HYBRID-ELECTRIC REGIONAL FUSELAGE & EMPENNAGES

101140567- HORIZON-JU-Clean-Aviation-2023-01

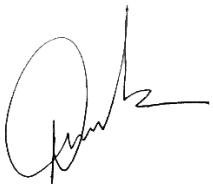
DOC TITLE

D1.2-3 – Data Management Plan

Project Name	HERFUSE – Hybrid-Electric Regional FUSelage & Empennages
Contract Number	Grant Agreement -101140567
Topic	HORIZON-JU-CLEAN-AVIATION-2023-02-HER-01
Start | Duration	01 Jan 2024 | 36 months
Project Coordinator	LEONARDO S.p.A
HERFUSE Website	www.herfuse.eu
Document Title	Data Management Plan
Version / Status	Final
Beneficiary (Organization)	EASN-TIS
Document Contractual Date of Delivery	30/06/2024
Document Actual Date of Delivery	03/07/2024
Document Number (according to Sygma: type-wp-sequence-revision)	HERFUSE-D9_R01
Document Type	Deliverable
Dissemination Level	PU

CLEAN AVIATION
Co-funded by the European Union

Co-Funded by the European Union, under Grant Agreement No 101140567.
Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Clean Aviation Joint Undertaking. Neither the European Union nor Clean Aviation JU can be held responsible for them.

	Name	Organization/Role	Signature
Author	Niki Iatrou	EASN-TIS / Dissemination and communication manager	
Approval Authority	Giovanni Di Lorenzo	LDO / WP Leader	
Coordinator (GAM-Art.7)	Vittorio Caiazzo	LDO / Project Coordinator	

This document reflects only the authors' view and the Commission is not responsible for any use that may be made of the information it contains

© Copyright – HERFUSE consortium

Document Concurrence

NO.	Name	Organization/Role
1	-	-

Contributing Beneficiaries

NO.	Organization
1	AIRBUS DEFENCE AND SPACE SA (ADS-S)

Electronic file details

Master file location:	https://projectsworkspace.eu/sites/HERFUSE/SitePages/Home.aspx
Filename:	HERFUSE-D9_R01.*docx*

Document description

Data Management Plan (DMP)

Abstract

HERFUSE (Hybrid-Electric Regional FUSelage & Empennages) aims to design innovative fuselage and empennages for future Hybrid-Electric Regional aircraft (HER) to reduce Green House Gases (GHG) emissions.

This deliverable underscores the strategies and practices for effectively managing research data within the Clean Aviation research proposal context. Through meticulous data management and adherence to established protocols, the project aims to ensure that all research data is handled with precision, facilitating seamless sharing and utilization to support the project's ambitious objectives. The project aspires to achieve groundbreaking advancements in aircraft performance, aligned with the 2035 Entry-into-Service (EIS) timeline, by addressing regulatory challenges and delivering innovative solutions.

The FAIR principles—Findable, Accessible, Interoperable, and Reusable—provide a structured approach to ensure effective data management, facilitating ease of sharing and utilization. The HERFUSE Data Management Plan (DMP) aims to adhere to these principles by establishing clear

guidelines for data usage, storage, and sharing within the project. Additionally, the DMP will detail procedures for data documentation and metadata creation to enhance the discoverability and usability of the collected data.

Keywords
Data management, FAIR principles, Open Science, DMP

Revision History

Version	Date	Author	Organization	Description
01	17-6-2024	Niki Iatrou	EASN-TIS	Dissemination and Communication Specialist
02	19-6-2024	Di Lorenzo Giovanni	LEONARDO	Clean Sky Project and Civil Projects Innovation & Research
1_final	19-6-2024	Niki Iatrou	EASN-TIS	Dissemination and Communication Specialist

Distribution List

No	Organization Name	Short name
1	LEONARDO - SOCIETA PER AZIONI	LDO
2	AIRBUS HELICOPTERS ESPANA SA	AHE
3	AIRBUS DEFENCE AND SPACE SA	ADS-S
4	AIRBUS DEFENCE AND SPACE GMBH	ADS-G
5	EASN TECHNOLOGY INNOVATION SERVICES BVBA	EASN-TIS
6	PANEPISTIMIO PATRON	UPATRAS
7	MARE ENGINEERING GROUP SPA	MARE
8	AEROSOFT	AEROSOFT-SPA
9	CEIIA - CENTRO DE ENGENHARIA E DESENVOLVIMENTO (ASSOCIACAO)	CEIIA
10	ASCO INDUSTRIES N.V.	ASCO

11	DESA SRL	DESA
12	C.I.R.A. CENTRO ITALIANO RICERCHE AEROSPAZIALI SCPA	C.I.R.A.
13	FUNDACION AITIIP	AITIIP
14	FUNDACION CENTRO DE TECNOLOGIAS AERONAUTICAS	CTA
15	FUNDACION ANDALUZA PARA EL DESARROLLO AEROESPACIAL	FADA-CATEC
16	IDEC, INGENERIA Y DESARROLLOS DE COMPOSITES SL	IDEC,
17	INSTITUTO DE SOLDADURA E QUALIDADE	ISQ
18	SIEC BADAWCZA LUKASIEWICZ INSTYTUTLOTNICTWA	ILOT
19	IDEKO S COOP	IDEKO
20	DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV	DLR
21	AERNNOVA AEROSPACE SA	ANN
22	AERNNOVA AEROSPACE SA	ANN
23	AERNNOVA ENGINEERING DIVISION SAU	AED
24	INSTITUTO NACIONAL DE TECNICA AEROESPACIAL ESTEBAN TERRADAS	INTA
25	UNIVERSIDAD POLITECNICA DE MADRID	UPM
26	AIRBUS ATLANTIC	AAT
27	MECANIZADOS VITORIA SA	MVI
28	FUNDACION PARA LA INVESTIGACION, DESARROLLO Y APLICACION DE MATERIALES COMPUESTOS	FIDAMC
29	CT INGENIEROS AERONAUTICOS DE AUTOMOCION E INDUSTRIALES SL	CT INGENIEROS
30	CSEM CENTRE SUISSE D'ELECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMEN	CSEM

Table of Acronyms and Abbreviations

Acronym/Abbreviation	Description / Meaning
CAJU	Clean Aviation Joint Undertaking
DMP	Data Management Plan
FAIR	Findable, Accessible, Interoperable, and Reusable
IPR	Intellectual Property Rights
TRL	Technology Readiness Level
WP	Work package
EU	European Union
OA	Open Access

Disclaimers

The project is supported by the Clean Aviation Joint Undertaking and its members.

Clean Aviation is the EU's leading research and innovation program for transforming aviation towards a sustainable and climate-neutral future.

As a European public-private partnership, Clean Aviation pushes aeronautical science beyond the limits of imagination by creating new technologies that will significantly reduce aviation's impact on the planet, enabling future generations to enjoy the social and economic benefits of air travel far into the future.

Visit the website to find out more about Clean Aviation: www.clean-aviation.eu

Funded by the European Union, under Grant Agreement No 101140567. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Clean Aviation Joint Undertaking. Neither the European Union nor Clean Aviation JU can be held responsible for them.

Copyright © 2024, HERFUSE Consortium, all rights reserved.

This document and its contents remain the property of the beneficiaries of the HERFUSE Consortium. It may contain information subject to intellectual property rights. No intellectual property rights are granted by the delivery of this document or the disclosure of its content. Reproduction or circulation of this document to any third party is prohibited without the consent of the author(s).

THIS DOCUMENT IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS DOCUMENT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Table of Contents

1. INTRODUCTION 9
2. DATA MANAGEMENT POLICY 10
3. Compliance with the FAIR Principles 12
4. DATA MANAGEMENT 14
4.1 Data Summary 15
4.1.1 "DATA SUMMARY" summary 22
4.2 Findable, Accessible-Interoperable, and Reused data (FAIR) 23
4.2.1 Findable data 23
4.2.1.1 "FINDABLE DATA" summary 30
4.2.2 Accessible Interoperable data 30
4.2.2.1 "ACCESSIBLE INTEROPERRABLE DATA" summary 38
4.2.3 The data re-use 39
4.2.3.1 "DATA RE-USE" summary 43
4.3 Other Research Outputs 44
4.3.1 "OTHER RESEARCH OUTPUTS" Summary 47
4.4 Data Preservation – Archiving, data security, and ethical aspects 47
4.4.1 "DATA PRESERVATION – ARCHIVING, DATA SECURITY, AND ETHICAL ASPECTS" Summary 50
5. SUMMARY 52
6. Appendix A – DATA MANAGEMENT PLAN 53

1. INTRODUCTION

According to the European Commission (EC), Data Management Plans (DMPs) are essential for efficient data management. A DMP outlines the data management lifecycle for the data collected, processed, and/or generated by a research project. Research data should generally adhere to the 'FAIR' principles, meaning it should be findable, accessible, interoperable, and reusable. These principles serve as a foundational framework and do not imply any specific technology, standard, or implementation.

