




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

Grant Agreement Number: 955356

D1.1: Quality Assurance Plan

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Activity	Task 1.3: Quality and Ethics assurance
Deliverable	D1.1: Quality Assurance Plan
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Abbreviation Lists

Abbreviation	Definition
AB	Advisory Board
CA	Consortium Agreement
DCM	Dissemination and Communication Manager
DL	Deliverable Leader
EB	Ethics Board
ER	External Relations
FCO	Financial Control Office
GA	Grant Agreement
HDS	Help Desk Secretariat
IEM	Innovation and Exploitation Manager
KPIs	Key Performance Indicators
PC	Project Coordinator
PCT	Project Coordination Team
PO	Project Officer
RI	Road Infrastructure
QAP	Quality Assurance Plan
QM	Quality Manager
TC	Technical Committee
TL	Task Leader
TM	Technical Manager
WP	Work Package
WPL	Word Package Leader

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

Term	Explanation
Open Access, Green Open Access, Gold Open Access	Publications are freely available online to all at no cost and with limited restrictions with regards to reuse. Gold Open Access is where an author publishes their article in an online open-access journal, making it freely accessible right from the moment they are first published, while Green Open Access, also referred to as self-archiving, is where an author publishes their article in any journal and then self-archives a copy in a freely accessible institutional or specialist online archive known as a repository, or on a website.
Peer-reviewed publications	Peer-reviewed publications refer to publications that have been evaluated by peers, i.e. other scholars. The dominant type of peer-reviewed scientific publication is the journal article, for which open access is mandatory in Horizon 2020. In addition, however, beneficiaries are strongly encouraged to provide open access to other types of scientific publications, some of which may, in some cases, not be peer-reviewed, including monographs, books, conference proceedings and grey literature (informally published written material not controlled by scientific publishers, e.g. reports).

Executive Summary

This deliverable document provides an extensive description of the quality assurance processes that will govern the course of the HERON project. This report is written in the framework of WP1 - Project Coordination and Management of the HERON project under Grant Agreement No. 955356.

This deliverable defines the project organization, procedures, roles, and responsibilities related to the quality control and quality assurance activities, that will be carried out during the forty-eight months' duration of the project. It describes how the project will execute its day-to-day activities, from a quality perspective, and ensures that standards, processes, and procedures are defined and their execution is continuously monitored, corrected when necessary, and improved.

Furthermore, the specific report exposes the proposed risk management approach of the project for controlling and managing all the potential risks. In addition, it presents the responsibilities and roles of the consortium members, the risk identification per task and activity, as well as the risk assessment and mitigation plans.

The present deliverable is based on the terms and conditions established in the HERON Grant Agreement, its Annexes, and the Consortium Agreement. The use of the present instructions and guidelines is able to secure better collaboration between the consortium partners. Lastly, this report is to be utilized by the HERON partners, to ensure project implementation according to the Gantt chart, quality assurance of project procedures and outcomes, by following EU rules of research and innovations outcomes reporting, as well as protect the consortium from potential divergences from the project goals and objectives.

1 Introduction

1.1 Purpose of the Document

The purpose of the specific document, titled: D1.1 “Quality Assurance Plan”, is to describe the adopted Quality Assurance Plan (QAP), by focusing on the indicators and quality processes related to the various Work Packages (WP), Tasks, Deliverables, Milestones, etc. of the HERON project plan. More specifically, the QAP comprises a high-level description of the quality assurance scheme as well as the procedural and organizational means for accomplishing it (see Figure 1). Additionally, this report aims to assemble the risk management plans for each WP.



Figure 1: HERON's quality control procedure.

In a nutshell, this deliverable report covers the best practices and processes for the various crucial project management activities, which are briefly presented below:

- Project management.
- Communication and contribution among HERON partners.
- Periodic review of the project progress, regarding the conformance to schedules and plans.
- Periodic review of the project plan.
- Management of deliverables and other various project outputs (e.g. development of the deliverables and submission procedures).
- Internal reviews of all deliverables so that they conform to requirements, standards, and specifications (review of every draft, plus a full validation review of the final version).
- Initiation and follow-up of corrective actions for resolving non-conformities, whenever deemed appropriate (i.e. event-driven).

- Documenting procedures, guidelines, roles, and tasks.
- Financial and activity reporting.
- Risk management on WP level.
- Measurement of project performance.
- Impact assessment.

The heart of this deliverable lies in an initial release of various processes, tools, and guidelines that are able to assist the numerous HERON-related tasks and procedures. It is underlined that the presented procedures, tools, and guidelines have been also successfully and effectively developed and employed in several similar projects and thus are in a mature state. Nevertheless, over the course of the years, the utilized processes, tools, and guidelines may need some small adaptations, updates, and modifications. Consequently, after the HERON consortium has been informed, the present report may be revised over time.

The remainder of this document is organized as follows:

Initially, Section 2 briefly discusses the overall project management structure, while Section 3 presents communication and contribution among HERON partners. Subsequently, Section 4 outlines the decision process and information flow, and Section 5 delineates the consortium as a whole and includes information about the contribution of each partner in the HERON project. In parallel, Section 6 describes the management of deliverables and other various project items, while Section 7 discussed the reporting procedures, whereas Section 8 analyzes the risk management process. Lastly, Section 9 concludes this deliverable report.

1.2 Intended Audience

The document's target is the HERON consortium partners, as it contains all quality procedures and indicators pertaining to WPs, tasks, deliverables, milestones, etc. of the original project plan. Moreover, risk management plans for each WP are developed.

1.3 Interrelations

This deliverable interacts with all other project activities, as it presents the overall project management structure, the way that the communication and contribution of the HERON project partners will take place, the risk management plans, as well as the quality assurance methodology, and the organizational and procedural means for achieving it.

2 Project Management

2.1 Project's Management Structure

The project's management structure considers both the complexity and the effort required to encompass management of knowledge, innovative and sustainable activities, intellectual property, coordination, and exploitation. Figure 2 illustrates an overview of the management structure of the HERON project. More details can be found in the D1.7 Project Management Plan, which was submitted on M3.

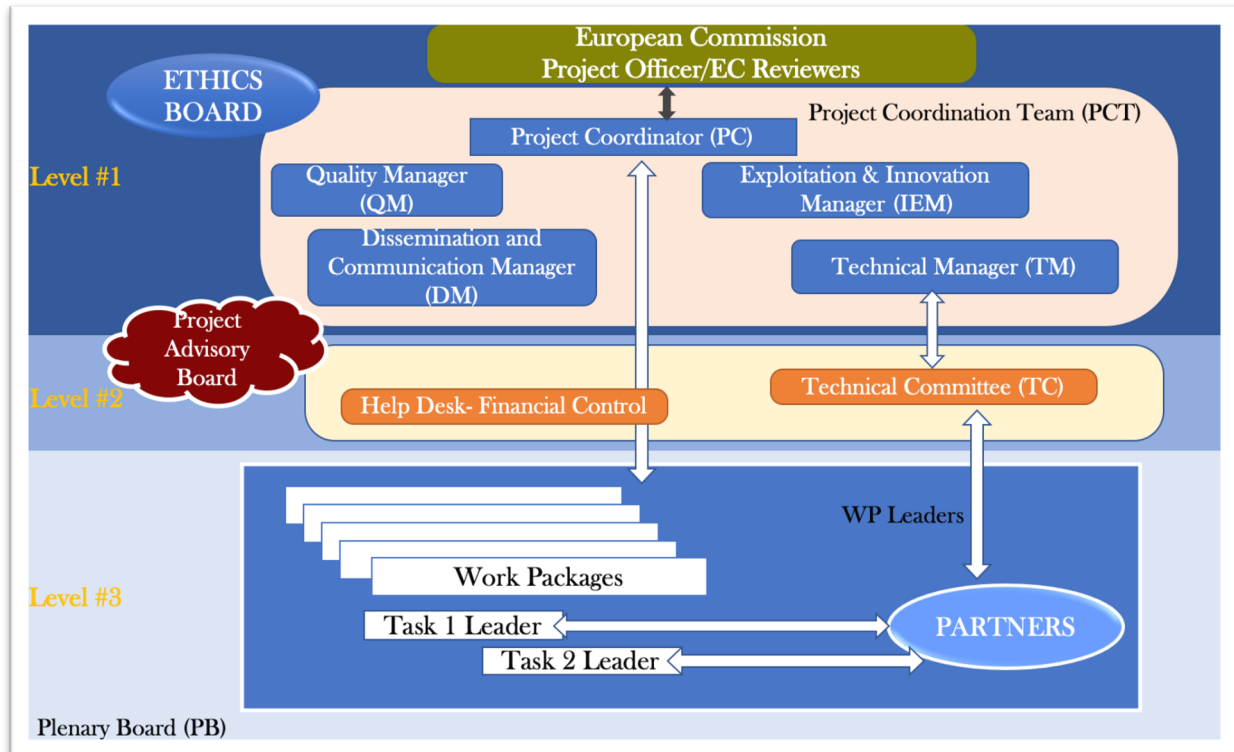


Figure 2: HERON management structure.

2.2 Project Coordinator (PC)

Generally, the Project Coordination Team (PCT) shall be responsible for the planning, execution, and controlling of the project. More specifically the PCT encompasses the following activities: (a) Administration and scientific coordination activities, (b) Implementation of all action plans, (c) Establishing a budget and schedule-controlling system, (d) Implementation of a quality assurance system, (e) Providing clear guidance on Intellectual Property issues, (f) Developing and maintaining a communication and reporting attitude, and (g) Creation of efficient team structures to minimize the number of meetings while being flexible.

The PCT is constituted by the Project Coordinator (PC), whose role is to be responsible for the overall management, communication, and coordination of the project. A special emphasis is to assure in accordance with the WP Leaders the overall integration of the single WPs and, also, to chair the Technical Committee (TC). The PC proposes strategic orientations to consortium members and ensures fluid communication with the EC Project Officer (PO). Any information regarding the project will be propagated to PO only through the PC, who acts as a proxy

between HERON partners and the EC. The details of the tasks and responsibilities assigned to the PC are described in the Grant Agreement and the Consortium Agreement (CA).

2.3 Technical Manager (TM)

The Technical Manager (TM) will ensure that the scientific and technological objectives of the project are met. The TM will cooperate closely with the WP Leaders towards successfully concluding all the technical/technological development, integration, and support tasks envisaged in the HERON work plan.

2.4 Innovation – Exploitation Manager (IEM)

The Innovation and Exploitation Manager (IEM) manages the execution of the overall exploitation plan of the project and supports the partners in setting up their individual business plans, as well as a business plan for the HERON final (combined) product as a whole, in order to exploit the results of HERON. The IEM will also ensure the partners assess opportunities for applying for patents or declaring copyrights.

2.4.1 Innovation Management

To successfully implement HERON's creative ideas, it is required an Innovation Management procedure to pave the way from concept to prototype development and thereby finally to market. The main focus of Innovation Management will allow responding to opportunities during the project's lifetime and use its creative efforts to introduce novel policies in the framework of improving the overall improvement of the RI resilience against extremes.

