Zero Emission electric Vehicles enabled by haRmonised circulArity

Deliverable 7.3

Risk Management Plan (First version)

30 April 2024

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ZEvRA
Zero Emission electric Vehicles enabled by haRmonised circulArity

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15th April 2024	V1	Initial draft document
26th April 2024	V2	Improved draft document
30th April 2024	V3	Submission version

ZEvRA project abstract

ZEvRA's main objective is to improve the circularity of light-duty EVs throughout their entire value chain, from materials supply and manufacturing to end-of-life (EoL) processes, which aligns with the European Union's goal of achieving zero CO2e emissions by 2035, particularly in the EV value chain. To do so, ZEvRA will develop a Design for Circularity (DfC) methodology and a holistic circularity assessment aimed at improving the production of electric vehicles (EVs) based on the 9Rs. This methodology will be validated by developing zero emission solutions for the most important automotive materials, covering > 84% material mix: steel, three versions of aluminium (wrought, casting, and foam), thermoplastics composites (long and continuous fibre-reinforced), unfiled/short fibre plastics, glass, tyres and Rare Earth Elements (REE). These solutions will be supported by a set of digital tools to support the manufacturing of the use cases, the assessment of circularity, traceability, and the virtual integration of components into a full replicable vehicle.

Figure 1: *ZEvRA consortium*

To maximise the outreach of our methodology and zero emission solutions, ZEvRA will develop a dedicated training & upskilling programme for the automotive workforce and academia, together with activities aimed at increasing awareness & acceptability of the proposed zero emission solutions. Lastly, circular business models targeting EoL and logistics aimed at improving the economic feasibility of circularity in EVs are advanced. ZEvRA's innovations aim to improve zero emission approaches in the life cycle and value chain of at least 59% of European EVs by 2035 through the 5 OEMs and Tier 1's that are part of the consortium (Figure 1), which includes industry and academia covering the entire automotive value chain.

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Abbreviations and Acronyms

Table 1: *Abbreviations and Acronyms*

Abbr.	Full name
CA	Consortium Agreement
CBM	Circular Business Model
DfC	Design For Circularity
EC	European Commission
EoL	End of Life
GA	General Assembly
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
LCT	Life Cycle Thinking
OEM	Original Equipment Manufacturer
PC	Project Coordinator
PMT	Project Management Team
QRM	Quality and Risk Identification Manager
RMP	Risk Management Plan
REE	Rare Earth Elements
SLCA	Social Life Cycle Assessment
TB	Technical Board
WP	Work Package

Executive summary

The deliverable defines the quality and risk management process during ZEvRA project implementation. This is to ensure the consistent quality of all project outputs, in order to fully meet the commitments (objectives and deliverables) made in the Grant Agreement. The document includes a risk assessment plan to identify potential deviations or setbacks during the entire project execution and prepare recovery actions, whenever needed. Quality and risk management should be implemented continuously throughout the project, based on the target definition and initial risk assessment carried out during the design phase.

1 Introduction

By the Project Management Plan (D 7.1) in WP7 Task 7.3 involves periodic Risk Management activities, which aim to identify, assess, and prioritize risks to minimize, monitor, and control the probability and/or impact of unfortunate events, also known as threats. Mitigation strategies and contingency plans will be developed to lessen the impact of risks that cannot be eliminated.

The Quality and Risk Identification Manager (QRM; Árpád Horánszky - Bay Zoltan) coordinate project risk management, update RMP, collect risk-related inputs from WP leaders every 3 months and present bi-monthly updates to the Technical Board (TB). Any identified risk will be addressed, and alerts will be raised if their priority increases. The QRM will monitor all activities related to risk management in collaboration with each WP leader for specific issues relevant to each WP.

The first version of the risk management plan made till 30th April 2024 is in line with the deliverable D7.3 risk management plan (first version), which will include an assessment with conclusions of the monitoring process. The plan will also outline the quality procedures used throughout the project. The second version of the risk management plan will be reported till 31th December 2024, in line with deliverable D7.4. The final version of the risk management plan (D7.5) will be published in month 24.

The Work Package Leaders support the QRM in all matters to identify current and risks for future deviations and to develop countermeasures. (Project Management handbook 3.3)

2 Risk Management process

For managing the risks that may appear in the project, the responsible manager set up a general risk management process divided in 6 steps, see Figure 1.