As part of making research data FAIR, a DMP includes information on:

- The handling of research data during & after the end of the project,
- What data will be collected, processed and/or generated,
- which methodology & standards will be applied,
- whether data will be shared/made open access, and
- how data will be curated & preserved (including after the end of the project).

The HERFUSE consortium is committed to complying with the open-access (OA) and FAIR data management practices that are mandatory by the Granting Authority.

The purpose of the DMP is to provide an overview of all datasets collected and generated by the project and to define the consortium's data management policy that is used regarding these datasets. Consequently, the deliverable is structured in four (4) sections:

- Section 1 elaborates on the main principles upon which the data management policy for the HERFUSE project is based on
- Section 2 elaborates on compliance with the FAIR principles
- Section 3 focuses on the DMP per HERFUSE partner, constituting the overall DMP, and reports how all the expected data sets will be diffused and protected following the principles of Section 1.
- Section 4 concludes by summarizing the key points of this DMP.

2. DATA MANAGEMENT POLICY

Data Generated by HERFUSE will comply with the **FAIR principle -Findable, Accessible, Interoperable, and Reusable**-. The data management policy includes the following principles:

• Research data will be managed to the highest standards throughout the research data lifecycle as part of the consortium's commitment to research excellence.

• Responsibility for research data management, through a sound research data management plan during any research project or program lies primarily with principal researchers, i.e. task leaders.

• Data management plans or protocols explicitly address data capture, management, information security (specifically integrity and confidentiality), retention, preservation, sharing, and publication.

• Data management task (WP 2.1) will provide training, support, advice, and where appropriate guidelines and templates for the research data management process and research data management plans.

• The consortium will provide mechanisms and services for the storage, backup, registration, deposit, retention, and preservation of research data assets in support of current and future access, during and after the completion of research projects.

• Any data, which is retained elsewhere, for example in an international data service or domain repository, should be linked to consortium data management.

• Research data management plans must ensure that research data are available for access and re-use where required by their funding body's terms and conditions or where otherwise appropriate and under appropriate safeguards.

• Principal researchers are responsible for deciding, subject to legal, ethical, and commercial constraints, which data are to be released to meet their obligations following the relevant documents such as the Consortium Agreement.

Membership Agreement, and Cooperation Agreement. Data shall be released for access and re-use as soon as practicable as necessary for other actions in Clean Aviation and after research activity is completed and results published.

• The privacy and other legitimate interests of the subjects of research data must be protected.

• Research data of future historical interest, and all research data that represent records of consortium, including.

data that substantiate research findings, will be offered and assessed for deposit and retention in an appropriate national or international data service or domain repository.

• Exclusive rights to reuse or publish research data should not be handed over to commercial publishers or agents without retaining the rights to make the data openly available for re-use unless this is a condition of funding.

The data produced will include, but not be limited to:

• Regional aircraft fuselage and empennages requirements, related to propulsion and systems' needs, relevant certification issues, infrastructural interface needs.

• Interface control documents connecting HERFUSE to HERA and other Clean Aviation projects on relevant systems, propulsion, and main components for performances, size, and volume, functions.

• Models and analyses at fuselage and empennages or major component level concerning integration effects into of relevant systems and propulsion technologies allowing to conceive the hybrid-electric regional aircraft.

• Assessment of scalability potential of results.

• Technology planning and demonstration at high TRL both in-flight (to be performed in Clean Aviation Phase 2) and on-ground (in HERFUSE or the next Clean Aviation Phase 2).

• Tools and simulation models concerning the major component and full fuselage and empennages configuration and definition and assessment of key functional operations.

• Contribution to impact assessment of regional hybrid-electric aircraft including life cycle evaluation and infrastructural and certification data as well as contributions to new standards.

3. COMPLIANCE WITH THE FAIR PRINCIPLES

HERFUSE will ensure research data is FAIR to make possible that knowledge is integrated and available for re-use in future research and projects. Data sharing will address any ethical and data protection concerns and fully complying with privacy issues as ruled by the applicable regulation. All conference and journal publications resulting from the project will be published in either Green or Gold open access. To ensure compliance with the FAIR principles, the HERFUSE consortium will need to apply the specific measures described below:

- **Findability:** HERFUSE will classify the data and deliverables with machine-readable metadata to easily find and(re)use them following standard metadata schemes. Both data and metadata will be assigned a globally unique and persistent identifier (e.g., DOI) and will be indexed in a searchable resource. Trusted repositories, for openly accessible HERFUSE data, may be ZENODO, Figshare, European Open Science Cloud, Open Research Europe, or partner institutional repositories.
- **Accessibility:** External users will access HERFUSE data in compliance with the Grant Agreement, Consortium Agreement, Cooperation Agreement, and Membership Agreement in force into Clean Aviation projects that will describe the main IPR and Knowledge Management rules. For the HERFUSE data and research outputs that will be characterized as openly accessible, the consortium partners will follow two main routes: 1) Self-archiving at trusted repositories as mentioned above (e.g., Zenodo, Figshare, etc.), and 2) Open access (OA) publishing, as required by Horizon Europe, to all scientific publications resulting from the project. Open access will also be provided to all public documents, deliverable reports, and produced dissemination/communication materials via the HERFUSE website.
- **Interoperability**: To ensure the relevant data and models' interoperability HERFUSE will follow HERA guidelines and specific sets of requirements (open formats, structured data models, open or standard interfaces) enabling data and models to be interoperable with other workflows, storage, and processing

- **Reusability:** The goal of the FAIR concept is to optimize the reuse of data and models. Metadata set in HERFUSE (interface contracts, open interfaces like FMI, license-free runtimes) will allow the reuse of its data in linked projects in Clean Aviation and beyond. The project data and models will remain reusable by depositing them in standardized, widespread data formats, independent of proprietary licensing. During the project's implementation, will be defined possible embargo periods and specific restrictions to the re-use will be reported in the Data Management Plan (DMP). The reusable data and models will be released with a clear and accessible usage license allowing further processing.

All HERFUSE partners will be responsible for ensuring that project-related data/research outputs are safely handled and stored. Specific measures will include sufficient storage provisions, regular backups, replication of files in multiple copies locally, as well as in the project's collaborative server (SharePoint), regular security updates, and securely controlled administrative access. No additional costs are foreseen for the described methods for the data curation and storage, which fall within the activities covered by the current grant. However, the foreseen DMP and/or. its updates may identify additional costs, if properly justified by the project's future activities and needs.

4. DATA MANAGEMENT

A systematic approach has been devised to construct an effective Data Management Plan (DMP) in alignment with Horizon Europe's recommendations. The process commences with data collection from HERFUSE consortium partners. EASN-TIS has developed a customized questionnaire, structured according to the EC's official template, categorizing data into six key areas:

i. Data Summary
ii. Findable Data
iii. Accessible-Interoperable Data
iv. Data Reuse
v. Other Research Outputs
vi. Data Preservation and Archiving

HERFUSE partners have been granted access to this questionnaire, which has created the current deliverable based on their input. The subsequent sections will address each of these categories. Appendix A provides a detailed outline of the DMP-specific questionnaire's structure.

4.1 Data Summary

The herein deliverable is a basic overview of the Data Management Plan (DMP) that the HERFUSE Consortium offers. The actions related to data production and reuse carried out by the project partners are included in this section. In addition, a thorough explanation of the specifications for the nature, structure, and volume of the data is provided, guaranteeing a seamless integration of research endeavors.