HERON will follow an open innovation approach, where members of the consortium collaborate extensively in their innovation process between them as well as involve other stakeholders. Open innovation will help to gain access to important complementary and will embrace to harvest ideas from many sources. The challenges of this approach such as finding suitable partners, developing relational capabilities, and protecting and dividing property rights will be overcome by complementary expertise of the consortium partners, by developing relations with policy and regulatory agendas, as well as the Advisory Board (AB). Our open innovation philosophy includes cross-industry workshops, collaboration with external organizations and projects, and a full chain of actors presented in the process.

2.5 Dissemination and Communication Manager (DCM)

The Dissemination and Communication Manager (DCM) along with the PC will monitor, lead and coordinate communication and dissemination activities. The DCM will work closely with the IEM and the PC to ensure a link with exploitation activities, taking into account IPR.

2.6 Quality Manager (QM)

The Quality Manager (QM) will be responsible for the implementation of the quality procedures determined in the Quality Plan (QP) described in this deliverable and the verification of the project results. Main responsibilities include the development of the QP, the monitoring of the implementation of the quality procedures along with the project duration, the review of the deliverables and initiating actions, reporting to the PC, when needed.

2.7 Technical Committee (TC)

The Technical Committee (TC) is expected to be the project's technology driving force and is led by the TM. TC members are permanent for the project duration, except if they wish to leave the TC themselves or because of EU intervention. The TC shall be in charge of supervising the project technological progress/achievements and submitting proposals to the Coordinator and PB upon all relevant technical issues such as redirection of technical work in a WP, major transfer of resources across WPs or Partners (over 10%), technological choices, changes in time plans substitution or exclusion of an existing Partner, resolution of the conflict between different technological WPs. All TC members will have a single vote. In case of equal votes, the vote of the TM shall be the decisive one. This group will meet once every three months following the project status and needs.

2.8 Work Package Leader (WPL)

Each Word Package Leader (WPL) leader is responsible for the management of the corresponding work package. They are supported by the leaders of embodied tasks. The main responsibilities of a WPL are presented below:

- Coordinating the technical work of the corresponding WP.
- Planning, coordinating, and harmonizing the content of the corresponding deliverables.
- Monitoring the procedure of the work in the corresponding WP.
- Report to the PC about technical progress and potential inactivity.
- Providing detailed theoretical knowledge and analysis of the most crucial technologies.
- Organizing WP meetings.
- Coordinating the WP input/output from/to supporting partners and external parties.
- Maintaining communication with the corresponding and related WPs.
- Supporting the IEM in the definition and implementation of the Innovation Strategy and Plan.
- Supporting the DCM in the definition and implementation of the Communication Strategy and Plan.

2.8.1 Task Leader

Similar to the WPL, the Task Leaders (TL) are responsible for the management of their tasks. It is underlined that a Task Leader reports to the WPL.

2.8.2 Deliverable Leader

Similar to the WPL and TL, the Deliverable Leaders (DL) are responsible for the management of their deliverables (see Section 6.3 for more details).

2.9 Other Roles Supporting the Coordination

2.9.1 Financial Control Office (FCO)

This service will monitor the Annual Cost Statements, and the PMs/expenditures on a 6-month basis and provide feedback to the partner, the PC, and the QM. It will use a software for scheduling and reporting and will train its staff to meet all WU requirements.

2.9.2 External Relations (ER)

This is an independent service, administered by the dissemination manager, that will receive all external requests (i.e. questions on project concept and results through the Internet, relation

to the Press and the Media), including follow-up of concentration activities with other projects and of activities of relevant standardizations bodies and International Fora.

2.9.3 Help Desk Secretariat (HDS)

Experienced staff from the PC will be able to provide feedback to partners upon request, concerning several project administrative issues such as Timesheets, Quarterly reports, Cost Statements, allowable costs, etc. Clear guidelines on these issues will be provided at the start of the project and will be revised, when necessary.

2.9.4 Ethics Board (EB)

Ethics Board's main task is to guarantee that all contractual, legal, ethical, and gender equality issues related to the project research are carefully considered and any relevant conventions are respected. This will be consisted of an expert in Ethics (assigned by the PC) and at least one expert member of the demo site leaders to supervise the overall ethical and legal framework for all kinds of activities to take place in the framework of the project.

2.9.5 Advisory Board (AB)

In order to maximize user influence on project developments at all levels, an Advisory Board (AB) has been set up. The following members of the AB have been secured (some of them have signed a letter of support). To present the above-mentioned roles mapped on partners of the HERON consortium, Table 1 describes their respective responsibilities.

Table 1: The HERON Advisory Board (AB) members.

Domain	Name	Institution	Country	Position
Transport Authorities	Hans Eriksson	Swedish Transport Agency	SE	Senior Advisor for international relations
	Corina Li	Road Transport Authority	RO	
	Arpad Gordos	Ministry of National Development	HU	Coordinator for international relations
Inspection Companies	Nassos Anastasopoulos	MISTRAS Group-International Company	GR	Director of Sales and Engineering
Networking-Communications	Francisco Javier Rodriguez Blanco	Nokia Networks	ES	PMO Head Global Services Delivery Transformation
AI/ML	Dr. Jin Yang	Futurewei Technologies, Inc. The US branch of Huawei	US	CTO, Applied AI/ML Research
Computer Vision	Prof. Luc Van Gool	Computer Vision Laboratory, ETHZ Zentrum	CH	Professor in Computer Vision Algorithms and Machine Learning
3GPP Standards	Dr. Apostolis Salkintzis	Lenovo & Motorola Mobility	GR	Standards Representative (Mobile 5G) & Lead 3GPP Architect

Construction Companies	Alvaro Duarte	AMISA Infrastructure Maintenance	ES	International Operation & Maintenance Manager
RI Resilience	Prof. John W van de Lindt, Ph.D., F. ASCE	Department of Civil and Environmental Engineering Colorado State University	US	Co-Director, NIST Center of Excellence for Risk-Based Community Resilience Planning
Remote Sensing	Dr. Michele Crosetto	Centre Tecnològic de Telecomunicacions de Catalunya	ES	Head of the Remote Sensing Department

3 Communication and Contribution among Partners

Communication through voice calls and emails is the typical way of collaboration and exchange of information between HERON partners. Additional means to facilitate internal collaboration and communication among the members of the HERON consortium were considered: (a) project distribution mailing lists, and (b) meetings (it is underlined that due to the COVID-19 pandemic, only digital meetings are allowed).

3.1 Communication of the Consortium

The Information flow within HERON will be ensured by the exchange of the internal technical and business documents, the notification of relevant new publications in literature, or by the standard bodies and the reports from external meetings. All technical documentation will be exchangeable in electronic format, according to a set of guidelines that have been described in the QP (guidelines for naming and classification) in the below sections. A web project document repository (SharePoint¹) has already been made by the ICCS team. Telephone and fax can be used for urgent needs only. Urgent correspondence over e-mail will be sent with a request for explicit acknowledgment. Ordinary mail will be used for strictly formal correspondence, i.e. when executing signatures are required. Adherence to the agreed communications standards will be enforced by the PC and the QM.

3.1.1 Mailing Lists

Apart from the conventional communication methods that were presented above and using experience from other similar projects, a mailing list management system can help all members of the HERON consortium to address their proposals and questions to the right partner(s). Table 2 shows the distribution of the HERON mailing lists.

Table 2: HERON distribution mailing lists

Mailing List Name	Distribution List Address	Description
heron_all	all@lists.heron-h2020.eu	Main contact persons, per organization, in HERON
heron_wp1	wp1-request@lists.heron-h2020.eu	WP1 contact persons
heron_wp2	wp2-request@lists.heron-h2020.eu	WP2 contact persons
heron_wp3	wp3-request@lists.heron-h2020.eu	WP3 contact persons
heron_wp4	wp4-request@lists.heron-h2020.eu	WP4 contact persons
heron_wp5	wp5-request@lists.heron-h2020.eu	WP5 contact persons
heron_wp6	wp6-request@lists.heron-h2020.eu	WP6 contact persons
heron_wp7	wp7-request@lists.heron-h2020.eu	WP7 contact persons
heron_wp8	wp8-request@lists.heron-h2020.eu	WP8 contact persons
heron_wp9	wp9-request@lists.heron-h2020.eu	WP9 contact persons
heron_wp10	wp10-request@lists.heron-h2020.eu	WP10 contact persons

¹ <https://www.microsoft.com/el-gr/microsoft-365/sharepoint/collaboration>

It is emphasized that a set of safety standards regarding the mailing lists are adopted:

- A user who is not on a mailing list is able to send an email to the list, but it will not be delivered until its approval by the list moderator(s).
- Unsubscription from a mailing list can be carried out, either by notifying the moderator(s) or automatically.
- The members of the mailing lists can be frequently updated, according to corresponding WP demands.

Furthermore, it is underlined that the rules below focus on guaranteeing a certain level of effectiveness regarding the communication through the HERON project mailing list structure:

- Comments, messages, and questions should not be irrelevant to the focus of the corresponding discussion group. Also, they should be to the point and as short as possible.
- Reposting and forwarding information and messages do not have to be changed. Moreover, if a message is personal, it is suggested to initially ask for permission.
- For any dispute between two or more members (provided that the number is relatively small) of a mailing list, it is recommended that the discussion is held through private messages, instead of sending public messages to the whole list. If the discussion gets to a point where the whole group might be of some interest, then a summary message is sufficient. Lastly, if the dispute cannot be resolved and it may have an impact on the deliverable, the Conflict Resolution section (see Section 4.2) explains the appropriate way to resolve it.

3.1.2 Meetings

The HERON project meetings can be classified according to the categories below:

- Kick-off meeting which aims on planning the initial tasks and work of each WP. Its scope is to serve and discuss the project's relevant issues and topics. In parallel, its purpose is to address ongoing activities and plan the work for the following period with participants all project partners, and EU representatives.
- WP progress meetings, which will run to verify and monitor the work progress of the corresponding WP. It is noted that the specific meetings will help update the status of the HERON project on a regular (e.g., weekly) basis. Furthermore, they contribute to effectively discussing operational, administrative, and technical topics in a timely fashion. The main participants of these meetings are the PCT, TC, and TM as well as the partners involved in the specific WP tasks.
- WPs coordination meetings, between the various WPLs. Such meetings typically run on a weekly basis but are scheduled however depending on the needs of each case.
- Dissemination meetings, in which the entire consortium discusses the outputs achieved during the various events and shares the knowledge with the community of HERON stakeholders.
- Project review meetings, which according to the GA aim at the project evaluation. These meetings run between the HERON consortium as well as the EC representatives and external reviewers. They will be appointed by the PO, who will evaluate the HERON project progress and execution towards the goals declared in the DoW.

It is noted that the PCT will meet every 4-6 months in order to keep track of the HERON project progress. In parallel, the WP meetings will take place every 3 or 4 months, in most cases in conjunction with the PCT meetings, or organized workshops. It is underlined that WP meetings may run whenever is required as a teleconference meeting. Lastly, all face-to-face meetings

initiated by the partners must be communicated in advance to the PCT, which will optimize their location and time, in order to minimize the travel costs, by coordinating several parallel meetings.

