



Final Data Management Plan

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Table of Contents

1. Executive Summary	4
2. Objectives	5
3. Data Summary	6
3.1 Deliverables	6
3.2 Dissemination and Communication Activities	6
3.3 Promotional Material and Videos.....	6
3.4 Publications.....	6
3.5 Project-internal communication	6
3.6 Experimental Study Data.....	6
3.7 Modelling Data	7
3.8 Methods	7
3.9 Datasets generated within HEIDI.....	9
4. FAIR Data	13
4.1 Making data findable, including provisions for metadata.....	13
4.2 Making data accessible	13
4.3 Making data interoperable	13
4.4 Increase data re-use	13
5. Allocation of Resources.....	14
5.1 Costs of making data FAIR.....	14
5.2 Responsibilities of data management.....	14
5.3 Long-term preservations	14
6. Data Security, Ethics and Other Issues	15
6.1 Data Security.....	15
6.2 Ethics	15
6.3 Other Issues.....	15
7. Conclusion	16
8. Abbreviations	17
9. References.....	18

List of Tables

Table 3-1: HEIDI Datasets.....	9
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1. Executive Summary

Deliverable D9.3, the Final Data Management Plan (DMP), consolidates the data management practices implemented throughout the HEIDI project. It builds upon the initial plan (D9.2) [1] and provides an overview of how research data was collected, processed, shared, and preserved in line with the FAIR principles [8]. The DMP adheres to the Horizon Europe guidelines and ensures full compliance with European Union (EU) and national regulations, including the General Data Protection Regulation (GDPR). Coordinated by VIF, the plan confirms that all consortium partners upheld consistent data governance practices. This final version reflects updates and adjustments made during the project's lifecycle and ensures long-term accessibility and reusability of project data and offers a glance at the datasets generated within the HEIDI project.

Keywords: Data Management Plan, FAIR data, Datasets

2. Objectives

The Data Management Plan (DMP) has played a central role in guiding HEIDI researchers in the effective handling of research outputs, data, and publications. Both the Initial (D9.2) [1] and Final (D9.3) DMPs outline the methodology adopted within the project to ensure compliance with the FAIR principles—making data Findable, Accessible, Interoperable, and Reusable—while also supporting data preservation and open access to promote reusability.

Recognizing that robust data management is essential for the dissemination, transfer, and long-term impact of scientific knowledge, the consortium has consistently aligned its practices with the requirements set out in Article 17 of the Grant Agreement (GA) [2] and the Consortium Agreement (CA) [3].

This final deliverable elaborates on and finalizes the data management practices initiated in D9.2 [1], following the Horizon Europe Data Management Plan Template [4].

Work Package 9 (WP9), led by VIF, has overseen the monitoring and implementation of data management practices, with VIF serving as the lead entity responsible for ensuring consistent handling of data. The principles and practices are connected to all HEIDI objectives.

3. Data Summary

The HEIDI project has placed a significant emphasis on data security measures and protocols. The project has safeguarded sensitive data collected from participants. The project has implemented rigorous access control mechanisms, granting data access strictly on a need-to-know basis and employing multi-factor authentication to verify user identities. To ensure the integrity and confidentiality of the data, data anonymisation and pseudonymisation techniques were used to protect personal identities while still allowing for meaningful analysis. These efforts ensured that the HEIDI project uphold high standards of data security and participant confidentiality, ensuring compliance with the EU data protection regulations, such as the General Data Protection Regulation (GDPR).

3.1 Deliverables

All HEIDI deliverables are available as PDF versions on the project SharePoint. After submission to the funding authority and approval by the EC, all public deliverables were published on the project website [9] and on CORDIS. Sensitive deliverables are only stored on our HEIDI SharePoint and only accessible by the consortium.

3.2 Dissemination and Communication Activities

Data generated by dissemination and communication activities was only used internally and nobody outside the consortium has access to it. Monitoring of these D&C activities was described in detail in Deliverables D8.2 Dissemination and communication plan [5], D8.4 HEIDI Y1 dissemination and communication activities [6] & D8.5 HEIDI Y2 dissemination and communication activities [7].

3.3 Promotional Material and Videos

Promotional materials, including videos, have been made publicly available on the project website [9]. Additionally, all dissemination materials are accessible to project partners through the project's SharePoint.