In addition, the rationale behind choices on data generation or reuse is examined, providing a direct link to the project's objectives. The data sources are also specified, focusing on their origins and how this affects their relevance and dependability. Additionally, the practical significance of this data is emphasized for different professional groups, elucidating how it enhances their comprehension, guides decision-making, and fosters progress in their domains.

All this vital information has been gathered through a comprehensive questionnaire, with the responses from HERFUSE Consortium partners summarized for easy reference in Table 1.

1. Will you re-use any existing data and what will you re-use it for? State the reasons if re-use of any existing data has been considered but discarded.
2. What types and formats of data will the project generate or reuse? (please specify shortly in the comment area)
3. What is the purpose of the data generation or re-use and its relation to the project objectives?
4. What data size do you intend to generate or re-use?
5. What is the origin/provenance of the data, either generated or re-used?
6. To whom might your data be useful ('data utility'), outside the HERFUSE project?

Table 1: Data Summary

Partner	Responses	Comments
1_LDO	1. The partner agrees with the re-use of any existing data. 2. MS Excel and Word, text, 3D Model (CATIA), stuctural Analisys (.dbf), images (.TIFF / .JPEG), .pdf. 3. The purpose of the data generation will be validate the TRL 5 for relevant technology bricks at major component/assembly or system level. 4. About dozens GB. 5. Primary Data. 6. R&D department, future project.	TBD at next document loop
2_ AHE	1. The partner agrees with the re-use of any existing data. 2. All kinds of output will be generated (Qualitative and Quantitative data) in the form of Documentation (MS Word, MS Excel, etc.), calculus data (RADDIOS), and 3D Models (CATIA). 3. All the documents and files generated will be law for all activities to be developed by AHE for each work package in which participating. Files will be for management and technical activities. 5. Primary data.	Data from previous projects, such as RACER (AIR-ITD B-4.1), will be reused to guide the design of the upper shell, specially focusing on configuration, material selection and welding technique. The data collected will be acquired from virtual simmulations, material data sheets and testing, via conventional ground testing, and NDI with Infra-Red Thermography (active for assembly test and passive for ground test).

	6. All airframe designers/manufacturers may find useful the data generated within this part of the project.	
3_ ADS-S	1. The partner agrees with the re-use of any existing data. 2. The format of HERFUSE design data will be converted to .pdf except for CATIA models. 3. The data collection in the project will be used to collect research data from studies related to mechanical tests done. 6. Non-sensitive information generated by AD in HERFUSE could be useful for Aeronautical end-users, including R&D Institutes.	ADS-S will reuse data from previous experiments to compare/evaluate new data generated in the project.
4_ ADS-G	1. The partner agrees with the re-use of any existing data. 2. Format of HERFUSE design data will be converted to .pdf except CATIA models. 6. Non-sensitive information generated by AD in HERFUSE could be useful for Aeronautical end-users, including R&D Institutes	TBD at next document loop
7_ Mare Group	1. The partner agrees with the re-use of any existing data.	Mare Group will reuse data from previous projects (ANGELA, DEFENDER, and T-WING) to compare/evaluate new data generated in the HERFUSE project. Other: 3D CAD, PowerPoint, FEM model and output files

	2. Documentation e.g plain text (.txt), MS Word (.doc/.docx) or MS Excel (.xls/ .xlsx), XML marked-up text (.xml) according to an appropriate DTD or schema, e.g. XHMTL 1.0 PDF/A or PDF (.pdf), Digital image data e.g JPEG (.jpeg, .jpg) TIFF (other versions; .tif, .tiff) JPEG 2000 (.jp2) Adobe Portable Document Format (PDF/A,PDF) (.pdf), Other (Please define in the comments). 3. The data collection in the project will be used to collect research data from studies related to the design processes and all FEM model calculation results (CAD, structural analysis output and report). 4. A data volume of at least 4 TB is expected. 5. The data collected will be generated with MS Office and Altair Hyperworks suites. 6. Companies in the aerospace sector.	
10_ ASCO	1. The partner agrees with the re-use of any existing data. 2. Lots of different outputs will be generated (Qualitative and Quantitative data) in form of Documentation (MS Word, MS Excel, etc.), 3D Models (CATIA), Patran files. 3. All the documents and files generated will be related to all activities to be developed by ASCO for each work package ASCO participates in. Files will be for management and technical activities. 4. Primary data from partner's group.	We will reuse data from previous experience in the material and extrusion process within the group.

	6. Structural designers may find useful the data generated within this part of the project.	
13_ AITIIP	1. The partner agrees with the re-use of any existing data. 2. The results will be in the form of documentation (MS Word, MS Excel, etc.), which will be the analysis parameters as well as reports. In addition to these results, there will be 3D model design results (CATIAV5) and multimedia. 3. All documents and files generated will be the basis of all activities to be developed by AITIIP for each work package in which it participates. The files will be for management, dissemination, and technical activities. 5. Primary data 6. All structural designers/fabricators may find the data generated in this part of the project useful.	Previous experience in thermoplastic forming in the CS2 INNOTOOL project and CS2 WELDER resistive welding will be used. The data collected will be acquired from virtual simulations, material data sheets, welding and forming tests, as well as dimensional measurements and NDIs.
15_CATEC	1. The partner agrees with the re-use of any existing data. 2. Many kinds of outputs will be generated (Documentation, digital image, etc). 3. All the documents and files generated will be in accordance with all activities to be developed by CATEC for each work package in which participating. 5. The data collected will be acquired via conventional testing, and NDI.	Data from previous projects will be reused to guide the desing manufacture and inspection of reference coupons.

	6. All airframe manufacturers may find useful the data generated within this part of the project..	
18_ ILOT	1. The partners agree with the re-use of any existing data. 2. Native 3D Catia files, MS office files format, and generic 3D file formats, like STEP, IGS or similar. 3. Data will be used for WP3, WP5, WP6 and WP8. 4. ~100GB 5. Primary data 6. N/A, Sensitive data, approval of distribution is mandatory for all consortium partners.	A new design will be delivered.
24_INTA	2. Documents will be presented in .doc .pdf formats 3. Certification plan, gaps nad certification review items 4. <1GB 5. Standards analisis, know how explotaition and INTA certification database 6.New certification type applicant, erupean regulation orgazitations, Design Organizations	TBD at next document loop
27_ MVI	1. The partner agrees with the re-use of any existing data. 2. The results generated will be in the form of documentation (MS Word, MS Excel, etc.), which will be the analysis parameters as well as reports. In addition to these results, there will be 3D model design results (CATIAV5) and multimedia. 3. Documents and files generated will be the basis of all activities developed by	Previous experience in manufacturing molds and aeronautical tools for different programs as well as welding.

	MVI for work package 8. The files will be for management, dissemination, and technical activities. 5. The generated and re-used data will be collected from virtual simulations, material data sheets, welding and forming tests, as well as dimensional measurements and NDIs. 6. All tooling designers and manufacturers may find the data generated useful.	
28_ FIDAMC	1. The partner agrees with the re-use of any existing data. 2. Manufacturing data will be generated, saved and further processed in .xls, .csv, .pdf formats. Consolidation/forming cycles will be generated, saved, and further processed in .xls, .csv, and .pdf formats. Scientific articles indexed in JCR will be generated. 3. The data collection in the project will be used to analyse and control the process. Dissemination of activities developed during the project are also considered. 4. 5GB for data collection from manufacturing activities // 1GB for dissemination activities. 5. Oven machine and welding robot controllers. 6. Aeronautical end-users, including R&D Institutes.	We will reuse data from previous experiments to compare/evaluate new data generated in the project.
30_ CSEM	1. The partner agrees with the re-use of any existing data.	Data from the SMARTWISE (Horizon 2020) project could be re-used.

	2. Quantitative e.g MS Excel (.xls/.xlsx), MS Access (.mdb/.accdb), dBase (.dbf), OpenDocument Spreadsheet (.ods), (.txt), MS Access (.mdb/.accdb), Digital image data e.g JPEG (.jpeg, .jpg) TIFF (other versions; .tif, .tiff) JPEG 2000 (.jp2) Adobe Portable Document Format (PDF/A,PDF) (.pdf) 3. Sensor data will be collected to verify the functionality of the Structural Health Monitoring (SHM) wireless sensor network (WSN). 4. A data volume of max 100 GB is expected. 5. The data collected will be acquired from the WSN prototype.	Sensor Data will be saved in .csv format and/or in a database. Photo and videos of the prototype setup could be taken.