It is also emphasized that due to the COVID-19 situation and the high risk to public health, based on the current circumstances in EU cities, face to face meetings are not possible at this time, at least for the first months of the project (exceptions may arise for meetings at the organizational level, if in parallel permitted by local measures and by with strict use of appropriate security and health safety measures). Subsequently, relevant face-to-face meetings will then take place according to the GA and the HERON project schedule. Nevertheless, this obstacle can be solved, without affecting the consortium and the progress of the HERON project, through various tools provided by modern technology. In particular, the consortium is utilizing Microsoft Teams² to host online audiovisual meetings (e.g., discussions about the various deliverables, workshops, kickoff meetings, and PowerPoint presentations). As the project is already running on M5, the HERON partners have been coordinated to adopt and conduct the aforementioned teleconference tools according to the following schedule:

- Every 6 months an online digital plenary meeting of the HERON consortium takes place.
- Every 2-3 weeks representatives from all HERON organizations (including WP leaders) will meet for a brief strategic project discussion concerning the various managerial, technical, dissemination, research topics. In rare cases that a partner cannot join (due to another unavoidable last-minute commitment), the PC will try to reschedule the teleconference on the same time and day, either one week after or one week before.
- Every week WP leaders are able to organize and run teleconferences for controlling the progress and achieving the objectives of their corresponding WP. In parallel, a TL may also request a teleconference meeting, which will be organized with the collaboration and under the supervision of the respective WP leader.

Microsoft Teams and SharePoint are going to be respectively the basic tools for the teleconferences and content, data, and files exchange (e.g., documents and presentations). It is underlined that after each teleconference meeting the organizer has to provide a short report (i.e., minutes) which will include: (a) main topics of the discussion, (b) decided action points, and (c) main topic and date of the event. The document that includes the aforementioned information must be uploaded to the HERON SharePoint repository, either under the consortium meetings folder (i.e., Documents > 04. Meetings) or WPs activities (i.e., Documents > 08. Workpackages), as a reference points for the all consortium partners.

In a nutshell, the members of the HERON consortium should note that the structure, frequency, and duration of the teleconference meetings, will be constantly evaluated and will be modified according to the requirements of the HERON project, in case any issue or risk arises.

3.1.3 Best practices

Table 3 and Table 4 provide a set of best practices and guidelines for both the participants and organizers regarding face-to-face and teleconference meetings respectively. Through these instructions the consortium cooperation will be enhanced, thus providing fruitful outputs.

² <https://www.microsoft.com/el-gr/microsoft-teams/group-chat-software>

Table 3: HERON face-to-face meetings

Entities that organize the face-to-face meeting	Entities that participate in the meeting
Arranging workshop equipment, rooms, and catering.	Determining the title and scope of the meeting, as well as communicating in advance (at least 1 month before) to the PC the duration and the preferred dates on which the workshop will run.
Providing a document which summarizes the most crucial logistical information (e.g., meeting room location, nearby recommended hotels, instructions on how to get to the building, etc.) in the corresponding event folder in the SharePoint repository.	Defining the optimal number and identification of the participants, preparing the agenda, and ensuring that meeting location (venue), time and agenda are distributed in advance (at least 1 month before) to the participants.
Contacting the session participants and ensuring that pre-registration for the session is complete.	Providing an overview of the project/activity at the beginning of the meeting and preparing a final summary at the end that summarizes the action points and conclusions agreed upon at all sessions of the meeting.
Ensuring that workshop material (e.g., sheets booklets, and pens) are adequately available.	Presiding over the various session discussions and presentations, as well as drawing session conclusions.
Ensuring that the schedule adheres during the various sessions and presentations	Ensuring that minutes are kept utilizing the corresponding correct template and that their final version is uploaded in the respective event folder in the SharePoint repository.
Contributing to the comfort of the participants by specifying for instance where to find an internet connection, telephones, fax machines, refreshments, toilets, banks, and various shops.	Create an overall short map.

Table 4: HERON teleconference meetings

Entities that organize the teleconference meeting	Entities that participate in the teleconference meeting
Informing the participants in advance of the time and date of the teleconference meeting, access links passwords and nicknames.	Notifying the corresponding mailing list in case they are unavailable to attend.
Informing the participants, at least one day before, about the agenda of the meeting.	Briefing about any concerns that may occur.
Ensuring that the participants received all the necessary teleconference files, such as agendas, reports, and outline documents.	Being punctual and trying to stick to the given time.
Introducing the participants to each other.	Limit the discussion to the relevant issues for that teleconference.
Utilizing various web sharing tools whenever possible to share files and documents either	Providing, ideally at the end of the teleconference, comments to the circulated minutes

online (i.e., through screen sharing) or offline (i.e., through SharePoint project repository).	within the timeframe and in the correct format that is indicated by the organizer.
Naming a date or utilizing an online voting tool, (e.g., doodle poll) for the following teleconference meeting.	Collecting their preferences online.
Ensuring that all participants receive a copy of the meeting minutes by utilizing the corresponding created template, as well as requesting from the participants to provide feedback if necessary.	Uploading online and discussing them as much as possible before leaving the teleconference meeting.

4 Decision Process and Information Flow

Project and quality management activities will ensure the proper implementation of the HERON project plan as well as the satisfaction of its goals and objectives. The next subsections present the activities and plans which are needed for the effective and smooth evolution of the HERON project across its whole lifecycle.

4.1 Decision Process

Decisions will normally be taken by the responsible team member, and organization bodies based on what is stated in the CA, the GA, and the QP, and the individual WP, or Task plans. In case there is a dispute between two or more team members, an escalation procedure must be followed, as presented in the Conflict Resolution section.

4.2 Conflict Resolution

In HERON, the consortium will have to agree on and develop technical, scientific, and commercial ideas and issues. Usually, an agreement will be reached first by informal contact, followed by official confirmation via e-mail, letter, or agreed minutes. For important issues, the agreement may take the form of a short report signed by the responsible decision-makers. Non-technical factors, e.g., resource allocation and contractual terms, will need to be agreed upon and documented in writing. Technical issues/conflicts within given contractual commitments that do not involve a change of contract, budget and/or resources/overall focus will be discussed/solved on the WP level first. If the decision being taken is unacceptable to partners found in the minority positions, the resolution of the conflict will be escalated, according to the path as shown in Figure 3.

- First, the implementation team will inform the WPL of the conflict that occurred.
- The WP leader will organize the WP team meeting and the issue will be discussed. In case of disagreement, the team will inform the WPL who will inform the PCT. The latter will contact the responsible persons and will try to resolve the conflict.
- The PCT will meet with the relevant parties to discuss the conflict. If no agreement occurs the issue will go to the TC that will have the authority for the final decision. The final decision must be accepted by all parties.

The most prominent decisions (e.g., re-allocation of project resources) will be made by the Plenary Board, which is composed of a representative from each consortium partner, by majority vote. The consortium agreement defines the details. Any conflict, which impacts organizational, technical, or administrative issues, is discussed and solved by the majority and, if necessary, by the Plenary Board partners. In case of an important impact to the CSA scope, plan, or contractual obligations, the proposal for implementing the change is submitted to the Project Officer for final approval.

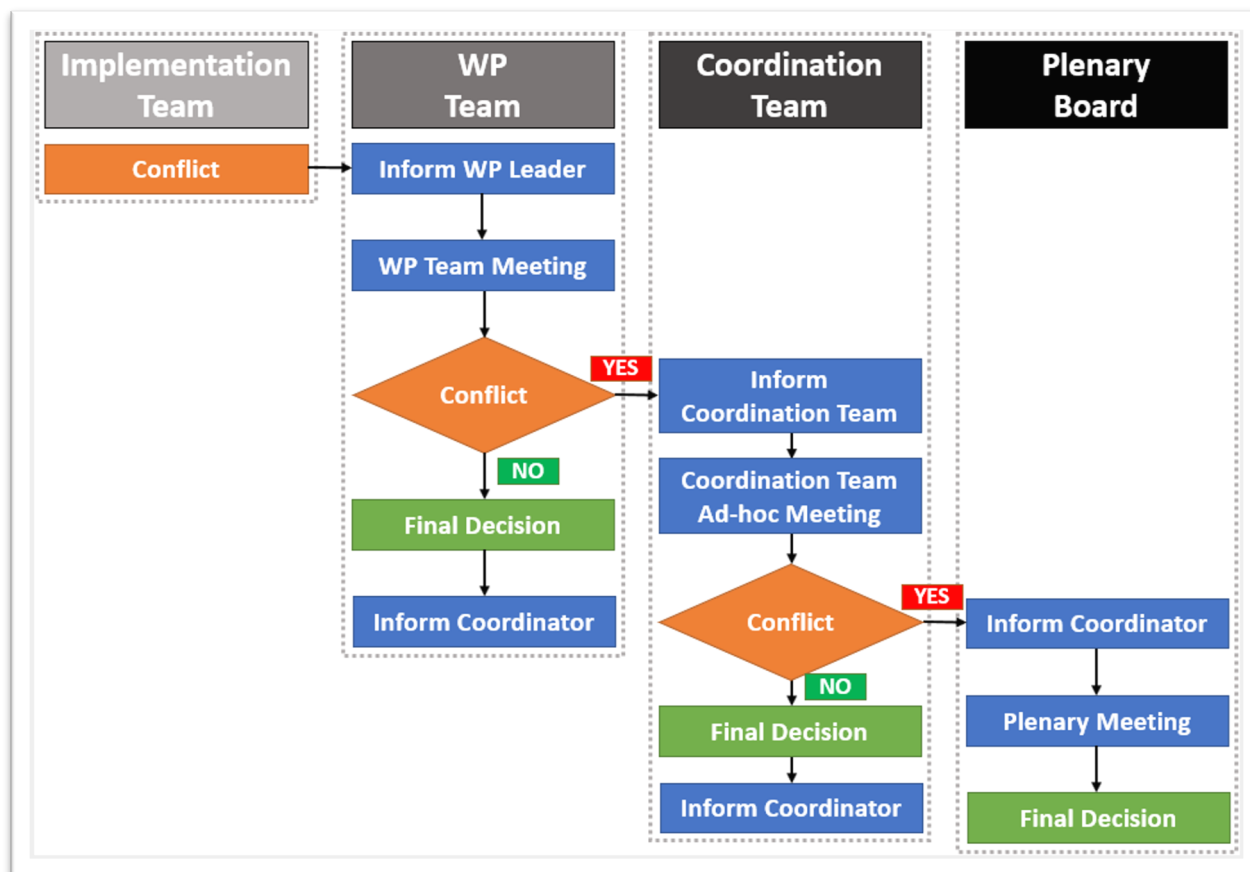


Figure 3: Conflict resolution procedure to be followed in the HERON project.