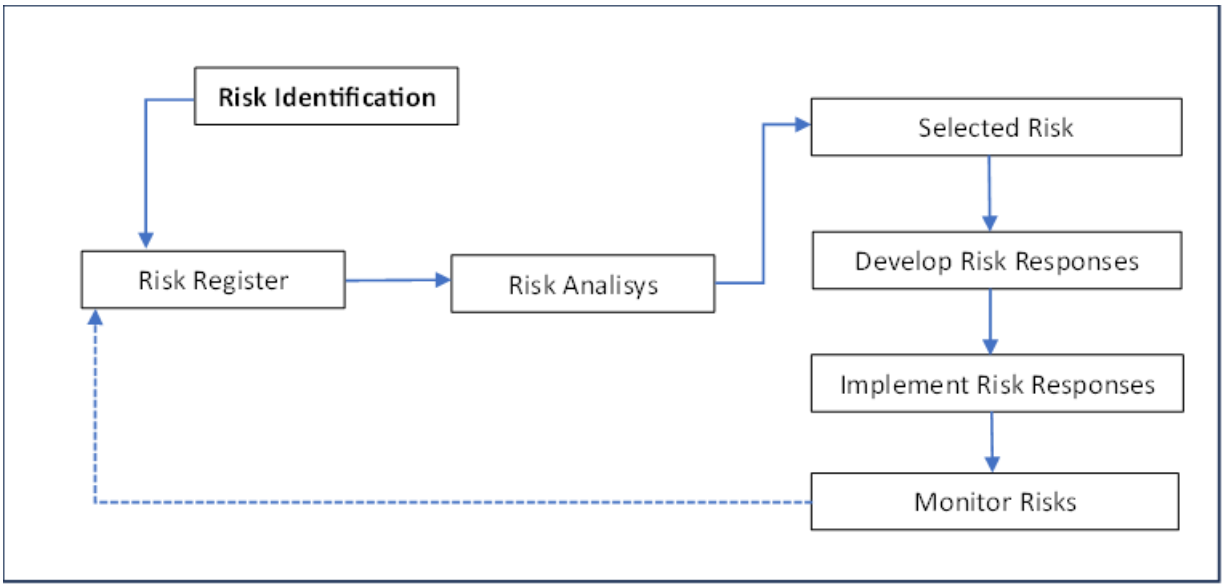

Figure 2: *Risk* Management *Process (RMP)*

Phases of the risk management process:

1. Risk Identification: Identification and description of a risk. Recording the affected work packages and tasks as well as the effects if the risk materialises. Definition of a risk owner.
2. Qualitative Risk Analysis: Assessment of the risk with regard to the probability and its impact.
3. Risk Assessment: Determining how to deal with the risk on the basis of the risk analysis.
4. Planning Risk Responses: Identification and development of possible risk responses to minimise the occurrence as well as the effect of the occurrence of a risk.
5. Implementing Risk Responses: Implementation of appropriate responses according to the assessment of the probability of occurrence and the impact if the risk materialises.
6. Monitoring Risks of RMP: Continuous monitoring of the risk by defined risk owners in order to be able to react to a possible increase in the probability of risk occurrence or a higher impact.

2.1 Risk identification

During the whole project life cycle, all key stakeholders and the WP teams coordinated by WP leaders will continuously identify potential risks. During the project planning stage the partners already identified the actual foreseeing main risks. (Table 1.)