Project videos have been published on the HEIDI website, shared across social media platforms, and uploaded to the HEIDI YouTube account to maximize outreach and visibility.

3.4 Publications

Project-related publications are freely and openly accessible through trusted repositories, with appropriate acknowledgment of the HEIDI project funding. This commitment to open access is outlined in both the Grant Agreement [2] and the Consortium Agreement [3].

All publications are also conveniently available on the HEIDI website [9].

3.5 Project-internal communication

The communication between the partners is and has always been fully confidential, unless otherwise specified.

3.6 Experimental Study Data

During the HEIDI project lifecycle, a diverse range of data was collected, generated, and managed to support various research activities. This included vehicle data, simulator data, questionnaire responses, behavioural measurements, task-specific evaluations, participant profiles, experimental measurements, and debriefing session summaries. Data were gathered from multiple sources including participants in exploratory, validation, and evaluation studies, ensuring a comprehensive dataset to evaluate different aspects of the HEIDI HMI. The final

data types encompassed quantitative metrics (e.g., speed, time to collision), qualitative feedback (e.g., debriefing sessions, questionnaire responses), and incident logs (e.g., near crashes).

The data was stored in various formats, predominantly in .csv and .xlsx, but also .h5 and .hdf format, to facilitate easy analysis and sharing within the project team. The data classifications ranged from demographic information and health data to specific behavioural and physiological measurements, all pseudonymized to ensure privacy. Data sharing was restricted to project internal use due to the sensitive nature of personal information. Throughout the project, data were managed using a private cloud-based SharePoint system, with provisions for archiving and preservation in the HEIDI Consortium Repository for four years post-project completion. This comprehensive approach ensured that data integrity, accessibility, and confidentiality were maintained throughout the project lifecycle.

3.7 Modelling Data

Methods, functionalities, and exemplary outputs developed within the project are openly accessible (see Table 3-1). However, the underlying models remain closed by default, unless explicitly stated otherwise. All data is stored on the HEIDI SharePoint, on the internal servers of project partners, and selected datasets will be made publicly available on trusted platforms.

3.8 Methods

Details regarding data collection methods are reported in deliverables D2.3 (exploratory studies), D5.3 (validation studies), and D7.1 (evaluation studies).

Four data collections were performed by VIF: Study 1, Study 2, and Study 5a and 5b. Two data collections were performed by VTI: Study 7 and 12. The data was gathered in three distinct work packages: WP2, WP5 and WP7. Study 1 and 2 were performed in WP2 and the focus was on evaluating the first versions of the internal HMI for regular and older drivers, respectively. Study 5 was performed in WP5 and the focus was on evaluating the final version of the iHMI and the evaluation methods themselves. All studies conducted by VIF used the own driving simulator infrastructure. Study 7 was performed in WP5 and the focus was on developing validation methods and evaluating a first version of the cHMI. Study 12 was performed in WP7 and the focus was on evaluating the final version of the cHMI. Both studies were conducted using the co-simulation setup developed in the HEIDI project, with a driving simulator and a pedestrian simulator connected through a multiplayer server. Both objective data (e.g., simulator data) and subjective data (e.g., questionnaires and interviews) was collected, alongside participants' personal details like address and email solely for compensation purposes. The information gathered was used by VIF, VTI and HRI-EU researchers to evaluate the iHMI and cHMI, with all data securely uploaded to SharePoint and restricted to consortium partners. Personal data was accessible only to researchers involved directly in the project. The data is set to be erased after five years.

Technical and organisational security measures were rigorously applied. Participants' data was pseudonymised, with a code assigned to each participant, and the key to this code was securely stored. Confidentiality, integrity, availability, and resilience of processing systems were ensured through strict control of the key until the project was closed. Additionally, VIF and VTI maintains a GDPR register to monitor all studies involving participants, facilitating compliance with GDPR regulations and accommodating any requests for data withdrawal. Regular testing and evaluation of security measures are conducted at VIF and VTI, with two-factor authentication required for external access to the respective SharePoint platforms.

There were no transfers of personal data to third countries or international organizations.

All methods employed in the HEIDI project are publicly available in deliverable D5.3 and D5.5, unless explicitly stated otherwise. These methods are stored either on the HEIDI SharePoint, the project website, or the internal servers of the respective partners (see Table 3-1).

