format (OSF)⁷, or Unisens (5) will be used to ensure interoperability. To exchange product and manufacturing process data between stakeholders and the MaaS platform, the ISO 10303 standard (STEP format) (6) will be used, while the open-standard DXF format will be used for sharing complementary 2D part drawings. Finally, ISO 13399 standard (7) will be followed for cutting tool information exchange between the stakeholders in the platform.

5.4 Reusable data

Regarding the **reusability** of data/research outputs, REED will provide documentation and tools for data generation, validation, interpretation, and re-use, with ensuring data quality (8–12). Zenodo's lifetime is guaranteed for at least 20 years, ensuring the long-term care of the data. To maximise the exploitation of the data, it will be referenced to project's dissemination actions and vice versa. The data generated during the demonstration phase may not be available due to confidentiality considerations of the real manufactured parts.

Regarding scientific publications, open access requires that every recipient guarantee free online access to all peer-reviewed publications pertaining to the findings of scientific research projects. The goal of REED is to give interested parties free access. Every article or paper that presents the project's findings should be published with open access in journals and conference proceedings and the preprint version must be posted to Zenodo and the project's website.

The EU symbol must be included with the following statement in any article or publication summarising the project's findings: “The research leading to these results has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No 101178405.”

⁵ <https://gaia-x.eu/>

⁶ <https://internationaldataspaces.org/>

⁷ <https://static.ouster.dev/sdk-docs/reference/osf.html>

5.5 Data storage and back-up routines

AYESA SharePoint is the working/collaboration area for the REED project. A dedicated folder for research data sets will be established.

Documents and elements in AYESA SharePoint sites are stored in Microsoft's cloud solutions - in Ireland and the Netherlands. There is no use of data centres in the US or outside EU/EEA (Norway, Iceland or Switzerland).

6. Preservation and sharing of data

6.1 Value of data

Datasets, if any, containing personal data must be anonymized before the end of the project.

Datasets that contain anonymized data from the partners in REED have generic value and can be taken care of beyond the normal storage time of the project.

6.2 Data sharing

Research data classified as unrestricted/public will be shared as early as possible. Data sets underlying scientific publications will be uploaded and made available at the latest by the publication date.

Data classified as restricted/internal will not be shared due to commercial or IPR reasons. These will be stored in data owner's infrastructure.

Due to the sensitivity of industrial data in REED, several lines of policy defences will be considered, i.e., definition of usage policies on data assets, contract policies on data contract (e.g., 13–15), and access policies on data catalogue. The DMP will serve as a basis for formulating shared policies. Then, the DMP will be updated in the light of the results of this work.

Later versions of this DMP will give detailed information on the classification of each dataset.

Persistent identifiers:

Datasets underlying scientific publications will be uploaded to REED's Zenodo account and assigned a DOI (Digital Object Identifier), ensuring the sustainable archiving of them. Datasets will also be equipped with standard metadata. Datasets will be linked to the publications using the DOI.

Sharing licences:

Research data classified as public will have standardized licenses regulating access, reuse, and further distribution. REED uses the [Creative Commons licences](#) (CC licences). The default licence will be CC BY, but other, more restrictive licences could be used. This will be considered for each shared data set.

Reuse of data:

Metadata and datasets are available through a web interface and if applicable, REST API.

Metadata is made available as JSON objects, and in the future, export to various standard export formats, like Zenodo, will be offered.

6.3 Allocation of resources

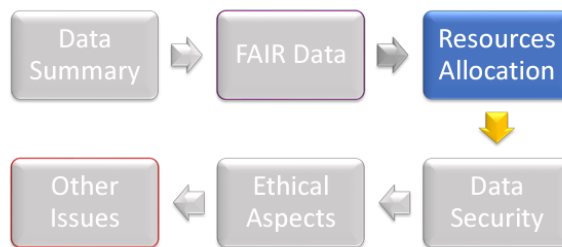


Figure 3. Resources Allocation

The project uses standard tools and partners' data platforms such as SharePoint. Some storage costs may incur. REED does not allocate any budget resources specifically for the data management. WPs include all relevant budget resources, such as the technical effort, management of the WP, as well as management of the related data. Data management is covered by project funds.

7. Data Security

In this section, we answer the data security questions such as: What provisions are in place for data security (including data recovery as well as secure storage and transfer of sensitive data)?

7.1 Access control and data security

All REED beneficiaries strictly follow the specific rules in ANNEX 5 of the Grant Agreement (GA) regarding CONFIDENTIALITY AND SECURITY (— ARTICLE 13).