4.1.1 "DATA SUMMARY" summary

All partners unanimously agree to the re-use of any existing data across various formats, including MS Excel, Word, text, 3D models (CATIA), structural analysis (.dbf), images (.TIFF/.JPEG), and .pdf. The data generation aims to validate TRL 5 for relevant technology components or systems, with an estimated size of about dozens of GB, utilized by the R&D department and for future projects. Documentation (MS Word, MS Excel), calculus data (RADDIOS), and 3D models (CATIA) will govern all activities for each work package, covering management and technical activities, along with sensor data collected to verify the functionality of the Structural Health Monitoring (SHM) wireless sensor network (WSN). An expected data of up to 100 GB will be produced. The generated and re-used data, sourced from oven machines and welding robot controllers, will focus on manufacturing, management, and dissemination activities, beneficial for aeronautical end-users, R&D institutes, structural designers, fabricators, tooling designers, manufacturers, and new certification applicants

4.2 Findable, Accessible-Interoperable, and Reused data (FAIR)

To promote information sharing and enhance the quality, impact, and benefits of scientific endeavors, Horizon Europe-funded projects are encouraged to adopt Open Science practices. The cornerstone of this initiative is the FAIR principles, which ensure the accessibility and usability of research data. Acknowledging the importance of Open Science, the HERFUSE consortium is committed to these principles, guided by the ethos "as open as possible, as closed as necessary."

It's important to note that Open Science encompasses more than just scholarly publications. Horizon Europe projects are urged to make their research data freely accessible, allowing partners to opt-out if legitimate interests or constraints exist. In the HERFUSE project, implementing FAIR principles focuses on conceptual integration rather than purely technical aspects, with ongoing monitoring throughout the project's duration.

This section outlines the HERFUSE Consortium's strategy for ensuring that the data generated or reused adheres to FAIR principles (sections 4.2.1, 4.2.2, and 4.2.3). Partner inputs are shown in Table 2. This strategy reflects the current state of the project and will be revised as the project progresses and achieves new milestones. Data sharing, archiving, and preservation are managed systematically during and after the project's completion, ensuring orderly and responsible data handling. The following sections detail the steps taken.

4.2.1 Findable data

In this section, the questions applied to the Consortium partners were:

1. Persistent Standard Identification[1] Mechanism - A Digital Object Identifier is suggested as a persistent and unique identifier for the HERFUSE project. Do you agree?
2. What metadata[2] will be created?
3. What disciplinary or general standards will be followed?
4. If metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.
5. Will search keywords be provided in the metadata to optimize the possibility for discovery and then potential re-use?
6. Will metadata be offered so that it can be easily collected and indexed?

[1] A persistent identifier (PID) is a long-lasting reference to a digital resource. A well-known example of a PID for journal articles, books, and data sets is the Digital Object Identifier (DOI).

[2] Metadata is “structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource”, for instance, a data set. “A metadata record is a file of information which captures the basic characteristics of a data or information resource. It represents the who, what, when, where, why, and how of the resource”.

Table 2: Findable Data

Partner	Responses	Comments
1_LDO	1. The partner agrees with the Digital Object Identifier implementation on the produced data. 2. Descriptive metadata e.g author, title, abstract, date. Context metadata are for example location, time, data collection method (tools) 3. Retrieving existing documents and data 4. the metadata are present (see answer n 2) 5. The partner agrees that search keywords will be provided in the metadata to enhance discoverability and facilitate potential re-use. 6. The partner agrees that metadata will be offered in such a way that it can be easily collected and indexed	Keywords will be included in the metadata to guarantee a more easy findability of the information. Metadata will be part of the data deposited on the HERFUSE common SharePoint.
2_ AHE	1. The data classification will be iaw the AHE standards. 2. All classifications are applicable. All files will be named according to the demonstrator and part identifiers, partner company, type of document/model, CNE issue and data. If needed, a document will be generated to set the Engineering Numbering System for documents, models and reports. 3. Data may be generated either by AHE as an individual or its Upper-Shell Consortium as a group.	

	4. iaw with previous answers 5. The partner agrees that search keywords will be provided in the metadata to enhance discoverability and facilitate potential re-use. 6. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data	e.g. thermoplastics, welding, IRT, NDT…
3_ ADS-S	1. The partner disagreed with the Digital Object Identifier implementation on the produced data. 2. - All files will be named according to the date of acquisition and experimental condition and put into corresponding folders. A "read me" file will be generated, explaining the experimental conditions employed as well as the standards followed - The metadata produced will be provided (as an Excel file) for each experiment: Experiment number, Conditions, Date, Entity, Description, Format 6. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data.	Not useful for the non-sensitive information provided
4_ ADS-G	1. The partner disagreed with the Digital Object Identifier implementation on the produced data. 5. The partner agrees that search keywords will be provided in the	Not useful for the non-sensitive information provided

	metadata to enhance discoverability and facilitate potential re-use. 6. Metadata will not be deposited at a common server and be freely searchable	
7_Mare Group	1. The partner disagrees with the Digital Object Identifier implementation on the produced data. 2. For example, an Excel file will be produced with the list of all FEM model updates during the years: model revision number, date, description. 3. Data may be generated by Mare Group as an individual.	The data classification will be iaw the Mare Group standards
10_ ASCO	1. The partner disagrees with the Digital Object Identifier implementation on the produced data 2. ASCO will work with the team assigned to the project and within the group. 3. ASCO will use standard Catia and Patran metadata.	Metadata will be embedded into ASCO's Catia models.
13_ AITIIP	1. The partner disagrees with the Digital Object Identifier implementation on the produced data. 2. All classifications are applicable. All files will be named according to the demonstrator and part identifiers, partner company, type of document/model, CNE issue and data. If needed, a document will be generated to set the Engineering Numbering System for documents, models and reports 3. Data may be generated either by Aitiip as individual or its Upper-Shell Consortium as group.	The data classification will be by the AHE standards.

	4. Following previous answers 5. The partner agrees that search keywords will be provided in the metadata to enhance discoverability and facilitate potential re-use. 6. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data	e.g. thermoplastics, resistance welding, thermoconformate Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data
15_CATEC	1. The partner agrees with the Digital Object Identifier implementation on the produced data. 2. To be defined 3. Data may be generated either by Upper-Shell Consortium as a group or CATEC itself 5. Yes, for thermoplastics, welding, IRT, NDT… 6. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data.	TBD at next document loop
18_ ILOT	1. The partner disagrees with the Digital Object Identifier implementation on the produced data. 5. The partner agrees that search keywords will be provided in the metadata to enhance discoverability and facilitate potential re-use.	example: - alloys FSW, topology optimalization, block structures Sensitive data, and approval of distribution is mandatory for all consortium partners. It will be indexed

	6. Metadata will not be deposited at a common server and be freely searchable. There will be links to the underlying data	
24_INTA	1. The partner disagrees with the Digital Object Identifier implementation on the produced data.	Not useful for certification comments evolution
27_ MVI	1. The partner agrees with the Digital Object Identifier implementation on the produced data. 2. Metadata will be created according to the HERFUSE project indications. 3. General standards will be followed from Upper-shell consortium. 4. iaw with previous answers 5. The partner agrees that search keywords will be provided in the metadata to enhance discoverability and facilitate potential re-use. 6. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data	e.g.WAAM, welding, thermoconformate moulds. Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data
28_ FIDAMC	1. The partner agrees with the Digital Object Identifier implementation on the produced data. 2. All files will be named according to the date of acquisition and experimental condition and put into corresponding folders. The metadata produced will be provided (as Excel file) for each experiment: Experiment number, Conditions, Date, Entity, Description, Form 5. e.g. thermoplastics, welding, NDT	Yes (in case of JCR research articles)

	6. Metadata will be deposited at a common server and be freely searchable.	
29_CTI	1. The partner disagrees with the Digital Object Identifier implementation on the produced data. 2. Descriptive metadata e.g author, title, abstract, date. Context metadata are for example location, time, data collection method (tools), Technical metadata e.g data format, hardware/software used, calibration, version, authentication, encryption, metadata standard. 3. Collecting data from individuals or groups 4. Quantitative Data & Qualitative Data	TBD at next document loop
30_ CSEM	1. The partner agrees with the Digital Object Identifier implementation on the produced data. 2. All files will be named according to the date of acquisition and experimental condition and put into corresponding folders. A readme file will be generated, explaining the experimental conditions as well as the data format employed. 3. Data may be generated either by CSEM as individual or with other partner in the Consortium as group. 4. See II.2 5. Sensor/Data Type keywords.	TBD at next document loop

4.2.1.1 "FINDABLE DATA" summary

In reviewing partners' responses regarding the implementation of Digital Object Identifiers (DOIs) for produced data, a diverse range of perspectives emerges. While some partners (three) agree with the DOIs, emphasizing comprehensive metadata inclusion and easy accessibility, others oppose the idea, preferring alternative data organization and access methods. The majority proposes specific naming conventions and metadata structures tailored to their data management needs, highlighting individual or collaborative data generation processes. Despite disagreements on DOIs, there is consensus on enhancing discoverability through metadata, using a common server, and providing links for data access. This variety underscores the complexity of data management within the consortium, necessitating flexible approaches to ensure effective utilization and re-use of project data.