3.9 Datasets generated within HEIDI

Table 3-1 presents a high-level overview of each dataset collected or created during the HEIDI project. It is structured vertically, with each dataset listed in a separate row and described across multiple columns. These columns include essential information such as the dataset name, responsible partner, task number, data format, archiving, and a brief description. This table effectively summarises critical attributes of each dataset, providing an at-a-glance view that facilitates quick reference and understanding of the project's data landscape.

Table 3-1: HEIDI Datasets

Data / data set name	Task	Partner	Data description	Standards, format	Can this data/set be shared?	Is the dataset reusable?	Archiving and preservation (incl. Storage and backup)
OccluRoads Dataset	T3.3	UAH	Dataset with video sequences containing occluding pedestrians for developing prediction systems	URL	YES	YES	Dataset stores at UAH URL. https://occluroads.s3.us-west-2.amazonaws.com/index.html
ImplicitInteractionDataset	T7.2	UAH, HRI	Dataset containing vehicle trajectories and crossing timestamps of pedestrians.	.csv	YES	YES	Dataset stored at UAH SharePoint. HMI Experiments
Simulator data study 7	T5.4	VTI	Data from all individual interactions and combined summary data from the study 7 data collection	.csv	NO	NO, requires new ethics approval	Dataset stored on HEIDI project folder [Datasets] and VTI SharePoint.
Questionnaire data study 7	T5.4	VTI	Questionnaire data from the study 7 data collection	.xlsx, .sav	NO	NO, requires new ethics approval	Dataset stored on VTI SharePoint.
Simulator data study 12	T7.2	VTI	Data from all individual interactions and combined summary data from the study 12 data collection	.csv	NO	NO, requires new ethics approval	Dataset stored on HEIDI project folder and VTI SharePoint.

Data / data set name	Task	Partner	Data description	Standards, format	Can this data/set be shared?	Is the dataset reusable ?	Archiving and preservation (incl. Storage and backup)
Questionnaire data study 12	T7.2	VTI	Questionnaire data from the study 12 data collection	.xlsx, .sav	NO	NO, requires new ethics approval	Dataset stored on VTI SharePoint.
Motion Recordings - Pedestrian Attributes	T3.2	RUAS	Full-body recording of normal/distracted/walking aid/wheelchair pedestrians	fbx	NO	YES	RUAS
Study 3 - Motion Recordings	T3.4	RUAS	Full-body recordings of pedestrian crossing the street with and without eHMIs	csv	YES, upon request	YES	RUAS
Study 3 - Questionnaires	T3.4	RUAS	Questionnaires of pedestrian crossing the street with and without eHMIs	physical paper, csv	NO	Yes	RUAS
Study 3 - Generated Synthetic Dataset	T3.4	RUAS	RGB dataset for POV of vehicle with crossing pedestrian	custom (csv, json, jpg, png)	NO	Yes	RUAS
Study 6 - Motion Recordings	T5.4	RUAS	Full-body recordings of pedestrian crossing the street with and without eHMIs	csv	YES, upon request	YES	RUAS
Study 6 - Questionnaires	T5.4	RUAS	Questionnaires of pedestrians crossing the street with and without eHMIs	physical paper, csv	NO	YES	RUAS
Study 10 - Motion Recordings	T7.2	RUAS, MAR	Pedestrian head and vehicle recordings of pedestrian crossing the street with and without eHMI	fbx	YES, upon request	YES	RUAS

