Improved Robotic Platform to perform Maintenance and Upgrading Roadworks: The HERON Approach

Grant Agreement Number: 955356

D1.12: Data Management Plan (third version)

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Document Control Sheet

Version history table			
Version	**Date**	**Modification reason**	**Modifier**
0.1	13/05/2024	Initial Table of Contents and basic structure of the deliverable	Nikolaos Bakalos
0.2	17/05/2024	1st version of the report	Nikolaos Bakalos
0.3	20/05/2024	Prefinal version of the report for internal review	All partners
0.4	31/05/2024	Minor updates	Iason Katsamenis
1.0	31/05/2024	Final version ready for submission	Anastasios Doulamis, Nikolaos Bakalos

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Abbreviation Lists

Table 1: Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
CA	Consortium Agreement
CCTV	Closed-Circuit Television
CUD	Chaussée Urbaine Démontable (Demountable Urban Roadway)
DMP	Data Management Plan
DOI	Digital Object Identifier
EC	European Commission
EU	European Union

Abbreviation	Definition
FAIR	Findable, Accessible, Interoperable and Re-usable
GA	Grant Agreement
GDPR	General Data Protection Regulation
IPR	Intellectual Property Rights
JSON	JavaScript Object Notation
KPI	Key Performance Indicator
NDTI	National Department of Transport Infrastructure
OA	Open Access
POPD	Protection of Personal Data
RC	Reinforced Concrete
RGB	Red, Green, and Blue
RI	Road Infrastructure
RUP	Removable Urban Pavement
TBD	To Be Determined
TC	Technical Committee
UAV	Unmanned Aerial Vehicle
URL	Uniform Resource Locator
WP	Work Package
YOLO	You Only Look Once

Table 2: Abbreviations of the Partners' names

Short name	Participant organization name
ICCS	Institute of Communications and Computer Systems
ACCI	Acciona Construcción S.A.
OLO	Olympia Odos Operation S.A.
UGE	Université Gustave Eiffel
ETHZ	Eidgenössische Technische Hochschule Zürich
ROB	Robotnik Automation
CORTE	Confederation of Organisations in Road Transport Enforcement
STWS	SATWAYS - Proionta Kai Ypiresies Tilematikis Diktyakon Kai Tilepikinoniakon Efarmogon Etairia Periorismenis Efthinis EPE
RISA	RisaSicherheitsanalysen Gmbh
INAC	InnovActs
IKH	Ainoouchaou Pliroforiki SA -IKnowHow-
RG	Resilience Guard Gmbh

Glossary of Terms

Table 3: Glossary of terms

Term	Explanation
Creative Commons	Licenses that allow creators to communicate which rights they reserve, and which rights they waive for the benefit of recipients or other creators.

Data cluster	A group of data that share similar characteristics.
Dataset	A structured collection of data generally associated with a unique body of work.
Green Open Access	Route to open access where the author, or a representative, archives (deposits) the published article or the final peer-reviewed manuscript in an online repository before, at the same time as, or after publication. Some publishers request that open access be granted only after an embargo period has elapsed.
Gold Open Access	Route to open access where an article is immediately published in open access mode. In this model, the payment of publication costs is shifted away from subscribing readers.
Metadata	Data that provides information about other data. They serve to provide information on the data produced, collected, or handled.
Open access	The practice of providing online access to scientific information that is free of charge to the reader.
Pseudonymization	The processing of personal data in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organizational measures to ensure that the personal data are not attributed to an identified or identifiable natural person.
Version	A variation of a dataset, metadata, or deliverable, i.e., an update, edit or change from an earlier version.

Executive Summary

This deliverable is written in the framework of WP1 – Project Coordination and Management of the HERON project under Grant Agreement No. 955356. Deliverable 1.12, namely “Data Management Plan (third version)”, provides an update of the roadmap of processes to be followed throughout the entire HERON project that was described in D1.2, “Data Management Plan (first version)” and D1.11 “Data Management Plan (second version)”.

This third version reports on additional datasets captured since the initial submission of the DMP and restates the project's adherence to FAIR principles and ethical and data security regulations in the generation, capturing, storage, and analysis of project-related data.

In parallel, it is noted HERON presents no ethical issues. The data collected will be related to traffic flows. HERON care does not lay on the personal data content but on the content referring to the traffic flows and the infrastructure. Nevertheless, it is underlined that in case any personal data, such as a person’s identity, is needed to be collected, the information will be treated securely.

1 Introduction

1.1 Purpose of the Document

The primary objective of this updated Data Management Plan (DMP) is to provide a comprehensive report on the data lifecycle within the HERON project. This includes data generation, collection, processing, and utilization by all project partners.