Table 2: *Initial Critical risks for implementation*

Nr.	Description of risk, mitigating measures (likelihood/severity)	WP(s)	Proposed risk-mitigation measures
1	LCT approach (LCA, LCC, SLCA) does not show positive results consistently (i.e. LCA is positive, LCC is negative) (L/M)	1	To search and reach the best available and rational solutions. Inquire for: i) alternative sustainable materials and ii) more effective modified processing methods. The methodology will be refined to clarify impacts on different dimensions.
2	Reluctance of target groups to apply the circularity strategies (L/L)	1	Emphasize the potential of the proposed solution focusing on their gains and market advantages vs. the current practice.
3	Delays in initial CAD model of project demonstrators (H/L)	2	Similar components will be used to test new models then the geometry is swapped out when the CAD is ready
4	Models not completed in time to provide data for demonstrator manufacturing (H/L)	2	Preliminary results from the models will be obtained to provide input to the WP4, the models will be further developed with more accurate data as the demos are developed.
5	Not all components can be integrated into the demo vehicle due to restricting building spaces (L/M).	3	Design of parts and components could be adapted so they fit the building space of the demo vehicle.
6	The performance of the vehicle might be limited for the non-virgin components (M/M)	3, 4	Although this is not foreseen, there are numerous technical possibilities that would be explored to improve performance, and which will be considered in the strategy.
7	The availability of molds is critical and may lead to delay (L/L)	3, 4	We could possibly change the demonstrating parts.
8	Aluminium scrap availability is limited. Some is contaminated (M/L)	4	Partly change of sources (e.g., from auto to building). Additional cleaning steps if needed, initial selection of the sourced scrap.
9	Aluminium alloy composition not achievable. Extrudability and castability not achieved. Aluminium foam inhomogeneity. (M/M)	4	Continuous analysis of mechanical properties, composition, and monitoring. Additional additives to improve extrudability, casting, foaming. Change of casting parameters.
10	Performance mismatch due to high PCR content (L/L)	4	Substituting certain portion of PCR with PIR.
11	Difficulties in attracting relevant stakeholders (L/M)	5	All partners are already cooperating with many relevant stakeholders within their sectors and are part of several networks and clusters. The existing network of contacts will be enriched with the innovation manager.

Nr.	Description of risk, mitigating measures (likelihood/severity)	WP(s)	Proposed risk-mitigation measures
12	Delay of awareness and educational execution and poor communication and clustering (M/M)	5	Regular meetings will be held to enhance interactions with stakeholders. The implementation plans will be prepared and evaluated. In case of failure of the expected actions, the project management procedures will be reassessed.
13	The size of the consortium makes it difficult to handle (M/M)	All	A multi-level structure (WP7) is set up for managing finances, technical and innovation/exploitation aspects through dedicated boards that meet regularly. If needed, this will be reinforced.
14	A partner leaves the project (L/M)	All	Partners will try to assume the partner's responsibilities, tasks and resources. If that is not possible, a substitute partner with similar profile will be searched for.
15	Progress starting too late resulting in poor delivery of outcomes (M/M))	All	Create a project with stepwise progress, realistic timeline and resource estimates.
16	Partners do not agree on the IPR of the results of the project (L/L)	All	CA will be signed prior start, establishing IPR rules/management, identifying expected results/owners.

2.2 Risk Analysis

If a risk arises during the project implementation, WP leaders would log and assess potential risks into the in the risk Impact is the level of effect that risk will have on the project. The corresponding gradation for the evaluation is shown in Table 3. Probability is a level of likelihood of occurrence of the project risk. The corresponding gradation for the evaluation is shown in Table 4.

Definition and determination of the risk owner:

- If a risk affects a WP, the corresponding WP leader becomes the initial owner of the risk. If a risk is assigned to a specific task, the corresponding task leader becomes the risk owner. In consultation with the WP or task partners, risk ownership can be transferred from the WP leader or task leader in order to ensure a more technically assessment and monitoring of the risk.
- If a risk affects more than one WP, the Technical Board selects the risk owner from the affected WPs/Taskleaders.
- If a risk affects all WP, the Project Management Team nominate the risk owner.
- register (Annex I.) and identify probability and impact.

Table 3: *Impact grades for Project Risks*

Rating		Affect
10	High	Project failure
9		Over budget or delay by 50 % or higher
8		Over budget or delay by 30-40 %
7		Over budget or delay by 20-30 %
6	Medium	Over budget or delay by 10-20 %
5		Slightly over budget or deadline
4		Serious reduction of reserves or buffers (time/cost)
3	Low	Serious reduction of reserves or buffers (time/cost)
2		Serious reduction of reserves or buffers (time/cost)
1		No measurable impact

Risk owner is responsible for fulfilling the risk registers cells and actualize those at least every two months. As the risk management process operates continuously throughout the project, the risk register is the basic document for risk management. This document is available in the project's common TEAMS library, with appropriate access for the persons concerned.

Table 4: *Probability grades for Project Risks*

Rating	Fact	High			Medium			Low		
Proability	10	9	8	7	6	5	4	3	2	1

Risk owners are required to update the relevant risks at least every two months, and the QRM will report to the TB on the current status of risk management on a bi-monthly basis. The QRM backs up the risk register every two months in the TEAMS directory. PMT fill the project's critical risks database on the Funding & Tenders platform by the actual risk register on the project TEAMS folder.

2.3 Risk Assessment

After project risks are identified, the risks owners prioritize them according to their probability and level of impact (Table 5).