The REED SharePoint site has these security settings:

- Access level: Organisation/Institute/Department/Restricted to persons (project members only)
- Encryption with SSL/TLS protects data transfer between partners and AYESA SharePoint site
- Threat management, security monitoring, and file-/data integrity prevents or registers possible manipulation of data

7.2 Data management and security

Due to the sensitivity of industrial data in REED, several lines of policy defences will be considered, i.e., definition of usage policies on data assets, contract policies on data contract, and access policies on data catalogue. The DMP developed in WP2 will serve as a basis for formulating shared policies. Once all design decisions are made, functional elements for implementation will be planned. The components of IDS / GAIA-X, such as connectors, identity provider, clearing house or broker, app provider, etc. to be used and their corresponding configuration will be defined and used to design a reference architecture to share information within the REED platform. Finally, the DMP will be updated in the light of the results of this work.

REED will draw from Manufacturing Data Space (MDS) to ensure secure, controlled data sharing in the MaaS platform, leveraging the IDS framework (T5.4). This will involve developing secure data connectors

and fostering distributed data management and interoperability. Training resources will also be provided to supporting stakeholders in using these tools, with a comprehensive DMP guiding policy and standard formulation for secure data handling within and beyond REED platform.

8. Ethical and legal aspects

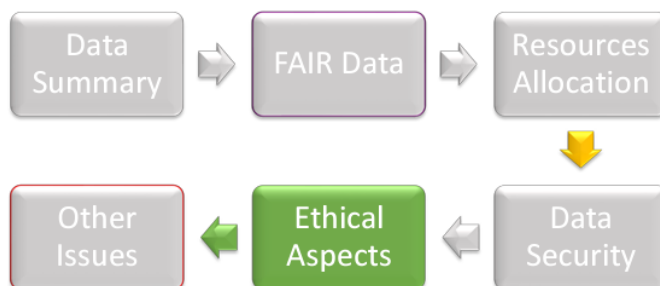


Figure 4. Ethical Aspects

This section helps answering questions such as: Are there any ethical or legal issues that can have an impact on data sharing? Is informed consent for data sharing and long-term preservation included in questionnaires dealing with personal data?

8.1 Ethical aspects

All REED beneficiaries strictly follow the specific rules in ANNEX 5 of the Grant Agreement (GA) regarding ETHICS (— ARTICLE 14) Ethics and research integrity. “*The beneficiaries must carry out the action in compliance with:*

- *ethical principles (including the highest standards of research integrity)*

and

- *applicable EU, international and national law, including the EU Charter of Fundamental Rights and the European Convention for the Protection of Human Rights and Fundamental Freedoms and its Supplementary Protocols.”*

In addition to being processed and handled securely and in compliance with the relevant privacy and data protection laws and regulations mentioned above, it is presumed that the data collected from project stakeholders has been carried out in compliance with applicable ethical standards and requirements in the countries in which the data was collected. For example, SINTEF has its own research ethics guideline⁸ and follows the research ethics guidelines prepared by the national research ethics committees⁹. Regarding scientific publication, SINTEF also follows the Vancouver recommendations, which are guidelines for authorship.

⁸ <https://www.sintef.no/en/sintef-group/ethics>

⁹ <https://www.forskningsetikk.no/en/guidelines/science-and-technology/guidelines-for-research-ethics-in-science-and-technology/>

8.2 IPR

IPR issues will be regulated by the REED project Consortium Agreement (CA).

8.3 Confidentiality

All REED beneficiaries strictly follow the specific rules in ANNEX 5 of the Grant Agreement (GA) regarding CONFIDENTIALITY AND SECURITY (— ARTICLE 13). Confidentiality is also regulated by the REED project agreement framework (CA). The REED project follows the principle: "As open as possible, as closed as necessary". The project aims to maximize access and reuse of research data generated by the project. At the same time, there are datasets generated in this project that cannot be shared due to commercial or IPR reasons.

9. Conclusions

In compliance with EC regulations and industry best practices, REED created and maintained a DMP reported in this deliverable. Our use of FAIR data management principles—which guarantee that data is Findable, Accessible, Interoperable, and Reusable—is covered in the DMP. REED chose Zenodo as a public research repository to meet these criteria. Through Zenodo, REED also provides access to datasets and project software. Because it is regarded as one of the most robust, well-supported, and well publicised data repositories for project results, the Zenodo public research repository was selected.

During the project, this DMP functions as a data inventory, listing all the data that the project created, processed, and gathered. Assuring that data on the REED platform is transferred in a regulated way to maintain data owner autonomy and agency over data, this DMP will be continuously updated to be in line with the work in WP5 on how to use the standardised framework provided by the IDSA and GAIA-X for secure and sovereign data sharing.

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