4.2.2 Accessible Interoperable data

This set of inquiries aims to identify the preferred open datasets favored by the HERFUSE consortium, following guidance from Open Research Europe. To accomplish this, a series of questions was distributed among Consortium partners, and their responses are summarized in Table 3. The second column of the table specifically captures the responses related to the "Accessible-Interoperable Data" questionnaire.

1. Will the data be deposited in a trusted repository?
2. ZENODO, an OpenAIRE and CERN collaboration platform, is suggested as a trusted repository for HERFUSE. Do you agree?
3. Will all data be made openly available? If certain datasets cannot be shared (or need to be shared under restricted access conditions), explain why, clearly separating legal and contractual reasons from intentional restrictions.
4. 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.
5. If there are restrictions on use, how will access be provided to the data, both during and after the end of the project?
6. Will the collected/generated data require special software, hardware or any specific technique or tool to be accessed or "read"? If so, will it be possible to include the relevant software/ tools (e.g. in open-source code)?
7. 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? Will you follow community-endorsed interoperability best practices? Which ones?

8. Will your data include qualified references to other data (e.g. other data from your project, or datasets from previous research)? 3

Table 3:Accesible Interoperable data

Partner	Responses	Comments
1_LDO	1. The partner agreed with data to be deposited in a trusted repository. 2. The partner does not agree that all data will be made openly available 3. The partner does not agree that all data will be made openly available. 4. Possible embargo periods and specific restrictions to the re-use will be defined during the project's implementation and will be reported in the Data Management Plan (DMP) 5. SharePoint folder access rights 6. To ensure the relevant data and models interoperability HERFUSE will follow HERA guidelines and specific sets of requirements (open formats, structured data models, open or standard interfaces) enabling data and models to be interoperable with other workflows, storage, and processing	Trusted repositories, for openly accessible HERFUSE data may be: ZENODO, Figshare, European Open Science Cloud, Open Research Europe, or partner institutional repositories. Point to be voted into PPB if not sensible and protected, the data will be openly available

[3] People should be able to exchange and interpret each other's data so preferably do not use dead vocabulary. But this also applies to computers, meaning that data should be readable for machines without the need for specialized or ad hoc algorithms, translators, or mappings. Interoperability, typically, means that each computer system at least has knowledge of the other system's data exchange formats. For this to happen and to ensure automatic findability and interoperability of data sets, it is critical to use commonly used controlled vocabularies, keywords, ontologies and thesaurus (having resolved globally unique and persistent identifiers.)

	7. The partner will use file formats that are as open and widely used as possible, which will also facilitate data exchange between partners 8. Background metadata will not need to be shared with the other partners	
2_ AHE	1. The partner agreed with data to be deposited in a trusted repository 2. The partner agreed on the usage of ZENODO as a trusted repository for HERFUSE 3. The partner does not agree that all data will be made openly available. 5. All documentation (interfaces) will be shared only among the applicable consortium members, via a secure common workspacespace/platform of data exchange. The platforms used will be Google Drive for AIRBUS internal management, and European Workspace for Consortium level 6. Virtual models and calculus files will be implemented in non open-source softwaare (CATIA and RADDIOS). Files will be accessible for all consortium members owning licenses for the corresponding softwares.	Data and metadata will be retrievable by their unique and persistent identifier assigned by the data repository. Trustworthiness based on experience with HERA

	8. The produced data will include qualified references to other data	
3_ ADS-S	1. The partner agreed with data to be deposited in a trusted repository 2. The partner agreed on the usage of ZENODO as a trusted repository for HERFUSE 3. No, only non-sensitive information will be public (as stated in Sygma) 5. All info will be available to the Consortium during project running. Public information will be available through the website and/or EU portals during project running and after the project closure. 7. All data will follow certain data file naming format so as to be interoperable and useful for all related end-users 8. All references to project or external documents will be specified	The repository will be DiPP tool - ADS internal tool –
4_ ADS-6	1. The partner agreed with data to be deposited in a trusted repository. 2. The partner disagrees on the usage of ZENODO as a trusted repository for HERFUSE	Repository will be DiPP tool - ADS internal tool -

	3. No, only non-sensitive information will be public (as stated in Sygma) 5. All info will be available to the Consortium during project running. Public information will be available through the website and/or EU portals during project running and after the project closure. 6. The produced data will need a special technique or tool to be accessed 7. All data will follow certain data file naming format so as to be interoperable and useful for all related end-users 8. All references to project or external documents will be specified	
7_Mare Group	1. The partneragreed with data to be deposited in a trusted repository 2. The partner disagrees on the usage of ZENODO as a trusted repository for HERFUSE 3. The partner agrees that all data will be made openly available. 5. If there are restrictions on use, the data will be not shared publicly and will contain notes that specify the restriction. In that case, it could be needed a specific data access committee to be required for the coordinator of the project, JU and the project customer. 6. Virtual models and calculus files will be implemented in non-open-source software (CATIA).Files will be accessible for all consortium members owning licenses for the corresponding softwares.	Data and metadata will be retrievable by their unique and persistent identifier assigned by the data repository The data produced and/or used in the project will be made openly available as the default as specified in the consortium agreement. If certain datasets cannot be shared (or need to be shared under restrictions), will be explained why, clearly separating legal and contractual reasons from voluntary restrictions.
10_ ASCO	1. The partner agreed with data to be deposited in a trusted repository 2. The partner disagrees on the usage of ZENODO as a trusted repository for HERFUSE	ASCO uses Leonardo PLM and Herfuse SharePoint plus our own PLM system.

	3. The partner agrees that all data will be made openly available 5. ASCO will follow the consortium rules for the project. After the project, ASCO-specific IP protection rules will apply. 6. Catia and Patran are not open-source software	.
13_ AITIIP	1. The partner agrees with data to be deposited in a trusted repository 2. The partner agrees on the usage of ZENODO as a trusted repository for HERFUSE 3. - Datasets that do not contain personal information will be made available upon publication as a supplement to the publication, AS LONG AS they are not subject to Export & Control Rules, or do not have any privacy classification other than "Public". - Datasets containing personal information will be made available upon request after ensuring compliance with relevant legislation 5. All documentation (interfaces) will be shared only among the applicable consortium members, via a secure common workspacespace/platform of data exchange. The platforms used will Microsoft Drive for AITIIP internal management and European Workspace for consortium-level 6. The produced data will need a special technique or tool to be accessed	TBD at next document loop e.g. thermoplastics, resistance welding, thermoconformate Virtual models files will be implemented in non open-source softwaare (CATIA).Files will be accessible for all consortium members owning licenses for the corresponding softwares.