Building upon the foundations laid in the first version (D1.2), this third iteration of the DMP adheres to GDPR and FAIR principles (see Figure 1). It specifically addresses:

- The types of data that will be created to fulfill the core objectives of the HERON project.
- The methods and processes involved in data collection, creation, and generation.
- The protocols for data storage, processing, and preservation.
- The accessibility of data to third parties during the project and after its completion.

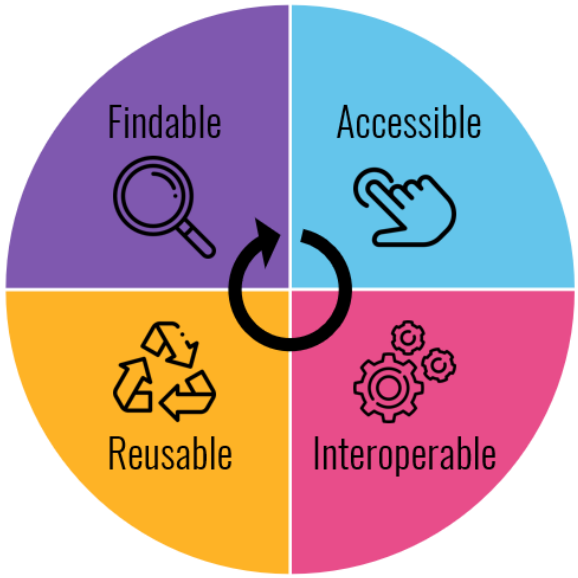

Figure 1: FAIR data principles (Findable, Accessible, Interoperable, and Reusable).

As with D1.2 and D1.11, this updated DMP is an official project deliverable (D1.12) for the HERON project, prepared in accordance with the European Commission's guidelines on FAIR data management in H2020 (EC, 2016). Furthermore, the dissemination level of this deliverable is public.

The structure of this document is as follows:

- **Section 2** details additional HERON datasets and their respective responsible partners.
- **Section 3** summarizes security and ethical concerns.
- **Section 4** provides the conclusion of this deliverable report.

1.2 Intended Audience

The document's target is the HERON consortium partners, as it describes how all archiving strategies are to be followed within the project for the information provided by the data owners during the project and the management of the content collected.

1.3 Interrelations

This deliverable interacts with all other project activities, as it provides information on the data that will be generated/collected, processed, and used by all the partners of the HERON project.

2 HERON datasets

In this section, we present the additional datasets collected by the HERON partners. The same questionnaire used in D1.2 and D1.11 was employed to report new datasets from project partners. Five major categories of datasets have been identified:

- Questionnaire or survey data
- On-site collected data
- Data collected via online repositories
- Generated (simulated) data
- Other

Based on these categories, 4 additional datasets have been specified by the HERON partners through the completion of the distributed dataset questionnaire (see Table 4). The main characteristics of these datasets, as identified by the HERON partners, are detailed in the following tables.

Table 4: List of the identified datasets that will be utilized in the HERON project.

No.	Responsible partner	Dataset Name	Data URL (given that the dataset is open)
1	ICCS	***Cracks and Potholes from UAV*** (See Table 5 for more details)	to be provided
2	ICCS	***Multispectral Road Corridor from UAV*** (See Table 6 for more details)	to be provided
3	ICCS and UGE	***RUP capturing from UAV*** (See Table 7 for more details)	https://github.com/ikasamenis/RUP-UAV/

Table 5: Cracks and Potholes from UAV (ICCS)

Dataset information	Description
Dataset Name	Cracks and Potholes from UAV
Responsible Partner	ICCS
Related WP/Task	• WP3 (Tasks 3.1, 3.2, 3.3) • WP4 (Task 4.4)
Dataset category	Collected data via UAV flight executed by ICCS
File type	• RGB road images: JPG, PNG • Annotations: TXT
Dataset description	This dataset consists of photos from UAVs deployed in the field in various heights, capturing road corridor visual data in the campus of the University of Athens. The National Kapodistrian University, Athens' largest educational institution, is located in the Zografou borough. In the summer of 2023, a portion of the campus roads sustained significant damage due to extreme weather events. Proximity to ICCS and its location within the same urban area of Athens allowed for drone operations without special permits, leading to its selection for data-capturing activities. During the autumn and winter of 2023-2024, three comprehensive data-capturing sessions were conducted. These sessions utilized drones at various altitudes and under diverse weather and lighting conditions, ensuring a robust and versatile dataset for research and development.
Data size	5.4 GB
Data sharing	• Open: The data will be made available openly accessible to the public. • Shareable via URL links. • The image files are accessible with any image viewer or editing software. The TXT files are accessible with any text editor. • Images do not contain personal data.
Data URL	TBD
Archiving & Preservation	The data is stored and preserved on ICCS servers with unlimited preservation time.
Ethics	No ethical or legal issues are expected for the collected data that may affect data sharing.