Data / data set name	Task	Partner	Data description	Standards, format	Can this data/set be shared?	Is the dataset reusable ?	Archiving and preservation (incl. Storage and backup)
Study 1 - Simulator data	T2.3, T2.4	VIF	Driver's actions in the simulator	.h5	YES, upon request	YES	VIF [Study 1 and 2]
Study 1 - Questionnaires	T2.4	VIF	Subjective assessment self	.csv	YES, upon request	YES	VIF [Study 1 and 2]
Study 1 - Interviews	T2.4	VIF	Reported comments	.csv	YES, upon request	YES	VIF [Study 1 and 2]
Study 1 - Videos	T2.3	VIF/UAH	Video of front view to support ML training	.mpg	YES, upon request	YES	VIF [Study 1 and 2]
Study 2 - Simulator data	T2.3, T2.4	VIF	Driver's actions in the simulator	.h5	YES, upon request	YES	VIF [Study 1 and 2]
Study 2 - Questionnaires	T2.4	VIF	Subjective assessment self	.csv	YES, upon request	YES	VIF [Study 1 and 2]
Study 2 - Interviews	T2.4	VIF	Reported comments	.csv	YES, upon request	YES	VIF [Study 1 and 2]
Study 2 - Videos	T2.3	VIF/UAH	Video of front view to support ML training	.mpg	YES, upon request	YES	VIF
Study 5a - Simulator data	T5.4	VIF	Driver's actions in the simulator	.h5	YES, upon request	YES	VIF [Study 5]
Study 5a - Questionnaires	T5.4	VIF	Subjective assessment self	.csv	YES, upon request	YES	VIF [Study 5]
Study 5a - Interviews	T5.4	VIF	Reported comments	.csv	YES, upon request	YES	VIF [Study 5]
Study 5b - Simulator data	T5.4	VIF	Driver's actions in the simulator	.h5	YES, upon request	YES	VIF [Study 5]
Study 5b - Questionnaires	T5.4	VIF	Subjective assessment self	.csv	YES, upon request	YES	VIF [Study 5]
Study 5b - Interviews	T5.4	VIF	Reported comments	.csv	YES, upon request	YES	VIF [Study 5]

Data / data set name	Task	Partner	Data description	Standards, format	Can this data/set be shared?	Is the dataset reusable ?	Archiving and preservation (incl. Storage and backup)
WP4	n/a	HRI-EU	no data has been gathered	n/a	n/a	n/a	n/a
Study 10 - Questionnaires	T7.2	MAR	Subjective self assessment	physical paper, .pdf, .xlsx	YES, upon request	Yes	MAR
D3.1 - Questionnaires	T3.1	MAR	Display assessment	physical paper, .pdf, .xlsx	YES, upon request	Yes	MAR
WP8 & WP5	n/a	TREE	No data has been gathered	n/a	n/a	n/a	n/a
Study 8 - Questionnaires	T7.2	BMW, NISYS	Questionnaire data from the study 8 data collection	.xlsx	YES, upon request	YES	NISYS
Study 8 – Real World Data	T7.2	BMW, NISYS	Synchronized data from driver monitoring (eye tracking), vehicle state information, questions (for driver distraction) and GPS-positions (vehicle, pedestrian)	.hdf5	YES	YES	Dataset stored at VIF SharePoint iHMI Real Experiments
Study 8 – Video of Test drive	T7.2	BMW, NISYS	Video from the experiments	.mp4	YES	n/a	Dataset stored at VIF SharePoint iHMI Video

4. FAIR Data

Throughout the course of the HEIDI project, data has been generated, processed, and shared among partners. This section outlines how the project ensured alignment with the FAIR principles—making data Findable, Accessible, Interoperable, and Re-usable [8]. This is also summarized in Table 3-1.

4.1 Making data findable, including provisions for metadata

All project partners followed a unified approach to data management to ensure proper documentation, traceability, and long-term accessibility, in line with FAIR data practices.

Data generated within HEIDI is stored on a dedicated SharePoint managed by VIF, with access rights assigned based on confidentiality levels. Metadata standards are applied to ensure discoverability and consistent classification of datasets.

Scientific publications resulting from the project are assigned Digital Object Identifiers (DOIs), and associated datasets are deposited in open-access repositories in accordance with the Grant Agreement [2] and the Consortium Agreement [3].

4.2 Making data accessible

The HEIDI project adopts an open-by-default policy for data sharing, with exceptions made for sensitive or confidential information, which is accessible only within the consortium.

All project data is stored on the central HEIDI SharePoint, which is managed by the coordinator (VIF). Access is limited to consortium members and is granted exclusively by VIF. The platform facilitates secure file sharing, with access control for individual documents.

Public deliverables, open-access publications, and dissemination materials are published on the official HEIDI website [9]. A significant portion of project deliverables—26 out of 37—are public and available online.

4.3 Making data interoperable

To support interoperability, HEIDI relies on widely-used and standardized data formats such as .docx, .pdf, .mp4, .xls, and .txt. Publications are shared in accessible formats that can be read online or downloaded without restriction.

English is the designated working language for the project, promoting interdisciplinary communication and cross-domain compatibility.

4.4 Increase data re-use

Data re-use has been assessed throughout the project lifecycle. Unless explicitly stated otherwise, data generated in HEIDI is treated as confidential, in accordance with the terms defined in the Consortium Agreement [3].