	8. The produced data will include qualified references to other data	
15_CATEC	1. The partner agrees with data to be deposited in a trusted repository	Data and metadata will be retrievable by their unique and persistent identifier assigned by the data repository
	2. The partner agrees on the usage of ZENODO as a trusted repository for HERFUSE	Trustworthiness based on experience with HERA
	3. The partner disagrees that all data will be made openly available.	Datasets that do not contain personal information will be made available upon publication as a supplement to the publication, AS LONG AS they are not subject to Export & Control Rules, or do not have any privacy classification other than "Public". Datasets containing personal information will be made available upon request after ensuring compliance with relevant legislation
	6. No specific software will be needed	
18_ ILOT	1. The partner agrees with data to be deposited in a trusted repository	Sensitive data, approval of repository must be made by all consortium partners.
	2. The partner agreed the usage of ZENODO as trusted repository for HERFUSE	All consortium partners must make sensitive data, approval of
	3. The partner agrees that all data will be made openly available.	
	4.	
	5. Security server access.	
	6. The produced data will not need a special technique or tool to be accessed	Standard data formats commonly used will be delivered.
	7. Standard data formats commonly used will be delivered.	
	8. The produced data will include qualified references to other data	Clear path links will be provided.
24_INTA	1. The partner agrees with data to be deposited in a trusted repository	
	2. The partner agrees the usage of ZENODO as trusted repository for HERFUSE	Always if the collaboration with EASA is compatible with the proposed environment

27_ MVI	1. The partner agrees with data to be deposited in a trusted repository 2. The partner disagrees the usage of ZENODO as trusted repository for HERFUSE 3. The partner does not agree that all data will be made openly available. 5. All documentation will be shared only among the applicable consortium members, via a secure common platform of data exchange. For MVI internally, a physical server will be used, and for Consortium level, European Workspace 6. The produced data will need a special technique or tool to be accessed	Data and metadata, if neccessary, will be deposited in a physical server. MVI does not have experience with these platforms Virtual model files will be implemented in non-open-source software (CATIA). Files will be accessible for all consortium members owning licenses for the corresponding software.
28_ FIDAMC	1. The partner agrees with data to be deposited in a trusted repository 7. All data will follow certain data file generation format so as to be interoperable and useful for all related end-users	Data and metadata will be retrievable by their unique a identifier assigned by the data repository

29_CTI	1. The partner agrees with data to be deposited in a trusted repository 2.The partner agrees the usage of ZENODO as trusted repository for HERFUSE 3. The partner disagrees that all data will be made openly available. 4. Quantitative Data & Qualitative Data will be used 6. The produced data will not need a special technique or tool to be accessed	Data from previous projects will be reused to guide the design of the tooling and to define the integration of the fuselage panels. The design dataset will require specific software (CATIA) that cannot be included
30_ CSEM	1. The partner agrees with data to be deposited in a trusted repository 2.The partner agrees the usage of ZENODO as trusted repository for HERFUSE 4. Without an embargo period unless linked to a "green open" access publication 6. The produced data will not need a special technique or tool to be accessed 7. We will use file formats that are as open and widely used as possible, which will also facilitate data exchange between partners.	Data will be stored in common format and could be decoded using strandard tools.

4.2.2.1 "ACCESSIBLE INTEROPERRABLE DATA" summary

All partners agree to deposit data in a trusted repository, with some specifically approving the use of ZENODO for HERFUSE while others (3 partners) disagree (Not all partners agree to make all data openly available, with restrictions and embargo periods defined in the Data Management Plan (DMP) or based on specific conditions). Some participants suggested that the

documentation and data will be shared securely among consortium members using various platforms (e.g., Google Drive, European Workspace, Microsoft Drive) and will adhere to standard formats for interoperability. Some partners noted that may need special techniques or tools for access and others may not. Furthermore, produced data shall include qualified references to other data and follow specific naming formats to ensure usability for all related end-users. Security measures and IP protection rules will be applied where needed during and after the project.

4.2.3 The data re-use

This set of questions is designed to identify the necessary documentation for validating data analysis and facilitating data reuse. Such documentation may include readme files with methodological details, codebooks, data cleaning procedures, variable definitions, and units of measurement. To address this and ensure consistency with previous sections, the following questionnaire was distributed among HERFUSE partners. Their responses have been compiled and summarized in Table 4.

1. Will your data be made freely available to permit the widest re-use possible? Will they be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement? (please specify license type, e.g CC-BY).
2. Will the data produced in the project be useable by third parties, in particular after the end of the project?
3. Describe all relevant data quality assurance processes. 4

[4] Data quality assurance is the process of determining and screening anomalies by means of data profiling, removing obsolete information, and data cleaning. Throughout the lifecycle of data, it is at risk of being distorted by the influence of people and other external factors. To protect its value, it is important to have an enterprise-wide data quality assurance strategy.

Table 4: The data re-use

Partner	Responses	Comments
1_LDO	1. The partner will make the data produced available to be re-used as much as possible 2. The partner disagrees that third parties will use the produced data. 3. All HERFUSE partners will be responsible for ensuring that project-related data/research outputs are safely handled and stored. Specific measures will include sufficient storage provisions, regular backups, replication of files in multiple copies locally, as well as in the project's collaborative server (share point), regular security updates, and securely controlled administrative access.	Immediate open access is provided to the deposited publication via the repository, under the latest available version of the Creative Commons Attribution International Public Licence (CC BY) or a licence with equivalent rights. Only data of Open Science will be re-usable
2_ AHE	1. The partner disagrees that its data be freely available to permit the widest re-use possible. 2. The partner disagrees that third parties will use the produced data. 3. G-MET-174-130-A	Only contractual data will be released freely. The rest of the documentation will be kept internally and shared iaw a special assessment. Within the AH Group iaw internal policies.
3_ ADS-S	1. The partner disagrees that its data be freely available to permit the widest re-use possible.	TBD at next document loop

	2. The partner disagrees that third parties will use the produced data	
4_ ADS-6	1. The partner disagrees that its data be freely available to permit the widest re-use possible. 2. The partner disagrees that third parties will use the produced data	TBD at next document loop
7_Mare Group	1.The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data 3. The data quality assurance processes are performed according to ISO 9001 and the company quality manual.	Only contractual data will be released freely. The rest of documentation will be kept internally, and shared iaw a special assessment. within the Mare Group internal policies.
10_ ASCO	1.The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data 3. Standard design and stress quality checks per ASCO procedures will be followed	This will be shared following group policy.

13_ AITIIP	1.The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data 3. ISO EN 9100	Only contractual data will be released freely. The rest of documentation will be kept internally, and shared following a special assessment. Within the internal policies of the AITIIP law, as well as the CA HERFUSE
15_CATEC	1. The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data 3. Register data will be quality controlled according to a procedure established in our group	TBD at next document loop
18_ ILOT	1. The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner disagrees that third parties will use the produced data 3. All project data will be generated according ADOA (Alternative Procedures to Design Organisation Approval).	Data transfer or processing agreement will be performed in the context of our consortia agreement. Sensitive data, approval of distribution is mandatory for all consortium partners.
24_INTA	1. The partner disagrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data	TBD at next document loop
27_ MVI	1. The partner disagrees that its data be freely available to permit the widest re-use possible	TBD at next document loop

	2. The partner agrees that third parties will use the produced data	within the internal policies of the MVI law, as well as the CA HERFUSE
28_ FIDAMC	1. The partner agrees that its data be freely available to permit the widest re-use possible 2. The partner disagrees that third parties will use the produced data 3. Data will be quality-checked at collection/generation by validation Register data will be quality-controlled according to a procedure established in our group	Data transfer or processing agreement will be performed in the context of our consortia agreement. If necessary, will be performed between our research group and collaborators for data transfer, previously approved by our legal department
29_CTI	1. The partner agrees that its data be freely available to permit the widest re-use possible 2. The partner agrees that third parties will use the produced data	Only contractual data will be released freely.
30_ CSEM	2. The partner will use file formats that are as open and widely used as possible including metadata so third parties could use the data.	TBD at next document loop

4.2.3.1 "DATA RE-USE" summary

The partners in the project hold differing views on the accessibility and re-use of produced data. While some (five partners) disagree with freely providing data for widest re-use and third-party usage, others are open to it. Quality assurance processes vary across partners, with some following ISO standards and company-specific quality manuals. However, there's a consensus on implementing secure data handling and storage measures. Despite disagreements on data accessibility, there's an acknowledgment (from three partners) of the need for standardized formats and metadata to facilitate potential third-party utilization.

4.3 Other Research Outputs

This section aims to collect information on any additional research outputs that may arise, whether in digital format (such as software, workflows, protocols, models, etc.) or physical format (such as new materials, samples, etc.). The status of this task, based on feedback from HERFUSE partners to EASN-TIS, is presented in Table 5.