5 Contributions

This Section presents the consortium as a whole and in particular Table 5 includes information about the contribution of each partner in the HERON project, as defined in the GA. The HERON consortium consists of organizations and experts with extensive backgrounds in research and innovation developments but also in the business domain, including road transport experts (focus on maintenance and upgrading roadworks), robotic and automation experts, Monitoring/Big Data, and ICT. Partners' main contributions to the project are summarised in Table 5.

Table 5: HERON's Partners' Expertise

Partner	Main contributions to HERON
ICCS	Project Coordinator, WP3 leader, responsible mainly for the ML and DL algorithms, but also the CV to be used. Responsible for the web dissemination of the project.
ACCI	ACCI will organize one of the end-users workshops to define the HERON requirements and will support the coordination of pilots in both: controlled areas and active motorways, being responsible for the Spanish pilot. As a company with a direct link with national roads and traffic authorities will facilitate further demonstrations and the exploitation of the project results.
OLO	OLO will host a pilot study and supervise the related activities, provide the user requirements and sign the use/business cases, assess the performance of the system and the obtained results, and disseminate the project's outcome with presentations in Greece and EU at related conferences that participates.
UGE	WP2 leader. UGE will provide one test site, which will have 2 parts namely the equipment Transpolis and an urban removable pavement site. Moreover, UGE will coordinate the definition of the use cases and the user requirements.
ETHZ	WP4 leader. The ASL at ETHZ will be the technical lead on research and engineering activities in the area of motion planning and manipulation for the ground robot. ASL will also contribute strongly to software integration, deployment, and testing.
ROB	ROB will lead WP5 and contribute to the integration activities and other HW-related initiatives. The company will apply this valuable know-how in the different tasks regarding the special needs of the HERON platform when it comes to robotization of the vehicle, the adaptation of devices, and robot navigation
CORTE	CORTE will support the identification of user needs and the definition of technical requirements in WP2 as well as play a leading role in the communication & dissemination activities in WP8, in particular by producing a communication plan and by engaging with the road transport community. Finally, CORTE will support the exploitation of results in WP9.
STWS	WP6 leader. Contribution to the definition of the end users' requirements, metrics, and system architecture technical specifications and operational scenarios. Lead Task 5.5. AR components, UI development, and integration. Lead WP6 - Develop the COP and customize the IMS to support maintenance and upgrading operations and coordinated response.
RISA	Task 6.2 Leader. Responsible for the development and deployment of DMS to all case studies. Data Analytics and Big Data.

INAC	WP7 leader. INAC will be responsible for the development of communication architecture and security elements. INAC will be also the WP7 leader, responsible for the main integration of the HERON components.
IKH	Responsible for the computer vision systems development for potholes and other features recognition, segmentation, and localization
RG	Tasks 1.4, 8.1, and WP9 Leader. Responsible for the data management, standardization, and training activities of the project.

6 Management of Deliverables and other Project Items

In this section, the management of deliverables and other project items will be presented. More specifically, in brief, these involve the:

- Document edition (the necessary software and tools that can be used for writing the documents, the appropriate language(s) that will be used in the deliverables, the nomenclature, as well as the templates).
- Deliverable production (the workflow which a deliverable document must follow from its early till its final stage).
- Roles (and in particular any new role which has not already been reported in Section 2).
- Supporting tools and artifacts (e.g., online repositories, uploading methods, and rules).
- Key Performance Indicators (KPIs) and evaluation (the KPIs of the HERON projected as presented in the Grand Agreement).

6.1 Document Edition

In Table 6 some key rules for the document edition are mentioned and described.

Table 6: Document Edition (Cheat Sheet)

#	Rules	Exceptions
Editing Suite Tools	Documents: Microsoft Word 365 Presentations: Microsoft PowerPoint 365 Spreadsheets: Microsoft Excel 365	Alternative editing tools (such as LibreOffice, or Google Docs, Slides, and Sheets) can be also utilized under the following terms: The editor of the document must use the HERON template and additionally agree in advance with any contributor. The editor of the deliverable must provide the templates for the new tool. If a contributor does not use the selected not-official editing tool/format, the deliverable editor is responsible for integrating these contributions provided in the official editing format/tool.
Language(s)	English (US) or English (UK)	-
Nomenclature	Date_DocName_Status_Version_Partner Date: When the document was first created. DocName: Name of the deliverable document. Status: Draft or final	It is noted that for non-deliverable documents, the specific rules can be relaxed. Nevertheless, it's suggested to try to stick as much as possible with them. e.g.: 20211006_WP1_D1_1_Quality_Assurance_Plan_v01_ICCS.docx

	Version: Current version of the deliverable document. Partner: Leader partner of the deliverable document. It is underlined that these rules are mandatory for any deliverable document.	
Templates	Deliverable template: Word Agenda template: Word Meeting minutes template: Word Presentation template: PowerPoint Deliverable review template: Word Reporting template: Word	It is emphasized that other templates created using alternative editing tools or formats, should be also made available in the Templates folder of the HERON repository: (Documents > 05. Templates)

6.2 Deliverables Handling Process

In order to the submitted to the EC deliverables be of the highest possible quality, each document has to go through some key review stages. Figure 4 illustrates the flowchart of the document deliverable handling procedure, through which the deliverable should be produced.

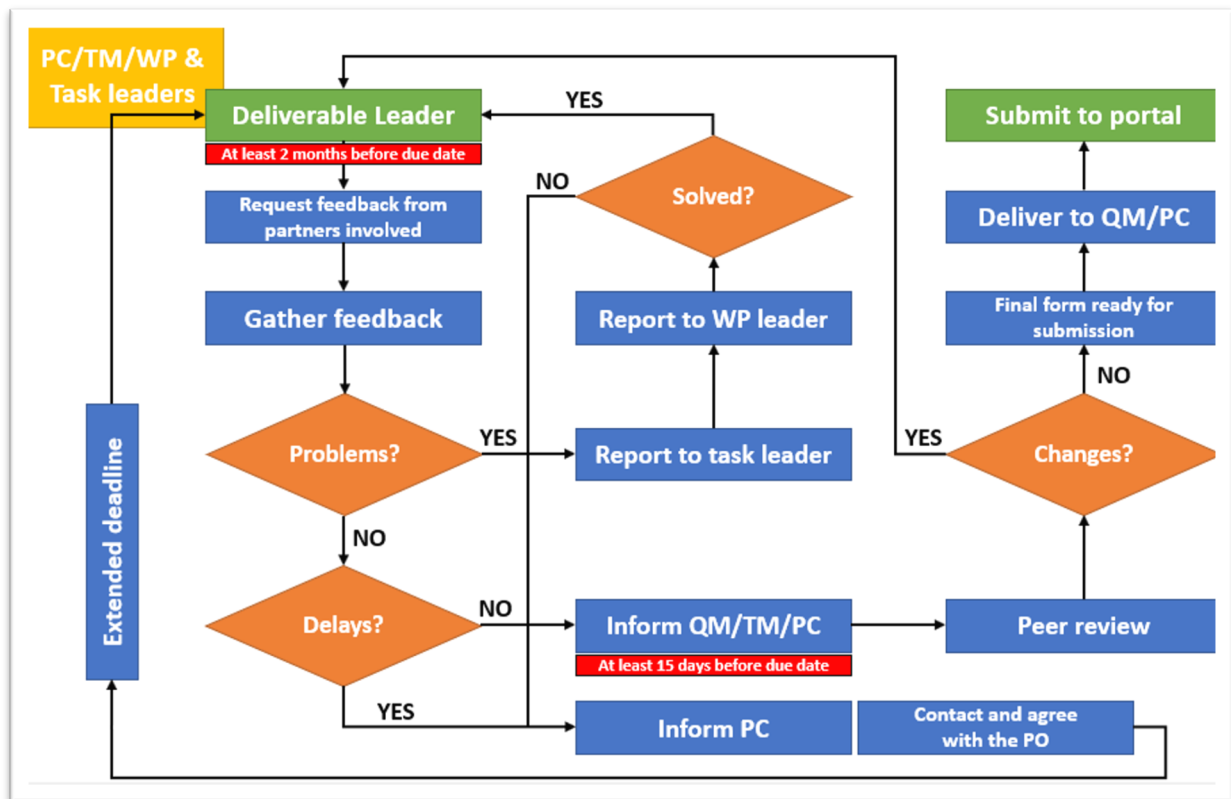


Figure 4: Deliverable handling process.

According to the above flowchart (see Figure 4) the deliverable handling procedure includes the below-mentioned steps:

- Partners involved with a deliverable should be reminded by the Deliverable Leader (DL), at least two months before its due date. Ideally, its processing procedure should start at that time.
- Subsequently, in the aforementioned timeframe, the DL will frequently request feedback from all the involved partners.
- In case of potential obstacles or problems, then the DL must report them to the Task Leader (TL), who in turn will communicate them to the Work Package Leader (WPL). If the issue is not able to be solved, then the WPL must inform the Project Coordinator (PC), who will communicate with the Project Officer (PO) in order to agree on a solution, and if necessary to extend the deadline of the deliverable.
- On the one hand, if the deliverable is delayed, it is underlined that the DL must inform the PC, who again will contact the PO in order to consider a potential extension of its deadline. On the other hand, if there are no delay issues, the DL will inform, at least 15 days before the deliverable due date, the Quality and Technical Manager (QM and TM) as well as the PC, and subsequently the document will be sent for the peer review.
- Through the peer review process, it will be decided whether the document needs any modifications or not. In such a case the DL must be informed, who thereby must notify the involved partners to solve the issues and make the required changes. Consequently, the above-mentioned four steps will be repeated in the remaining timeframe with extended deadlines if required.
- If the peer-review process does not spot any problems and no modifications on the document are needed, the deliverable is ready for submission from the PC (final form), on the website of the European participants' portal.
- It is noted that the final step included the delivery of the report to the QM as well as PC for its submission.

6.3 Roles

In the following subsections the roles participating in the production process of deliverable documents are presented and described:

6.3.1 Deliverable Leader

The Deliverable Leader (DL) is the main editor of the document and leads the deliverable production procedure, being also responsible for the submission of a high-quality report in due time. Furthermore, the DL is the main contact point with the other roles, being also in charge of uploading the deliverable to the right location of the HERON project SharePoint. Lastly, the DL is responsible for notifying the peer reviewer, approval, and QM whenever the deliverable report is ready for the next step in the deliverable handling and production procedure (see Section 6.2).

6.3.2 Deliverable Contributor

The Deliverable Contributor participates in the production of a part of the deliverable attributed by DL. Thereby the Deliverable Contributor contributes with information and content and also supports the DL in producing a high-quality document, as well as addressing reviewers' requests and comments.

6.3.3 Deliverable Peer Reviewer

The Deliverable Peer Reviewer is responsible for carefully reviewing the information and content of the report, thus ensuring that the deliverable objectives are fulfilled, from the technical and/or scientific point of view. Moreover, the Deliverable Peer Reviewer must supervise that the overall review objectives of the deliverable are met. It is underlined that a Deliverable Peer Reviewer must not be a direct contributor to the corresponding deliverable. Ideally, however, the Deliverable Peer Reviewer should have a special interest in the topic that is covered by the specific report (e.g. a related TL or WPL). Lastly, proofreading is expected by the Deliverable Peer Reviewer.