Table 5: *Impact proability matrix*

PROBABILITY											
	Fact	10									
	High	9									
		8									
		7									
	Med	6									
		5									
		4									
	Low	3									
		2									
		1									
			1	2	3	4	5	6	7	8	9	10
			Low			Medium			High			
			IMPACT									

risks that warrant a response - High
risks that require further analysis - Medium
potential risks that can be ignored - Low

2.4 Risk Response Planning

A risk response plan is an action, reserve, or agreement that will help with risk mitigation. The project may plan risk responses as additional tasks, reserves of time, reserves of budget, or adjustments to processes. To overcome systematic project risks, the WP leaders/participants may introduce additional processes and workflows. They should be appropriately documented in risk register and approved by the TB. Each risk response plan should have a dedicated owner, the risk owner. The risk owner monitors the project risk and collaborate on the risk treatment. The owner of the risk must manage risk in all its aspects. In case of issues, the risk owner should escalate it to the TB through QRM.

2.5 Monitoring Risks of RMP

During the whole lifetime of the project, the QRM and risk owners will continuously monitor the existing risks.

Risk owners will estimate, at least every 2 months, the status of mitigating measures and indicate in the risk register the estimated percentage achieved with the current response as well as the aspects remaining.

3 Quality management

The quality of the project results is based on the formal and professional quality of the deliverables undertaken in the GA, as this is the basis for the eligibility of the associated costs and the recognition of the professional community.

It is in line with the job description and related tasks, ensuring that the results fully meet the objectives set at the project design stage. Not only must the requirements of the GA and CA be fully met, but the interdependency of tasks must also be such that they are completed in a form and content that ensures that subsequent tasks build on previous deliverables. The deliverables (data, descriptions, reports, etc.) should be clear, concrete and easy for users to understand.

As specified in the project management handbook, the lead beneficiary (LB) for the deliverable send the deliverable to the deliverable reviewer who, together with the STM and QRM, carries out a review of the deliverable. As experts in the relevant scientific/professional field, each submitter will identify 2-3 professional indicators against which professionalism can be assessed.

The Reviewer will assess the deliverable against the following indicators:

1. Compliance with the required format
2. Clear language, specific wording
3. Consistency with related outcome products
4. Compliance with the specified professional indicators

After the assessment of the deliverable the reviewer give feedback for the deliverable leader if the document accepted / accepted with minor modification / major modification suggested.

The deliverable will be accepted and uploaded to the platform when all 4 indicators have fulfilled by the document.

4 Conclusions

This document provides an internal handbook detailing the essential procedures the partners will follow for managing the quality of the project outputs as well as identify and appropriately manage the risks affecting the effectiveness of the project. Insistence on the procedure will ensure the project tasks will be implemented, on schedule, and within budget in fulfilment of the project objectives.

Although quality and risk management activities will be ongoing throughout the life of the project, as set out in the GA, the second version of this Risk Management Plan (D7.4) will be completed and submitted to EC by 31.12.2024 and the final version (D7.5) by 31.12.2025, with necessary changes made as the exercise progresses.

5 References

IT PM School – Risk Management Plan Example from Real Project - https://itpmschool.com/project-risk-management-plan/

HORIZON-CL5-2021-D2-01-05 SOLiD project D8.1 Project Quality Management Plan - https://thesolidproject.eu/wp-content/uploads/2022/11/D8.1.pdf

HORIZON EUROPE SCALEC project D7.2 Quality Management Plan - https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://scale-horizon.eu/%3Fjet_download%3D5715&ved=2ahUKEwj66dL_hseFAxUigf0HHdx5Dm4QFnoECBsQAQ&usg=AOvVaw38PORLGw8XGyDLhEhLS5nj

Annex I: Risk register

Index	WP	Description	Effects	Acute period	Probability	Impact	Risk Rank	Owner	Response Plan
1	1	LCT approach (LCA, LCC, SLCA) does not show positive results consistently (i.e. LCA is positive, LCC is negative)	Could introduce uncertainty into the decision-making processes. Stakeholders may become skeptical in the application of circularity measures	2	5	3	Low	Violeta Vargas	To search and reach the best available and rational solutions. Inquire for: i) alternative sustainable materials and ii) more effective modified processing methods. The methodology will be refined to clarify impacts on different dimensions.
2	1	Reluctance of target groups to apply the circularity strategies	Ambition and expected impacts may not be reached to a high degree	1	5	4	Medium	Violeta Vargas	Emphasize the potential of the proposed solution focusing on their gains and market advantages vs. the current practice.
3	2	Delays in initial CAD model of project demonstrators	Delay in detailed design of the demonstrator and associated use cases	1	7	2	Low	Yvonne Aitomaki	Similar components will be used to test new models then the geometry is swapped out when the CAD is ready