9. What other research outputs will the project generate or re-use? Please shortly specify.
10. How these research outputs will be managed and shared, or made available for re-use, in line with the FAIR principles? [5]

Table 5: Other research outputs may arise during the projects' lifetime

Partner	Responses	Comments
1_LDO	1. Outputs that the project will generate or reuse are Models, New Materials, and Demonstrators. 2. If certain datasets cannot be shared please specify the reasons and conditions in the comment area e.g legal and contractual reasons, voluntary restrictions	if not sensible and protected, the data will be available following specific request

[5] The FAIR guiding principles for scientific data management and stewardship were developed by the international research community and are based on four key concepts: Findable, Accessible, Interoperable, and Reusable. Those principles are designed to:
- Support knowledge discovery and innovation both by people and machines
- Support data and knowledge integration
- Support new discoveries through the harvest and analysis of multiple datasets and outputs
- Promote sharing and reuse of data
- Be applied across multiple disciplines, even those that involve sensitive data
- Help data and metadata to be 'machine readable'

2_ AHE	1.HERFUSE results may complement other National initiatives such as CORSARIO and LIDER, and European as ENGRT and future EDF projects. All data outputs produced will be stored in case they may be used for future iterations of the project, developing further the concepts settled at HERFUSE, or being modified for future retrofits of the pieces into already existing platforms. 2. If certain datasets cannot be shared please specify the reasons and conditions in the comment area e.g. legal and contractual reasons, voluntary restrictions	iaw with previous comments about sharing restrictions. e.g. Internal regulations.
3_ ADS-S	1. Outputs that the project will generate or reuse are Models, Samples, New materials	Centre fuselage barrel demonstrator
4_ ADS-G	1.Models, Samples, New materials	Centre fuselage barrel demonstrator
7_Mare Group	1. HERFUSE results may be complementary to other projects. All data outputs produced will be stored in case they may be used for future iterations of the project, developing further the concepts settled at HERFUSE, or being modified for future retrofits of the pieces into already existing platforms. 2. iaw with previous comments about sharing restrictions (e.g. internal regulations).	TBD at next document loop
10_ ASCO	No foreseen other outputs at this stage.	TBD at next document loop
13_ AITIIP	1. HERFUSE results may be complementary to other National initiatives and European and future EDF projects. All data outputs produced will be stored in case they may be used for future iterations of the project, developing further the concepts settled	TBD at next document loop

	at HERFUSE, or being modified for future retrofits of the pieces into already existing platforms. 2. Following previous comments about sharing restrictions. e.g. Internal regulations.	
15_CATEC	1 All data outputs produced will be stored in case they may be used for future iterations of the project, developing further the concepts settled at HERFUSE, or being modified for future retrofits of the pieces into already existing platforms.	TBD at next document loop
18_ ILOT	1. Outputs that the project will generate, or reuse are Models and samples. 2. Sensitive data, approval of distribution is mandatory for all consortium partners.	TBD at next document loop
24_INTA	Partner has not responded to this section	TBD at next document loop
27_ MVI	1. HERFUSE results may be complementary to other National and European initiatives and to future EDF projects. All data outputs produced will be stored in case they may be used for future iterations of the project, developing further the concepts settled at HERFUSE, or being modified for future retrofits of the pieces into already existing platforms. 2. iaw with previous comments about sharing restrictions.e.g. Internal regulations.	TBD at next document loop
28_ FIDAMC	Outputs that the project will generate, or reuse are Samples	Parts manufactured
29_CTI	1. Outputs that the project will generate, or reuse are Models 2. If certain datasets cannot be shared, please specify the reasons and conditions in the comment area e.g legal	TBD at next document loop

	and contractual reasons, voluntary restrictions	
30_ CSEM	1. Software for data visualization may be developed within the scope of the project.	TBD at next document loop

4.3.1 "OTHER RESEARCH OUTPUTS" Summary

The majority of partners mentioned that the project aims to generate or reuse outputs such as models, samples, and new materials, with potential complementarity to other national and European initiatives like CORSARIO, LIDER, ENGRT, and future EDF projects. All produced data outputs will be carefully stored for potential future use, whether for further iterations of the project or modifications for retrofitting into existing platforms. Partners acknowledge the need to specify any datasets that cannot be shared due to legal, contractual, or voluntary restrictions, ensuring transparency and compliance.

4.4 Data Preservation – Archiving, data security, and ethical aspects

The HERFUSE Consortium is dedicated to the secure management of generated data throughout the project's lifecycle, emphasizing protection against accidental loss or unauthorized manipulation. Research data processed and generated by HERFUSE will be stored, preserved, and archived using various methods based on the associated sharing policies. The aim is to preserve and make data accessible to interested parties during and after the project's conclusion, for both open and non-open data.

All HERFUSE partners are responsible for ensuring the safe and secure handling and storage of project-related data, fully compliant with relevant EU data protection regulations. Deliverables, reports, internal documents, and other project materials will be stored on the project's collaboration server (SharePoint). Additionally, authors may use institutional repositories if available. This section is expected to gain importance as the project progresses.

To address this aspect and maintain consistency with previous sections, the following questionnaire was distributed among HERFUSE partners. Their responses have been compiled and summarized in Table 6.

Table 6: Data Preservation

Partner	Responses	Comments
1_LDO	1. No additional costs are foreseen for the described methods for the data curation and storage, which fall within the activities covered by the current grant. However, the foreseen DMP and/or its updates may identify additional costs, if properly justified by the project's future activities and needs. 2. On-line segragated folder (with relevant back-up) will guarantee proper storage/archiving/transfer of sensitive data. 3. The partner finds ethic or legal issues that can have an impact on data sharing 4. The partner will not use of other national/funder/sectorial/departmental procedures for data management	Sensitive property data will be provided, unless otherwise agreed between the parties, only to implement the Agreement. data management will be done in accordance with FAIR principles
2_ AHE	2. The data will be preserved iaw Airbus standards and policies.	TBD at next document loop
3_ ADS-S	1.To be defined during the project's lifetime 2. The partner proposes Airbus Policy for data security (DiPP platform) 3. The partner finds ethic or legal issues that can have an impact on data sharing 4. The partner will not use of other national/funder/sectorial/departmental procedures for data management	TBD at next document loop
4_ ADS-G	2. Airbus Policy for data security (DiPP platform)	TBD at next document loop

	3. The Consortium Agreement limits dissemination of results of the project	
7_Mare Group	1. It will be defined afterwards. 2. Sensitive data are managed according to the Grant Agreement, European and National law. Recovery and safety storage: a cloud copy of each data (deliverables or official documentation delivered) is automatically saved. 3. The partner finds no ethical or legal issues that can have an impact on data sharing 4. No further use of other national/funder/sectorial/departmental procedures for data management is made	TBD at next document loop
10_ ASCO	1. To be defined 2. The data will be preserved according to ASCO standards and policies.	TBD at next document loop
13_ AITIIP	1. To be defined 2. The data will be preserved in accordance with AITIIP standards and policies. 3. In accordance with previous answers 4. In accordance with previous answers	TBD at next document loop
15_CATEC	2. - Data saved in the company's servers are also backed up - Access to the documentation stored in the company's servers is restricted only to group members	TBD at next document loop
18_ ILOT	2. Data saved in the company's servers are also backed up and access to the documentation stored in the company's servers is restricted only to project members.	TBD at next document loop

	3. - There are no personal data, data sensitive and approval of distribution is mandatory for all consortium partners 4. ISO 9001:2015, AQAP 2110:2016, ADOA	
24_INTA	2. Standard	TBD at next document loop
27_ MVI	1. To be defined 2. The data will be preserved iaw MVI standards and policies. 3. Following the previous answers 4. Following with the previous answers	TBD at next document loop
28_ FIDAMC	1. Data generation is part of the experimental work on the project and will be covered through the activities planned 2. Standard	Access to the documentation stored in the company's servers is restricted only to group members
30_ CSEM	1. To be defined 2. Data saved in CSEM servers are secure and backed up. 3. There are no personal data, nor any other grounds for confidentiality 4. Data will be stored on CSEM servers for the internal level and European Workspace for the Consortium level.	TBD at next document loop

4.4.1 "DATA PRESERVATION – ARCHIVING, DATA SECURITY, AND ETHICAL ASPECTS" Summary

The methods for data curation and storage outlined in the project are anticipated to incur no additional costs within the scope of the current grant, although potential updates to the Data Management Plan (DMP) may reveal otherwise as future project activities unfold. To ensure the proper handling of sensitive data, an online segregated folder with relevant backup systems will be implemented. Despite the commitment to data sharing, ethical or legal concerns have been identified by some partners, necessitating careful consideration and adherence to relevant regulations. Partners such as Airbus and CSEM propose leveraging their respective policies and platforms, such as the DiPP platform, to enhance data security measures. Sensitive data management across partners adheres strictly to regulations outlined in the Grant Agreement,

European, and National law, with cloud backups ensuring data safety. However, the use of alternative national, funder-specific, sectorial, or departmental procedures for data management is avoided by most partners, who instead rely solely on the established methods within the project framework. Additionally, partners like ASCO, AITIIP, and ILOT adhere to their standards and policies for data preservation, while CSEM ensures data security through their servers and backups. Overall, data generation and preservation are integral components of the project's experimental work, covered through planned activities and stored securely on relevant platforms.