The Deliverable Peer Reviewer has to fill in the review report, by using the related template, in due time. It is noted that comments should also be provided into the deliverable by utilizing various Microsoft Word tools such as track-changes or review comments. Moreover, the reviewer has to upload the updated document with the embedded comments as well as the review report to the HERON project repository (SharePoint), and finally inform accordingly the DL. In the HERON project, each deliverable document will be reviewed by two partners. Table 7 presents the reviewers for each HERON deliverable in detail.

Table 7: HERON deliverables' reviewers

Del	Title	Reviewer 1	Reviewer 2
D1.1	Quality Assurance Plan	RG	CORTE
D1.2	Data Management Plan (first version)	ACCI	OLO
D1.3	Societal impact report (version 1)	UGE	ETHZ
D1.4	Societal impact report (version 2)	ACCI	OLO
D1.5	Quality Assurance Report (version 1)	INAC	RISA
D1.6	Quality Assurance Report (version 2)	UGE	CORTE
D1.7	Project Management Plan (version 1)	ICCS	RISA
D1.8	Project Management Plan (first period)	INAC	RISA
D1.9	Project Management Plan (second period)	ROB	ETHZ
D1.10	Project Management Plan (Final period)	STWS	IKH
D1.11	Data Management Plan (second version)	RISA	UGE
D1.12	Data Management Plan (third version)	RG	ROB
D1.13	Data Management Plan (fourth version)	ETHZ	UGE
D2.1	End-user needs and KPIs report	ICCS	RISA
D2.2	Architecture specification	ROB	ETHZ
D2.3	Geographic data and services inventory	STWS	IKH
D3.1	AI - driven image segmentation and feature extraction	ROB	ETHZ
D3.2	Software for refinement of segmentation results	STWS	RISA
D3.3	Point of interest recognition and classification software	UGE	RG
D3.4	Point of interest georeferencing and precise localisation software	ROB	ETHZ
D3.5	High level planner	ICCS	IKH
D4.1	Design and Implementation of the low-level controller	IKH	ICCS
D4.2	Motion Planning and Learning Manipulation Actions	STWS	INAC
D4.3	Representation for high level planning	INAC	ICCS
D5.1	3D Mapping and Autonomous Navigation	STWS	ICCS

D5.2	Drones Implementation	STWS	ROB
D5.3	Design and Development of the Robotic Platform with adaptive and enhanced capabilities	UGE	STWS
D5.4	Development of the AR components	INAC	IKH
D6.1	Secure Communication and Networking infrastructure	ICCS	STWS
D6.2	Middleware and DF services	IKH	INAC
D6.3	COP and Customized IMS for RI operations	ACCI	OLO
D7.1	Definition and testing of the interfaces of the HERON sub-components	IKH	ICCS
D7.2	Report on the system configurations for the field trials and deployment at the demonstration sites	ROB	RISA
D7.3	First version (V1) of the HERON System	UGE	STWS
D7.4	Final version (V2) of the HERON System	ACCI	OLO
D7.5	Acceptance tests for the HERON system	ETHZ	UGE
D7.6	Reports on pilot testing (version 1)	CORTE	RG
D7.7	Reports on pilot testing (final version)	ICCS	CORTE
D7.8	Trials assessment and recommendations	CORTE	UGE
D7.9	Training Package and Consensus building workshop notes	CORTE	UGE
D8.1	Corporate identity and general templates for dissemination material	ICCS	RISA
D8.2	Project Website	ICCS	RISA
D8.3	Dissemination and Communication (first version) Plan	IKH	RG
D8.4	Dissemination and Communication Plan (second version)	STWS	ACCI
D8.5	Information Packs for referenced and networked communication amplifiers	RG	CORTE
D8.6	Annual Magazine issued (first version)	ETHZ	CORTE
D8.7	Report on the project clustering activities (first version)	RG	ICCS
D8.8	Report on the project clustering activities (final version)	INAC	STWS
D8.9	Annual Magazine Issues (second version)	UGE	CORTE
D8.10	Annual Magazine Issue (third version)	ETHZ	CORTE
D8.11	Annual Magazine Issue (Fourth Version)	RG	CORTE
D9.1	Exploitation Strategy (version 1)	ACCI	OLO
D9.2	Exploitation Strategy (second version)	UGE	ROB
D9.3	Market Analysis and Business Plan (first version)	ETHZ	RG
D9.4	Market Analysis and Business Plan (second version)	INAC	STWS
D9.5	Workshop Documentation	CORTE	ICCS
D9.6	The HERON Roadmap	CORTE	ICCS
D10.1	H - Requirement No. 1	RG	CORTE
D10.2	POPD - Requirement No. 2	ETHZ	STWS
D10.3	EPQ - Requirement No. 3	ACCI	OLO

6.4 Deliverable Approval and Quality Management

The deliverable approval procedure aims in ensuring that the requests and comments of the peer review report have been addressed by the corresponding DL and contributors, as well as, if necessary, keeping in touch with the peer reviewer. It is noted that the DL must update the

corresponding sections that are mentioned in the review report, by utilizing the related template that is created for that purpose, in due time.

Subsequently, in the last round of proofreading, a deliverable quality check is carried out, in order to spot and edit any typographical or grammatical errors as well as mistakes that have to do with style, spelling, and layout. Moreover, through this process, it is confirmed that the review comments and requests have been addressed. It is emphasized that the content of each report depends on the type of provided content. Thereby, the responsibility for the information of each deliverable document lies with the author(s). However, the deliverables have to meet a set of quality criteria, which are presented below:

- **Completeness:** All the content provided in the deliverable has to be reliable and correspond to reality. Therefore, all background information utilized in the deliverable documents must be supported by references to appropriate works or research. Furthermore, all foreground information must be provided in a clear manner in order to avoid misinterpretation.
- **Accuracy:** The content must concentrate on the key issues and be written in such a way that takes into account the scope of the specific research areas as well as its target audience.
- **Relevance:** All the utilized content must be provided to the necessary depth for the reports, according to the project as well as programme objectives.
- **Appearance and structure:** Though various contributions from several partners will be merged and consolidated in a single document, reports must be prepared with a uniform layout and design. It is underlined that the Consortium must use the templates provided in the HERON SharePoint folder (under Documents > 05. Templates) for any project reporting purposes.
- **Punctuality:** The deliverable report must be released on time.

The DL must update and finalize the document and its final .pdf version so that the documents can be uploaded to the HERON repository and in parallel in the EU official portal. Subsequently, the DL will notify by email the PC to proceed with the uploading process to ECAS.

6.5 Supporting Tools and Artefacts

6.5.1 Online Repository (SharePoint)

The HERON official repository is an instance of Microsoft SharePoint, which is a web-based collaborative platform, which also integrates with Microsoft Office. Additionally, SharePoint provides a compliant and secure file synchronization. It is underlined that the access is restricted to HERON project partners. Figure 5 depicts the homepage of the HERON SharePoint repository, whereas Figure 6 depicts its Documents section.

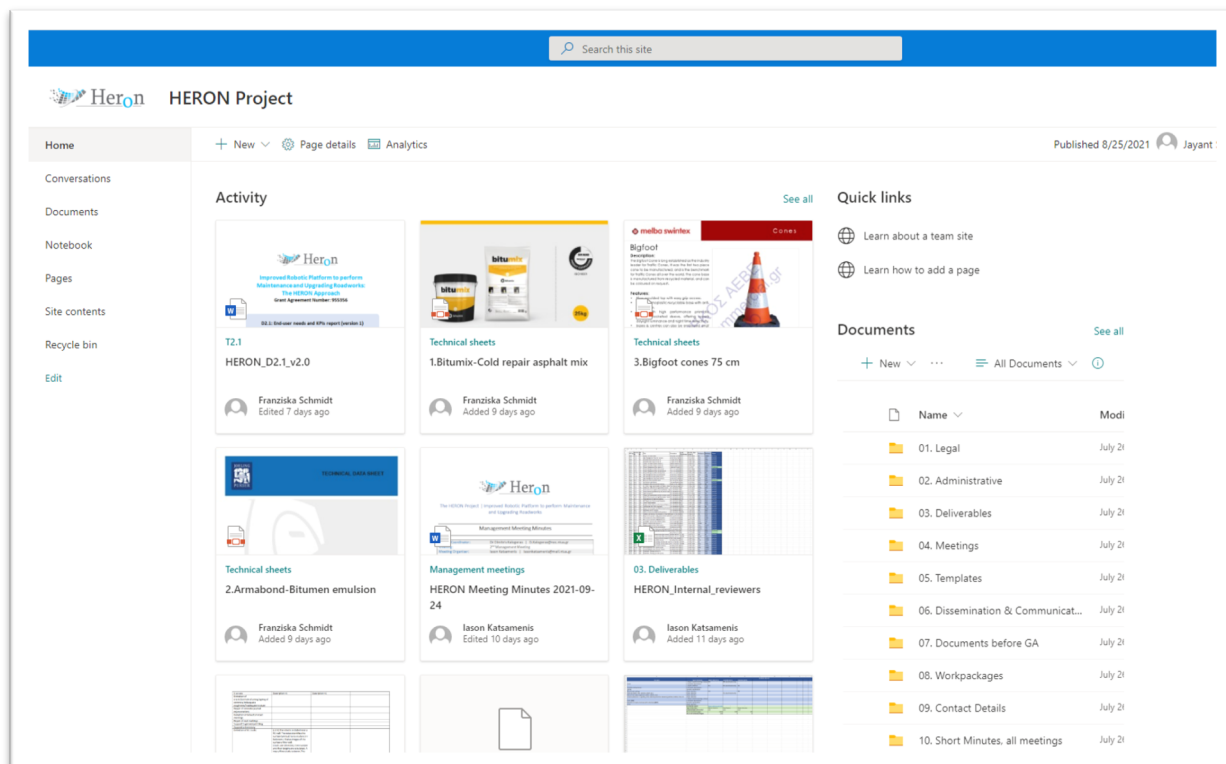


Figure 5: Homepage of the HERON SharePoint site.