Index	WP	Description	Effects	Acute period	Probability	Impact	Risk Rank	Owner	Response Plan
4	2	Models not completed in time to provide data for demonstrator manufacturing	Inaccuracy in property prediction and additional costs due to greater testing effort in practical investigations	1	7	3	Medium	Yvonne Aitomaki	Preliminary results from the models will be obtained to provide input to the WP4, the models will be further developed with more accurate data as the demos are developed.
5	3	Not all components can be integrated into the demo vehicle due to restricting building spaces	Incomplete overall demonstrator and possible additional costs	2	4	5	Medium	Stefan Caba	Design of parts and components could be adapted so they fit the building space of the demo vehicle. Alternatively, additional prototypes with better integration capability are possible.
6	3, 4	The performance of the vehicle might be limited for the non-virgin components	Reduction of the project result and acceptance of the solutions for exploitation	2	6	4	Medium	Stefan Caba	Although this is not foreseen, there are numerous technical possibilities that would be explored to improve performance, and which will be considered in the strategy.
7	3, 4	The availability of molds is critical and may lead to delay	could cause delay or additional effort of toolmaking	2	4	5	Medium	Christian Hannemann	We could possibly change the demonstrating parts.

Index	WP	Description	Effects	Acute period	Probability	Impact	Risk Rank	Owner	Response Plan
8	4	Aluminium scrap availability is limited. Some is contaminated	extension of supplier range needed and drying/cleaning could be additionally needed	2	1	2	Low	Christian Hannemann	Partly change of sources (e.g., from auto to building). Additional cleaning steps if needed, initial selection of the sourced scrap.
9	4	Aluminium alloy composition not achievable	Extrudability and castability not achieved. Aluminium foam inhomogeneity	2	4	6	Medium	Christian Hannemann	Continuous analysis of mechanical properties, composition, and monitoring. Additional additives to improve extrudability, casting, foaming. Change of casting parameters.
10	4	Performance mismatch due to high PCR content	requirements may not be fulfilled, source change needed	2	4	4	Medium	Christian Hannemann	Substituting certain portion of PCR with PIR.
11	5	Difficulties in attracting relevant stakeholders	Dissemination KPIs might be affected if stakeholders are not reached and engaged	2	4	5	Medium	Ricardo del Valle	All partners are already cooperating with many relevant stakeholders within their sectors and are part of several networks and clusters. The existing network of contacts will be enriched with the innovation manager.

Index	WP	Description	Effects	Acute period	Probability	Impact	Risk Rank	Owner	Response Plan
12	5	Delay of awareness and educational execution and poor communication and clustering	Participation of companies and academic stakeholders in training materials might be affected if delays are present	2	3	6	Medium	Ricardo del Valle	Regular meetings will be held to enhance interactions with stakeholders. The implementation plans will be prepared and evaluated. In case of failure of the expected actions, the project management procedures will be reassessed.
13	All	The size of the consortium makes it difficult to handle	Insufficient information for the partners involved, resulting in delays in project work	2	6	5	Medium	Daniel Nebel	A multi-level structure (WP7) is set up for managing finances, technical and innovation/exploitation aspects through dedicated boards that meet regularly. If needed, this will be reinforced.
14	All	A partner leaves the project	Delay in associated project work and related work as well as reduction in quality if taken over by a less suitable partner	2	3	4	Low	Daniel Nebel	Partners will try to assume the partner's responsibilities, tasks and resources. If that is not possible, a substitute partner with similar profile will be searched for.
15	All	Progress starting too late	Compression of work, resulting in poor delivery of outcomes and additional costs	1	4	4	Medium	Daniel Nebel	Create a project with stepwise progress, realistic timeline and resource estimates.

Index	WP	Description	Effects	Acute period	Probability	Impact	Risk Rank	Owner	Response Plan
16	All	Partners do not agree on the IPR of the results of the project	Limited communication and collaboration with possible delays and/or reduced quality of deliverables	1	3	2	Low	Daniel Nebel	CA will be signed prior start, establishing IPR rules/management, identifying expected results/owners.