List of Tables

Table 1: Data Summary 16
Table 2: Findable Data 24
Table 3:Accesible Interoperable data 31
Table 4: The data re-use 40
Table 5: Other research outputs may arise during the projects' lifetime 44
Table 6: Data Preservation 48

5. SUMMARY

This document represents the collaborative efforts to define, structure, and securely store all datasets generated throughout the project. It organizes collected information into four main sections: Data Summary, FAIR Data, Other Research Outputs, and Data Preservation-Archiving, serving as a roadmap for the initial release of the DMP. Following this, dedicated questionnaires were presented for each data type to gather pertinent information, with detailed responses from the HERFUSE Consortium presented in dedicated tables and summarized the tables in a final paragraph for each category. Emphasis is placed on FAIR data, forming the cornerstone of the management and preservation strategy for research data collected during and after the project's lifecycle. Data summaries focus on types, formats, expected sizes, and the rationale behind data generation or reuse in line with HERFUSE's objectives. The section on Other Research Outputs explores potential additional research results within the project framework, including software, workflows, protocols, and models. Regarding data preservation and archiving, the document outlines the utilization of the project's collaboration server to store deliverables, reports, and other project-related material, emphasizing data security measures. Complementary aspects address the authors' responsibilities in tracking and depositing relevant research data generated by HERFUSE, along with considerations for ethical compliance, including the prevention of personal data misuse.

6. APPENDIX A – DATA MANAGEMENT PLAN

I. Data summary	Describe the types and format of data the project will generate / collect	Comment Area: Participants are encouraged to fill in *where appropriate*
1.Will you re-use any existing data and what will you re-use it for? State the reasons if re-use of any existing data has been considered but discarded.		example: We will reuse data from previous experiments to compare/evaluate new data generated in the project
2. What types and formats of data will the project generate or re-use? (please shortly specify in the comment area)		example: Data will be saved in .csv format
3. What is the purpose of the data generation or re-use and its relation to the objectives of the project?		example: The data collection in the project will be used to collect research data from studies related to mechanical tests done
4. What is the expected size of the data that you intend to generate or re-use?		example: A data volume of 3 TB is expected
5. What is the origin/provenance of the data, either generated or re-used?		example: The data collected will be acquired from mechanical testing along in tandem with modelling data
6. To whom might your data be useful ('data utility'), outside HERFUSE project?		

II. Findable Data (FAIR data)	Please carefully read the explanatory notes, where available, in column A by setting your mouse cursor on the question and provide your detailed answers.	Comment Area: Participants are encouraged to fill in *where appropriate*
1. Persistent Standard Identification Mechanism - Digital Object Identifier is suggested as persistent and unique identifier for HERFUSE project. Do you agree?		
2. What metadata will be created?		example: - All files will be named according to the date of acquisition and experimental condition and put into corresponding folders. A "read me" file will be generated, explaining the experimental conditions employed as well as the standards followed - The metadata prodcued will be provided (as Excel file) for each experiment: Experiment number, Conditions, Date, Entity, Description, Format
3. What disciplinary or general standards will be followed?		
4. In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.		
5. Will search keywords be provided in the metadata to optimize the possibility for discovery and then potential re-use?		
6. Will metadata be offered in such a way that it can be easily collected and indexed ?		example: - Metadata will be deposited at a common server and be freely searchable. There will be links to the underlying data

III. Accessible and Interoperable Data	Describe how this data will be shared/made accessible. If data cannot be made publicly available, explain why. Please carefully read the explanatory notes, where available, in column A by setting your mouse cursor on the question.	Comment Area: Participants are encouraged to fill in *where appropriate*
1. Will the data be deposited in a trusted repository?		*example: - Yes. Data and metadata will be retrievable by their unique and persistent identifier assigned by the data repository*
2. ZENODO, Figshare, European Open Science Cloud, Open Research Europe, or partner institutional repositories are suggested as trusted repositories for HERFUSE Do you agree?		
3. Will all data be made openly available? If certain datasets cannot be shared (or need to be shared under restricted access conditions), explain why, clearly separating legal and contractual reasons from intentional restrictions. *Note that in multibeneficiary 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.*		*example: - Datasets that do not contain personal information will be made available upon publication as a supplement to the publication* *- Datasets containing personal information will be made available upon request after ensuring compliance with relevant legislation*
4. 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.		
5. If there are restrictions on use, how will access be provided to the data, both during and after the end of the project?		
6. Will the collected/generated data require special software, hardware or any specific technique or tool to be accessed or "read" ?If so, will it be possible to include the relevant software/ tools (e.g. in open-source code) ?		
7. 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? Will you follow community-endorsed interoperability best practices? Which ones?		*example: - We plan to make our datasets interoperable by using controlled vocabularies, keywords or ontologies where possible.* *- We will use file formats that are as open and widely used as possible, which will also facilitate data exchange between partners.*
8. Will your data include qualified references to other data (e.g. other data from your project, or datasets from previous research)?		

IV. Reuse Data	Please carefully read the explanatory notes, where available, in column A by setting your mouse cursor on the question and provide your detailed answers.	Comment Area: Participants are encouraged to fill in *where appropriate*
1. Will your data be made freely available to permit the widest re-use possible? Will they be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement? (please specify license type, e.g CC-BY).		*example: - Data will be deposited at a repository/database (please provide name) immediately and without embargo, using a license (please specify license type, e.g CC-BY). - Data transfer or processing agreement will be performed in the context of our consortia agreement. If necessary, will be performed between our research group and collaborators for data transfer, previously approved by our legal department*
2. Will the data produced in the project be useable by third parties, in particular after the end of the project?		
3. Describe all relevant data quality assurance processes.		*example: - Data will be quality-checked at collection/generation by validation - The register holder assures data quality in terms of completeness and correctness of registration. - Register data will be quality controlled according to a procedure established in our group - Data will be checked at the point of entry using a specific software for double entries, completeness, missing data and unreasonable values*

IV. Other Research Outputs	Describe the other research outputs that the project will generate	Comment Area: Participants are encouraged to fill in *where appropriate*
1. What other research outputs will the project generate or re-use? Please shortly specify.		
2. How these research outputs will be managed and shared, or made available for re-use, in line with the FAIR principles?		

IV. Data Preservation and Archiving (including storage and backup)	How will the data be curated and preserved (including Data storage and back up) during and after the research?	Comment Area: Participants are encouraged to fill in *where appropriate*
1. Do you know how much it will cost to make these data sets and/or research outputs available? How will you cover these costs? (e.g. direct and indirect costs related to storage, archiving, re-use, security, etc.). 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).		
2. 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)?		*example: - In OneDrive, it is possible to recover changed/deleted datasets - Data saved in company's servers are also backed up - The data will be safely stored in repository X for long term preservation and curation - Access to the documentation stored in company's servers is restricted only to group members*
3. Are there, or could there be, any ethics or legal issues that can have an impact on data sharing?		*example: - There are no personal data, nor any other grounds for confidentiality - Sensitive personal data will be handled according to GDPR - Consent has been acquired from participants to process/share data*
4. 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 in the comment area).		