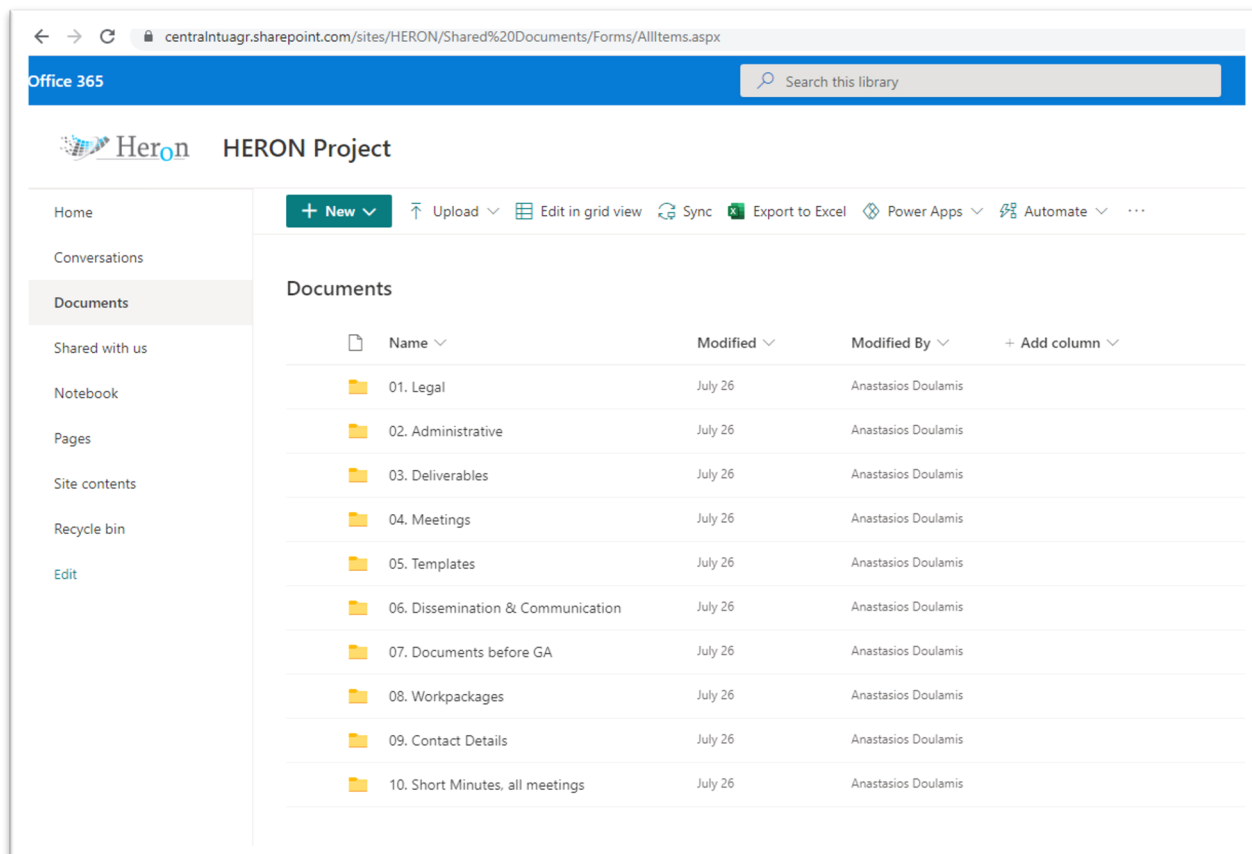


Figure 6: HERON SharePoint document section.

Additionally to the file management and synchronization functionalities, the tool also provides other various useful features such as:

Calendar (SharePoint)

The SharePoint has its own build-in Calendar which can be found in the Site Contents section. As a matter of fact, the SharePoint calendar is an Event List file type.

Office 365 (SharePoint)

The SharePoint tool is fully compatible with Microsoft Office 365. In particular, Microsoft Office files can be opened and edited directly from inside the SharePoint repository, by utilizing the built-in feature.

6.5.2 GitHub and/or GitLab

If necessary, the consortium will determine to use either GitHub³ or GitLab⁴ as an online repository for code sharing. More specifically, the code repositories can be either public or private (depending on the utilization of the code).

6.5.3 Templates

There is a set of document templates that project partners must utilize. The templates are created and defined in Task 8.1 of WP8. In particular, some of the created templates, which can be found in the HERON SharePoint site (under the folder Documents > 05. Templates), are for posters, letters, PowerPoint presentations, minutes, deliverables, business cards, etc.

6.6 Key Performance Indicators (KPIs) and Evaluation

The Key Performance Indicators (KPIs) and Evaluations as defined for the HERON project are described as follows:

- **KPI_1: Maintenance operators' collaboration:** Manual tasks and tools will be integrated with the robotic manipulator. Its expected impact in their work: * hazards related to manual usage and direct exposure to traffic due to automated visual inspections reduced by 75% according to risk assessment; * perceived easiness of usage greater than 6/10, and * 50% increase in typical maintenance/upgrading tasks per day.
- **KPI_2: Manipulation tasks:** The integration of a new generation collaborative robotic arm will foster the added value of operators' work that will perform complex tasks while the robot takes care of repetitive, heavy duties. The number of different predefined manipulation tasks is expected to be at least 3. The speed of this action is expected to be improved, resulting in up to 50% faster maintenance and upgrading tasks.
- **KPI_3: Improved CV & ML:** Novel learning methods for probabilistically detecting surface defects and potential pavements failures in RIs in near RT (just in time) processing complexity. We target to minimize both false positive and false negative rates (target below 25%).

³ <https://github.com/>

⁴ <https://about.gitlab.com/>

- **KPI_4: SLAM accuracy and robustness:** At least 3 different SLAM algorithms will be compared. The final solution will guarantee a localization/ mapping mission failure rate of 5% while having a maximum localization error of less than 0.2 m.
- **KPI_5: Visibility enhancement:** Use of gradient-based processing applied to near-IR (NIR) and RGB data will improve visibility under fog, rain, haze, etc. The same amount of visual content will be obtained at 30% longer distances.
- **KPI_6: Cognition devices integrated:** The usage of different data sources in automated vehicles will be key to achieving the relevant goals of the project. The number of sensors providing point-clouds, images and other data sets will be greater than 6, also considering hardware and software aspects (such as power, cabling, and interfaces).
- **KPI_7: Interactive operating center:** Minimum 20 frames-per-sec (FPS) on any area of the globe with a sub-metric precision. Time to correctly localize the displayed situation and synthesis of the major RI elements under maintenance or upgrading < 5 sec. Reduced intervention time and costs.

7 Reporting

As a contractual obligation, reporting to the European Commission is achieved by utilizing the R&I Participant Portal. It is noted that three types of reporting are available:

- Continuous reporting with EU.
- Periodic reporting with EU.
- Internal reporting for the consortium.

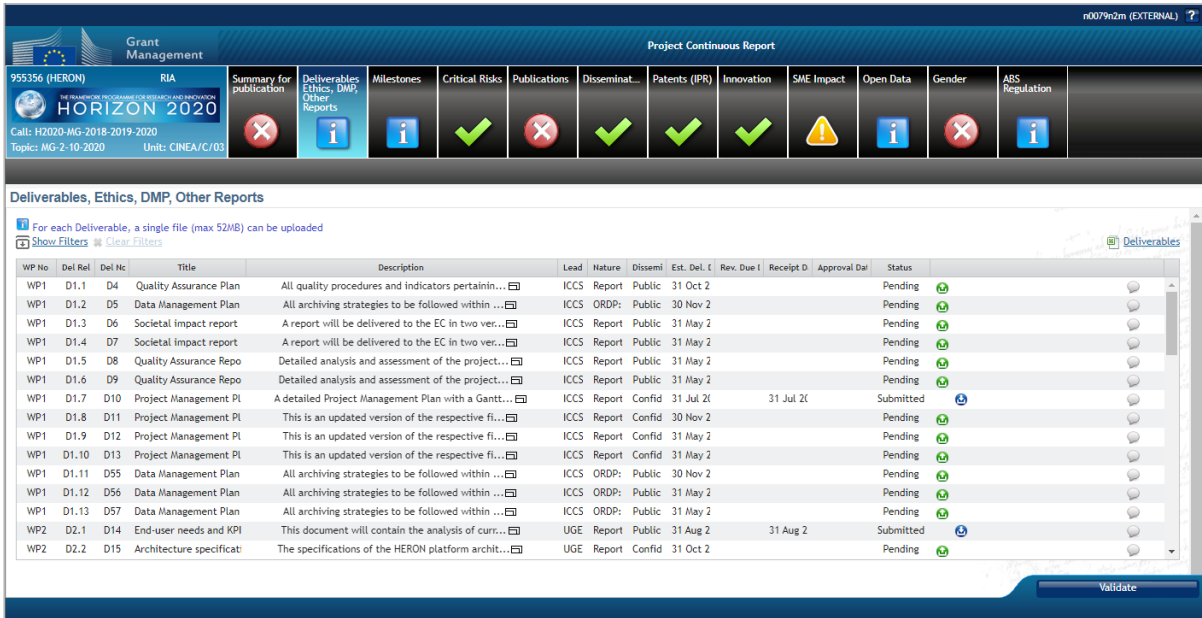
7.1 Continuous Reporting

Continuous reporting is carried out by the consortium members through deliverables and various dissemination activities per month. Moreover, the continuous reporting of HERON dissemination achievements will be announced and become published on the HERON project website⁵. Additionally, the consortium will continuously report through the EU portal the development and progress, which notably is continuously available for the beneficiaries to (a) submit deliverables, (b) report progress related to achieving goals and milestones, and (c) answer the questionnaire on various issues at the moment that their respective data is available.



Figure 7: EU portal for continuous reporting.

⁵ <http://www.heron-h2020.eu/>



WP No	Del Ref	Del No	Title	Description	Lead	Nature	Dissemi	Est. Del. I	Rev. Due I	Receipt D	Approval Dat	Status
WP1	D1.1	D4	Quality Assurance Plan	All quality procedures and indicators pertaining...	ICCS	Report	Public	31 Oct 2				Pending
WP1	D1.2	D5	Data Management Plan	All archiving strategies to be followed within ...	ICCS	ORDP	Public	30 Nov 2				Pending
WP1	D1.3	D6	Societal impact report	A report will be delivered to the EC in two ver...	ICCS	Report	Public	31 May 2				Pending
WP1	D1.4	D7	Societal impact report	A report will be delivered to the EC in two ver...	ICCS	Report	Public	31 May 2				Pending
WP1	D1.5	D8	Quality Assurance Repo	Detailed analysis and assessment of the project...	ICCS	Report	Public	31 May 2				Pending
WP1	D1.6	D9	Quality Assurance Repo	Detailed analysis and assessment of the project...	ICCS	Report	Public	31 May 2				Pending
WP1	D1.7	D10	Project Management PI	A detailed Project Management Plan with a Gantt...	ICCS	Report	Confid	31 Jul 21		31 Jul 21		Submitted
WP1	D1.8	D11	Project Management PI	This is an updated version of the respective fi...	ICCS	Report	Confid	30 Nov 2				Pending
WP1	D1.9	D12	Project Management PI	This is an updated version of the respective fi...	ICCS	Report	Confid	31 May 2				Pending
WP1	D1.10	D13	Project Management PI	This is an updated version of the respective fi...	ICCS	Report	Confid	31 May 2				Pending
WP1	D1.11	D55	Data Management Plan	All archiving strategies to be followed within ...	ICCS	ORDP	Public	30 Nov 2				Pending
WP1	D1.12	D56	Data Management Plan	All archiving strategies to be followed within ...	ICCS	ORDP	Public	31 May 2				Pending
WP1	D1.13	D57	Data Management Plan	All archiving strategies to be followed within ...	ICCS	ORDP	Public	31 May 2				Pending
WP2	D2.1	D14	End-user needs and KPI	This document will contain the analysis of curr...	UGE	Report	Public	31 Aug 2		31 Aug 2		Submitted
WP2	D2.2	D15	Architecture specificat	The specifications of the HERON platform archit...	UGE	Report	Confid	31 Oct 2				Pending

Figure 8: EU portal for continuous reporting for HERON deliverables.