When data was designated for public release, it was made openly available through appropriate repositories and platforms, supporting transparency, reproducibility, and broader reusability.

5. Allocation of Resources

5.1 Costs of making data FAIR

All expenses related to the setup, operation, and maintenance of the HEIDI SharePoint are covered by the project coordinator VIF. While the repository will not be actively maintained beyond the project's conclusion, the data stored on the platform will remain accessible after the project ends.

Costs associated with open-access publication are the responsibility of the corresponding authors and respective project partners. Each partner's budget includes dedicated resources to support these efforts, ensuring that the project's research outputs remain openly accessible. Further details regarding cost allocations can be found in the Grant Agreement [2].

5.2 Responsibilities of data management

The overall responsibility for data management lied with the project coordinator VIF. This included the establishment and administration of the SharePoint, managing user access, and addressing access requests.

Each data generator within the consortium was responsible for ensuring the quality of the data they collected and uploaded. All partners were committed to adhering to the FAIR principles throughout the lifecycle of data handling within the project.

5.3 Long-term preservations

The long-term preservation of data used and generated during the project is actively considered by all partners. Both the HEIDI website and the SharePoint will remain accessible for a minimum of four years following the project's completion, ensuring continued availability of key resources.

6. Data Security, Ethics and Other Issues

6.1 Data Security

All data collected during the HEIDI project has been managed with the highest standards of security. The entire consortium was committed to ensuring robust data protection throughout the project's duration. Any data transfers between partners were conducted through secure channels to prevent unauthorized access. The HEIDI project also ensured full compliance with applicable EU regulations on the protection of personal data, including the General Data Protection Regulation (GDPR) [8].

6.2 Ethics

As the HEIDI project involved the conduct of studies, strict adherence to the highest ethical standards at both the EU and national levels has been a top priority for the consortium. To address this, the project submitted Deliverable D5.1 Ethical Guidelines and Procedures [10], which outlines the protocols for collecting, storing, and processing personal and sensitive data. This deliverable also defined the core principles governing data use and management within the project. Given the involvement of personal data, the consortium has appointed an external ethics advisor to provide expert guidance on all ethical matters. Several meetings with the ethics advisor have taken place and given valuable input for our research.

6.3 Other Issues

No issues have been identified during the course of the project.

7. Conclusion

The HEIDI project was committed to responsible, transparent, and secure data management throughout its lifecycle. By adhering to the FAIR principles [8]—ensuring data is Findable, Accessible, Interoperable, and Re-usable—the project supported knowledge sharing and long-term impact.

The project's SharePoint platform ensured secure storage and controlled access to data, while open-access dissemination and clear standards promoted visibility and reusability. The consortium's adherence to ethical standards, including the appointment of an external ethics advisor, reinforced the project's responsibility in handling personal and sensitive data in full compliance with EU regulations.

8. Abbreviations

Term	Definition
CA	Consortium Agreement
D	Deliverable
D&C	Dissemination & Communication
DMP	Data Management Plan
DOI	Digital Object Identifier
EC	European Commission
EU	European Union
FAIR	Findable, Accessible, Interoperable and Re-usable
GA	Grant Agreement
GDPR	General Data Protection Regulation
HEIDI	Holistic and adaptive Interface Design for human-technology Interactions
PU	Public
R	Document, Report
WP	Work Package

9. References

- [1] HEIDI Deliverable D9.2 “Initial Data Management Plan”, approved: April 2024
- [2] Grant Agreement Number 101069538 – HEIDI
- [3] Consortium Agreement HEIDI, final version
- [4] Horizon Europe Data Management Plan Template, Version 1.0, 2021-05-01
- [5] HEIDI Deliverable D8.2 “Dissemination and communication plan”, approved: April 2024
- [6] HEIDI Deliverable D8.4 “HEIDI Y1 dissemination and communication activities”, approved: April 2024
- [7] HEIDI Deliverable D8.5 “HEIDI Y2 dissemination and communication activities”, submitted: August 2024
- [8] Horizon Europe Programme Guide: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf, Version 2.0. 2022-04-11 (last accessed April 2025)
- [9] <https://heidi-project.eu/>
- [10] HEIDI Deliverable D5.1 “Ethical Guidelines and procedures”, approved: April 2024