Table 6: Multispectral Road Corridor from UAV (ICCS)

Dataset information	Description
Dataset Name	Multispectral Road Corridor from UAV
Responsible Partner	ICCS
Related WP/Task	• WP3 (Tasks 3.1, 3.2, 3.3) • WP4 (Task 4.4)
Dataset category	Collected data via UAV flights executed during the ICARUS project [1].
File type	• RGB road images: JPG, PNG • Hyperspectral road images: TIFF • Segmentation masks: TIFF • Annotations: TXT
Dataset description	This dataset consists of photos from UAVs deployed in the field in various heights, capturing road corridor visual data in an area from Egnatia Odos national highway.
Data size	27.5 GB
Data sharing	• Open: The data will be made available openly accessible to the public. • Shareable via URL links. • The image files are accessible with any image viewer or editing software. The TXT files are accessible with any text editor. • Images do not contain personal data.
Data URL	TBD
Archiving & Preservation	The data is stored and preserved on ICCS servers with unlimited preservation time.
Ethics	No ethical or legal issues are expected for the collected data that may affect data sharing.

Table 7: Removeable Urban Pavement Data from UAV (ICCS-UGE)

Dataset information	Description
Dataset Name	RUP Data from UAV
Responsible Partner	ICCS-UGE
Related WP/Task	• WP3 (Tasks 3.1, 3.2, 3.3) • WP4 (Task 4.4)
Dataset category	Collected data via UAV flight executed by ICCS on RUP elements installed in UGE's premises in Nantes
File type	• RGB road images: JPG, PNG • Annotations: TXT
Dataset description	This dataset consists of photos from UAVs deployed in the field in various heights, capturing a test RUP section at Gustave Eiffel University premises in Bouguenais, near Nantes. The test section, constructed by Gustave Eiffel University in 2020, measures 8.51 meters in length and 2.31 meters in width. This section comprises slabs with a 46 cm edge and 23 cm thickness, including a surface layer of 4 cm porous concrete for the 22 double-layer hexagonal slabs with a weight of around 280 kg, 4 cm hydraulic concrete for the 15 half-edge slabs, and 2 single-layer quarter-slabs.
Data size	800 MB
Data sharing	• Open: The data will be made available openly accessible to the public. • Shareable via URL links. • The image files are accessible with any image viewer or editing software. The TXT files are accessible with any text editor. • Images do not contain personal data.
Data URL	https://github.com/ikatsamenis/RUP-UAV/
Archiving & Preservation	The data is stored and preserved on ICCS servers with unlimited preservation time.
Ethics	No ethical or legal issues are expected for the collected data that may affect data sharing.

3 Ethics and Security

For data handling, HERON will fully adhere to:

1. Directive 95/46/EC of the European Parliament and the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data.
2. The Charter of Fundamental Rights of the EU, specifically the article concerning the protection of personal data.
3. The opinions of the European Group on Ethics in Science and New Technologies in their report "Citizens Rights and New Technologies: A European Challenge" on the Charter on Fundamental Rights related to technological innovation.
4. General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679).

However, similarly to what was reported in D1.2, the data collected by the project are related to traffic flows and infrastructure readings. Personal data will not be collected by the consortium and no humans will be tracked. HERON care does not lay on the personal data content but on the content referring to the traffic flows and the infrastructure.

Moreover, as it was reported in D1.2 in case any personal data, such as a person's identity, is needed, the information will be treated securely in the manner reported and following all ethical and data security regulations and legislation.

4 Conclusions

This document provides updated guidelines for managing the data that will be collected, generated, or processed during the HERON project. Using a specific template/survey, partners have identified three additional datasets. Should the need arise to add more datasets as the project progresses, they will be categorized within the existing data clusters, and the relevant guidelines will apply.

For potential partners who may need to collect, generate, or process data in later stages of the project, this document serves as a reference point. All project partners are required to adhere to the FAIR principles and the guidelines presented here to ensure proper methods are used for the collection, storage, maintenance, use, and reuse of research data both during and after the completion of the HERON project. Compliance with these guidelines is mandatory for all project partners.

References

[1] Katsamenis, I., Bakalos, N., Protopapadakis, E., Karolou, E. E., Kopsiaftis, G., & Voulodimos, A. (2023, July). Real time road defect monitoring from UAV visual data sources. In Proceedings of the 16th International Conference on PErvasive Technologies Related to Assistive Environments (pp. 603-609).