In addition, in terms of the scientific publications, they must contain the statement that the results were produced with the assistance of EU financial support (see Article 38.1.2 of the GA). The consortium will report joint publications by:

- Public and private project participants.
- Public and private project participants with public and private organizations, outside of the consortium related to the project.

For the specific publications, the consortium must ensure open access (free of charge online access for all users) to all peer-reviewed scientific publications relating to its results (see Article 29.2 of the GA).

Lastly, the consortium will provide open access to other various types of scientific publications, some of which may not be peer-reviewed, including monographs, books, conference proceedings, and grey literature (i.e., informally published written material that is not controlled by scientific publishers, such for instance reports).

Finally, it is noted that dissemination and communication activities will list only activities directly connected to the HERON project, and the type of audience reached.

7.2 Periodic Reporting

The Periodic reporting session is active only during the reporting period and can be found under Manage Project → Periodic Reporting. It is emphasized that the HERON project has three reporting periods:

- First interim report: from month 1 to month 18 (01/06/2021 – 30/11/2022)
- Second interim report: from month 19 to month 36 (01/12/2022 – 31/05/2024)
- Final report: from month 37 to month 48 (01/06/2024 – 31/05/2025)

It is underlined that the consortium must provide a separate summary for each periodic report, by updating the summary of the previous period. The required subtables should contain the following information:

- Summary of the context and overall objectives of the action.
- Work carried out from the start of the action to the end of the period covered by the report as well as main outputs accomplished so far.
- Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the action so far).
- Address (URL) of the action's public website.

The reporting must follow the quality requirements that are presented below:

- The summary must be suitable for direct publication by the Commission.
- Easily understandable by the general audience and preferably not longer than 7,480 characters (roughly two pages), without confidential data.
- The summary must be a stand-alone text, without references to other parts of the report, but with only to publicly available information and content.

7.3 Internal Reporting

In the HERON project a secondary, internal reporting procedure is adopted, that incorporates progress and financial reporting. Firstly, the scientific progress is monitored on monthly basis by the Scientific and Technical Committees as well as the WPLs. Secondly, the financial reporting takes place every 6 months and 1 month after the period completion. It is noted that the reporting information for the consortium and need material submission to EU are presented described in detail in the HERON GA (see Article 20 of GA).

Additionally to the above-mentioned reporting documents to EU, the PC, to maintain a lively and continuous channel of communication with the PO and EU, will schedule a report email every four months, that includes the HERON project basic features (for instance project activities in progress, project deviations, planning, and feedback from various relevant events).

8 Risk Management

The risk management has the objective to avoid, or minimize the impact of potentially possible but unforeseen, or unlikely external or internal events that change the likelihood to achieve the targeted outcome in projected time, quality or cost. ICCS will coordinate the partners' technical efforts and outputs. Technical activities of the WPs will be monitored in accordance with the WP and task leaders. The aim is to comply with technical milestones, intermediate outputs, and eventually project objectives. The Technical Management activity will coordinate the related WPs and activities, executing the risk management.

Deadlines and technical objectives will be respected, and particularly technical critical issues will be given particular attention. Technical management meetings will be held with regular deadlines to assess the degree of completion of work, including technical results and deliverable preparation. Specific attention will be devoted to the use of monitoring resources.

8.1 Roles and Responsibilities

The Project Coordinator, who will supervise the Quality and risk management, will be responsible for the following tasks:

- Distributing the required resources of the Quality Assurance Plan within the scope of the project's budget
- Developing, and implementing the Quality Assurance Plan
- Monitoring the project and defining any new or changing risks.
- Keeping track of the initial risk list with the support of the consortium.
- Contributing to risk mitigation plan
- Coordinating with the consortium to monitor risks and implement risk response strategies
- Participating in quality control procedures on deliverables
- Assessing the effectiveness of the risk management strategies
- Reporting regularly to the consortium and
- Making the final decision on risk actions, in coordination with the WP Leaders.

Work Package (WP) Leaders are responsible for the following tasks within their corresponding work package(s):

- Identifying and describing any type of risk.
- Assigning the risk mitigation to its' owner and helping in the development of the risk response strategies.
- Controlling the risk response steps assigned.
- Reporting on the progress of the risk response to the Project Coordinator.
- Implementing, with the help of the Project Coordinator, the activities associated with risk monitoring and control.

8.2 Risk Management Plan

During the implementation of the HERON, internal and external risks, as well as any other issues that might affect the project progress, are identified and monitored, in order to carry out mitigation actions as soon as possible. The management process identifies and monitors technical and management risks that might affect the project's progress towards its objectives, in order to carry out mitigation actions as early as possible. Risks can arise from unexpected technical difficulties, or scientific findings, poor communication or cooperation between the partners, resource shortage, objectives not achievable in terms of budget or feasibility, partners leaving the consortium, human operational errors, etc. Each partner has the responsibility to report immediately to their respective WP leader any risky situation that may arise and may affect the project objectives, or its successful completion. Any change in the time schedule of the deliverables, or in the allocated budget must be reported to the corresponding WP Leader, or to the Project Coordinator.

Risk Management falls under the responsibility of the Coordination Team. The consortium monitors closely the risks and WP leaders must evaluate and update their likelihood regularly. The consortium performs the risk identification, analysis, response planning, monitoring and control as shown in Figure 9.



Figure 9: HERON risks manipulation.

After a risk or group of risks has been identified and documented, it is important to assess the probability that the risk may occur and if it occurs, the extent of the possible impact. The exposure to a given risk is estimated using the following risk matrix.

During risk response planning, strategies and plans are developed to minimize the effects of the risk to a point where it can be controlled and managed. During response planning, higher priority risks should receive more attention than lower priority risks. Every risk that poses a threat should be assigned to a responsible party during response planning. Risk mitigation

involves reducing the probability and/or the impact of a risk to an acceptable level. Taking early and proactive action against risk is often more effective than attempting to repair the damage a realized risk has caused. Contingency planning is an example of risk mitigation.

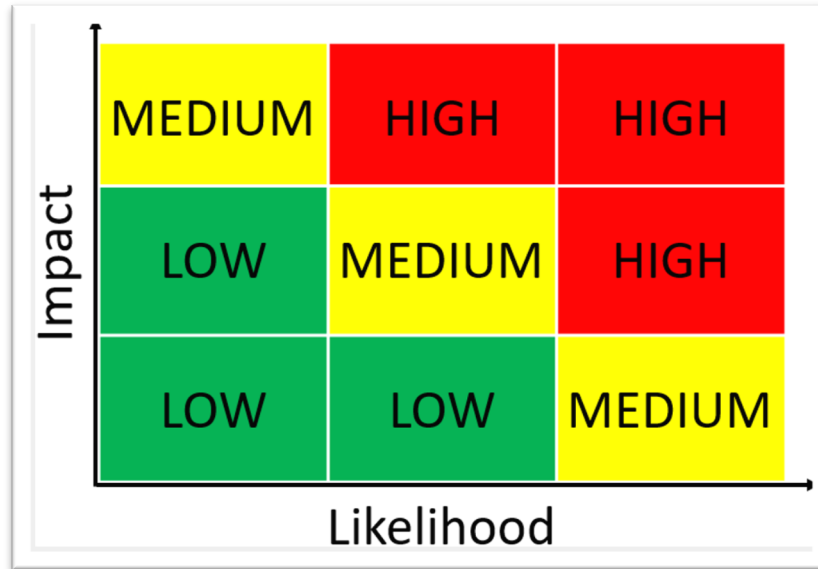


Figure 10: Categories of the HERON risks impact.

Project consortium members have already listed and analyzed potential risks, which are presented below from Table 8 to Table 17 for each WP respectively. It is noted that they are expected to change, or new risks may appear and some others will be discarded since risks are dynamic. Timely awareness and reaction to potential issues and problems are crucial for risk management effectiveness. In the event of technological changes, the Coordination Team supported by the Technical Committee (TC) will task one, or more WP Leaders to investigate and to advise the Coordination Team on appropriate actions. Risk Management issues will be included in the Periodic Progress Reports.

Table 8: WP1, Project Coordination and Management, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
1.1	Loss of key staff.	Medium	Medium	Most of the partners are large organizations and will be able to replace staff that leaves, move departments, or are promoted with equivalent personnel. There is no critical task that is dependent on a specific individual.
1.2	Loss of a key partner.	Low	High	There is a purposely adopted degree of overlap in the skills possessed by the partners (particularly regarding the main technological aspects, e.g., climatic modeling, structural engineering). In the unlikely case that a partner withdraws, the

				<p>PCT will analyze two main options:</p> <ol style="list-style-type: none"> 1) the substitution of the partner by another partner of similar characteristics. 2) the assumption and redistribution of tasks among the rest partners of the project.
1.3	Risk of not delivering the project on budget and time due to its highly strategic and innovative nature.	<p>Low/ Medium</p> <p>(depending on the problem/delay)</p>	<p>Medium/ High</p> <p>(depending on the problem/delay)</p>	<p>The partners will review their budgeted amounts on a regular basis. This will help the identification of potential deviations. The PCT will help the partners with internal redistributions if necessary. In addition, most partners are experienced organizations who have led/participated in, and successfully delivered large and complex EU projects before. A detailed project management plan, with a standard mitigation section, will be developed at the very beginning of the project (pre-emptive analysis).</p>
1.4	Partner is not capable to provide appointed deliverable.	Low	Medium	<p>As stated above, most partners are experienced organizations who have participated and successfully delivered large and complex EU projects. Possibly change task assignment first within the consortium (through the partners' complementarity as explained above).</p>
1.5	Lack of overall coordination of the project.	Low	Medium	<p>The effective coordination of the HERON project is ensured by the managerial structure and through the project work plan. Moreover, the project coordinator is extensively experienced in organizing similar EU as well as national projects.</p>
1.6	Impossibility to complete the peer-to-peer activities between partners, case studies due to the COVID-19 situation, or other various causes.	Low	Medium	<p>In case of travel restrictions that will make impossible physical meetings, due to COVID-19 or other causes, our consortium will develop a contingency plan to move activities online as much as possible for the period in which traveling won't be</p>

				possible, based on the experience with interactive platforms and collaborative tools, and capitalizing on the experience of the partners.
1.7	Partners do not agree on the IPR of the results of the project.	Low	Medium	An exploitation plan will be developed within the first steps of HERON, identifying the expected results (foreground), and who will be the owner. In addition, a CA will be signed by all partners before the project starts, establishing the basic rules for the management of the IPR issues regarding the results of the project.

Table 9: WP2, End-Users Requirements, Metrics and System Design, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
2.1	Technology evolution during the project renders the platform design and its modules obsolescent before being completed.	Low	High	Partners are providing State-of-the-art technical solutions with a low probability of becoming obsolescent in the project timeframe (even if technological improvements might appear). The HERON project will identify key technology innovations in the market that may be assessed for their incorporation within the HERON platform according to the degree of completion of the project.
2.2	The requirements are incomplete and/or too generic.	Medium	Medium	An explicit definition of the trade-offs, barriers, and sensitivity issues will occur in the HERON project from its initial stages in such a manner that risk mitigation is facilitated. Deliverable D2.1 is a living document during the first year of the HERON project, which makes it possible to update it (also with the feedback from the first technical works in the WP3-6).

Table 10: WP3, AI-based algorithms and tools Recognition, Classification and Localisation of the Points of Interest, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
3.1	Unavailability of the sensor network.	Low	Low	Site survey and end-user requirements will be followed from the beginning of the project to have laboratory tests as soon as possible in order to emulate real conditions for the sensor network. The development will be based on INAC's current, awarded, and proven main business line.
3.2	Lack of precision of 3D models.	Low	Low	Incorporation of different types of sensors such as laser scanners, LIDAR, photos, Radar, and fusion of the information across these types of sensors.
3.3	Delays in the 3D processing.	Medium	Low	Adoption of 4D maps incorporating temporal change history information so as to minimize the analysis time & hierarchical schemes of the analysis.
3.4	Failure of CV algorithms.	Medium	Medium	Fusion with other types of sources and the use of the 3D models.
3.5	Localization sensors accuracy/reliability issues.	Medium	Medium	In case initially specified position/localization sensors prove to be less reliable than projected or the required accuracy is not achieved, additional sensors will be added by fusing a GNSS-based setup with integrated filtering.
3.6	Underperformance of the AI features.	Low/ Medium	Medium/ High	Re-training of the models with new datasets will take place. In the case that this mitigation fails, the focus will be given to the further improvements of the ones with the best performance.

Table 11: WP4, Motion and High-Level Planner for the automated HERON system, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
4.1	Grasping and manipulation planning is too slow for online deployment.	Low	Medium	State-of-the-art grasp synthesis approaches developed at ETHZ have already shown real-time (>10Hz) planning and

				execution capabilities on readily available computing hardware. We will use these methods as a starting point for developing the HERON grasping and manipulation planning solutions.
4.2	Failure to learn symbolic state abstractions for high-level planning from sensor data.	Medium	Low	State abstractions will first be modeled manually. The dataset of labeled demonstrations used to learn the abstractions of new states will be expanded and labeled at an increasingly finer resolution to mitigate learning failures.
4.3	Contact-based force interactions cannot be controlled precisely enough	Low	Medium	ETHZ has prior experience with contact-based force interactions in different scenarios but similar requirements, giving confidence that the requirements can be achieved. Should unforeseen problems arise which can not be solved using software only, hardware-based solutions such as compliant tools will be used to bridge the gap between achievable and required precision.

Table 12: WP5, Development of the Robotic Platform, Improved Navigation and integration with the sensing devices, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
5.1	Hardware adaptation is delayed due to late design changes.	Medium	Medium/High	Redesigns and adaptations will be frozen before manufacturing and adaptations of the hardware will be done in different iterations after validation and testing phases.
5.2	Platform manufacturing hinders maintenance operations.	Low	Low/Medium	Whenever possible, individual developments will have separated testing plans even before full integration of the hardware. Prioritization will be made for those activities with a higher workload.
5.3	UIs are not user-friendly.	Low	Medium	Users will be heavily involved in the process providing feedback for their further elaboration and improvement.

5.4	Failure of the 3D mapping toolkits to provide precise robot navigation.	Low	Medium	HERON supports a combination of SLAM methods for robot navigation and localization. In particular, the traditional SLAM approaches of using positioning sensors are combined with visual SLAM methods. Therefore, the respective risks are minimized in the framework of HERON.
5.5	Multiple parallel developments lead to a weakly integrated robot and unreliable technical solution.	Medium	High	Modularity will be prioritized without the need of integrating all different developments at once.
5.6	Technical developments requiring higher resource disposition than expected.	Low/ Medium	High	Regarding specific technology which is not at the aim of the research, renting off-the-shelf devices could contribute to avoiding the risk.

Table 13: WP6, Communication and Networking Solutions, DSS, IMS and CoP, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
6.1	Cybersecurity and privacy requirements are not respected.	Low	Medium	INAC participates in T2.1 and T2.2 and in other key tasks to ensure security & privacy is considered through all the project in strict connection with task T6.2 and security controls developed in WP4.
6.2	Loss of connectivity due to a broken link, out of range, unanticipated factors.	Low	Medium	Integrate multiple and different interfaces (e.g., 4G, 5G, ad-hoc, satellite) for the drones to communicate, implement self-healing, redundant, ad-hoc, seamless, co-operative connectivity with reconfiguration or alternative connections for the swarms of drones, with TSN and P2P file distribution protocols.
6.3	The interface of DSS/IMS is too complicated.	Medium	Medium	The user-centered design approach as well as the use of ENGAGE commercial platform that is already tuned to be used by usual operators without specific skills requirements.
6.4	Middleware availability and seamless	Medium	Medium	The basic implementation will be coupled with the

	connectivity with other modules failure.			requirements of the other participants (module providers and pilot operators) so as to have a competitive and functional version of the middleware soon enough before pilots. Furthermore, the IoT middleware that RISA has already built will provide the necessary expertise to avoid failures in middleware development and interconnection with the other modules.
6.5	DF complexity fails to meet project requirements.	Medium	Medium	DF will be designed and implemented in a modular way but also split into three different layers in order to minimize complexity. Agile development will be used in order to increase efficiency in development in such an intensive and complex task. ICCS and INAC having expertise in IoT data fusion and STWS in application-driven DF will help to mitigate this risk.

Table 14: WP7, Field integration, demonstration and validation activities, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
7.1	Loose integration of project results.	Low	Medium	Loose integration of the technical results is a serious cause of R&D projects failure. The continuous and iterative development methodology associated with a well-planned framework preparing the integration will be the key to success. The experience of ROB that acts as the main robotic system integrator guarantees the success of the integration process. The backend integration will be carried out by STWS and RISA, while the middleware integration will be made by ICCS and RISA. All these partners have wide experience in both research and industrial projects.
7.2	Loss of a case study.	Low	Medium	An alternative case study will be sought, from the same or

				another partner. The existing end-users may support the project with several alternative case studies in the unlikely case that we will have to change the selected case studies.
7.3	The integrated system is not accepted by the end-users	Low	High	The negative evaluation of the system by the end-users after the pilot activities would result in the overall failure of the project. The involvement of pilot partners throughout the project ensures that their requirements are included in the system by design, thus eliminating the risk.
7.4	Unavailability of pilot sites for on-site testing	Low	Medium	The involvement of three pilot sites in the project ensures that there will be several pilot site locations to test the system in a variety of situations.

Table 15: WP8, High-Impact Communication and Dissemination Activities, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
8.1	Low involvement of stakeholders in events.	Low	High	Use project partners to mobilize stakeholders; Carry out interviews to pinpoint the problem of low engagement; revise dissemination plan and introduce new dissemination and communication activities to increase their involvement.
8.2	Low number of participating stakeholders in workshops; Small representation and harvest of input.	Low	High	Apply diverse methods of reaching out and collecting input, such as personal interviews, questionnaires, focus groups.
8.3	Very diverse target audiences, different interests in the project from different stakeholders.	Low	Medium	Build personal relationships; get actively involved with the local partners and start building the first core of the project.
8.4	Low impact of communication and dissemination activities.	Low	High	KPIs measuring the impact of communication and dissemination activities will be established in D8.3 Dissemination and Communication Plan (1 st version), for the purpose of

				monitoring the flow of visitors to the project website and social media channels, as well as the impact of other communication and dissemination efforts (publications, events, etc.). The impact of these activities will be regularly monitored against the KPIs and reported in D8.4 Dissemination and Communication Plan (2 nd version). CORTE, as dissemination leader, together with the project coordinator, will engage with existing networks and related EU-funded projects in order to maximize the dissemination impact of HERON. The visibility of the project will be supported by relying on networks and communication channels of all consortium partners.
8.5	The website is not evolving at the same speed as the project.	Low	Medium	The possibility of subcontracting an external service will be explored.
8.6	Failure to engage the stakeholders and interest groups.	Low	Medium	Carry out identification and analysis of stakeholder and interest groups, and implement planned targeted dissemination actions.
8.7	Lack of public awareness of the HERON activities.	Medium	Medium	The network is diverse and includes leading scientists, industrial partners, end-users, standardization partners, etc. Most of them are affiliated with international committees that guarantee relevant connections and channels.
8.8	Not enough visibility among targeted user groups.	Low	Medium	Establish communication tasks working on targeting outreach activities and create different tools and materials for the user groups and stakeholders and facilitate internal and external communications.

Table 16: WP9, Exploitation of Results, Standardization and Sustainability Activities, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
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9.1	Poor visibility of the impacts and benefits of the project.	Low	High	Pro-active, timely, and planned communication actions throughout the duration of the project.
9.2	Failure to engage the stakeholders and interest groups.	Low	Medium	Identification and analysis of stakeholder and interest groups and planned targeted dissemination actions.
9.3	The business plan reveals a failure of market potential.	Medium	High	Address the exploitation of the solution road to market through replicability and interaction with users and decision-makers.

Table 17: WP10, Ethics requirements, risks, and mitigation strategies

Risk ID	Description of risk	Likelihood	Impact	Mitigation strategies
10.1	Activities raising ethical issues.	Medium	High	Before the beginning of an activity, each beneficiary must have obtained any ethics committee opinion required under national law.
10.2	Privacy concerns or loss of privacy control.	Medium	Medium	The HERON concept preserves users' privacy by design and no central databases with sensitive data are planned.

9 Conclusions

The specific deliverable report has presented and described the adopted Quality Assurance Plan (QAP) of the HERON project. In particular, it emphasized the quality processes and indicators pertaining to Work Packages, Tasks, Deliverables, and Milestones defined in the original project plan. The QAP that was delineated in this document includes a top-level description of the quality assurance methodology and the organizational and procedural means for achieving it. Furthermore, the risk management plans for each WP have been outlined.

In a nutshell, this report covers the best practices and processes, for the various project management activities, related to the Quality of the delivered solutions. Activities affecting the Quality are: (a) Project management, (b) Communication and contribution among HERON partners, (c) Periodic review of the project progress, regarding the conformance to schedules and plans, (d) Periodic review of the project plan, (e) Management of deliverables and other various project outputs (e.g. development of the deliverables and submission procedures), (f) Internal reviews of all deliverables so that they conform to requirements, standards, and specifications (review of every draft, plus a full validation review of the final version), (g) Initiation and follow-up of corrective actions for resolving non-conformities, whenever deemed appropriate (i.e. event-driven), (h) Documenting procedures, guidelines, roles, and tasks, (i) Financial and activity reporting, (j) Risk management on WP level, (k) Measurement of project performance, (l) Impact assessment. Lastly, it is emphasized that the presented processes, tools, and guidelines have been also successfully and effectively developed and employed in several similar projects and thus are in a mature state.