



Solid-statE lithium
metal bAttery
wiTh in situ
hyBrid ELecTrolyte

Horizon Europe

THE NEXT EU RESEARCH & INNOVATION
INVESTMENT PROGRAMME (2021 - 2027)

HORIZON-CL5-2021-D2-01
DG/Agency: CINEA



HORIZON EUROPE PROGRAMME – HORIZON-CL5-2021-D2-01-03
Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries
supporting electro mobility and other.

SEATBELT project – Grant Agreement no. 101069726



DELIVERABLE 10.1

Project Handbook



Funded by
the European Union



History of changes

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Status	First version of the deliverable	

SEATBELT consortium

No.	Participant	Acronym	Type	Country
1	Centre National de la Recherche Scientifique	CNRS	RTO	FR
2	Commissariat à l'Energie Atomique et aux Energies Alternatives	CEA	RTO	FR
3	Polykey Polymers	PK	SME	ES
4	Life Cycle Engineering	LCE	SME	IT
5	Centre de Recherches Métallurgiques	CRM	RTO	BE
6	Consejo Superior de Investigaciones Científicas	CSIC	RTO	ES
7	Blue Solutions	BS	IND	FR
8	Münster Electrochemical Energy Technology	MEET	UNI	DE
9	Universidad Del Pais Vasco	UPV	UNI	ES
10	Zentrum für Sonnenenergie- und Wasserstoff- Forschung Baden-Württemberg	ZSW	RTO	DE
11	CIC energiGUNE	CICe	RTO	ES
12	Institut Laue-Langevin Europe	ILL	RTO	EU
13	Renault	Renault	IND	FR
14	Euro Support Advanced Materials	ES	IND	NL
15	Imperial College of London	ICL	UNI	UK



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Disclaimer



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Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. This project also contributes to the objectives of the Batt4EU Partnership under call topic ID: HORIZON-CL5-2021-D2-01-03 (Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries supporting electro mobility and other applications).

1. Overall project presentation

As of 2025, new generations of Li batteries based on silicon/carbon (Gen. 4a) and Li metal (Gen. 4b) anode, where flammable liquid electrolyte is replaced by a non-flammable solid-one, will take over the current Li-ion device. However, only all-solid-state Gen. 4b Li batteries are expected to fulfil the needed cell gravimetric energy density specifications demanded by electromobility and stationary applications. Therefore, SEATBELT ambition is to generate a local EU industry that revolves around a cost-effective, robust all-solid-state Li battery comprising sustainable materials by 2026. SEATBELT intends to achieve the first technological milestone of developing a battery cell (TRL5) meeting the needs of Electric Vehicle (EV) and stationary industry. The low-cost SEATBELT cell is safe-by-design with sustainable and recyclable materials, reaching high energy densities (>380 Wh/kg) and long cyclability (>500 cycles) by 2026 in line with the 2030 EU targets. The cells are produced by low-cost solvent-free extrusion process comprising a combination of innovative materials: thin Li metal, hybrid electrolyte, a safe cathode active material without critical materials and thin Al current collector. The cell design being optimized by interface (operando and atomistic modelling) and process (machine learning) methodologies. In addition, new in situ imaging instrumentation will be developed to investigate safety properties and mechanical deformation to assess cell safety in real conditions. An innovative recycling cycle from materials to cell level will be also established. Thus, SEATBELT will be the start point of a first EU all-solid-state battery value chain, whose main players in Research and Technological Development (RTD) and Industry sectors are within the consortium. So, cells and modules will cycle using industrially relevant protocols dedicated to EV and stationary applications. SEATBELT consortium is composed of 14 beneficiary partners and 3 affiliated entities, and one associated partner, from 7 European countries.

More information at:



Project website: <https://seatbelt-project.eu/>

CORDIS website: <https://cordis.europa.eu/project/id/101069726>

2. Deliverable presentation

This project handbook acts as a tool to execute the SEATBELT project in an efficient manner. Indeed, such handbook, whose first version is described in this deliverable, comprises the management rules and the procedures to ensure a rigorous project execution on a daily basis. Therefore, this document comprises all the necessary information, management procedures and guidelines, and decision processes that the consortium will have to follow along the course of the project. This, to ensure fast decision-making process, a solid project monitoring, an efficient risk management, and a high-level of quality in the deliverables. This deliverable presents the initial plan, and it will be updated regularly because the varieties of rules and procedures may require to be updated depending on the evolution of the project and the needs of the consortium partners.

3. Acknowledgment

The author(s) would like to acknowledge all the consortium partners for their work on this deliverable.

4. Interest of the handbook

4.1. Objectives

This deliverable corresponds to the project handbook (*i.e.*, a document of reference) providing information on the contextualization, plans, and procedures to follow during the project to properly execute it. Therefore, this first version of the SEATBELT project handbook acts as a reference plan for all consortium partners to ensure proper management of the work packages (WPs) and their associated tasks. In addition, this handbook will be updated on a regular basis to take into consideration the evolution of the project and the need to deepen some rules and add additional information for the consortium members.

4.2. Management basis and precedence

The project handbook is built according to the conventional understanding of the management plan typically at place for Horizon 2020 and Horizon Europe projects related to the development of the next generation of battery materials and processes. In terms of chronology, the basis of this plan was elaborated prior the official project kick-off and already inserted within the structure of the project proposition. Moreover, communication and dissemination activities are reported in other deliverables related to the SEATBELT WP9 (Communication, Dissemination, Exploitation) and are thus not reproduced here. The reader is kindly asked to refer to the public deliverables D9.1 (Plan for dissemination and exploitation including communication activities) and D9.2 (Communication materials and visual identity of SEATBELT) for complete details related to these topics. At last, it is important to note that the overall obligations for the consortium partners to ensure proper execution of SEATBELT is defined in the Grant Agreement (GA) comprising the Description of Actions (DoA) followed by the Consortium Agreement (CA) which regulate the interactions between partners. Consequently, the GA and CA supplement the project handbook.

5. The SEATBELT project plan

5.1. Project basis

Table 1 below lists all the basic information of the SEATBELT project as detailed in the GA and CA documents. The SEATBELT project is made of ten Work Packages (WPs), eight technical WPs, one dedicated to communication, dissemination, and exploitation, and a last one related to the project management. In addition, **Figure 1** represents the decomposition of the SEATBELT work plan per WP with the logos of the institution of the WP leader. Moreover, all public information related to the project can also be found on the CORDIS webpage of the project:



CORDIS website: <https://cordis.europa.eu/project/id/101069726>


Entry	Description
Project name	Solid-state lithium metal battery with <i>in situ</i> hybrid electrolyte.
Acronym	SEATBELT
Grant agreement ID	101069726
Funded under	Climate, Energy and Mobility.
Start date	July 1 st , 2022 (kick off meeting)
End date	June 30 th , 2026
Objectives	To pave the road towards a cost-effective, robust all-solid-state lithium battery comprising sustainable materials by 2026.
Work plan	See Figure 1 (the logos of the WP leader institutions are also indicated)
Partners	See the complete listing of the consortium partners, their acronym, and the location map on page 3 of this document.
Total budget	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Total cost € 7 851 448,75</p> <p>EU contribution € 7 851 448,50</p> </div>  </div> <p>(Snapshot of the CORDIS website related to the SEATBELT project)</p>

Table 1. Quick overview of the SEATBELT project.

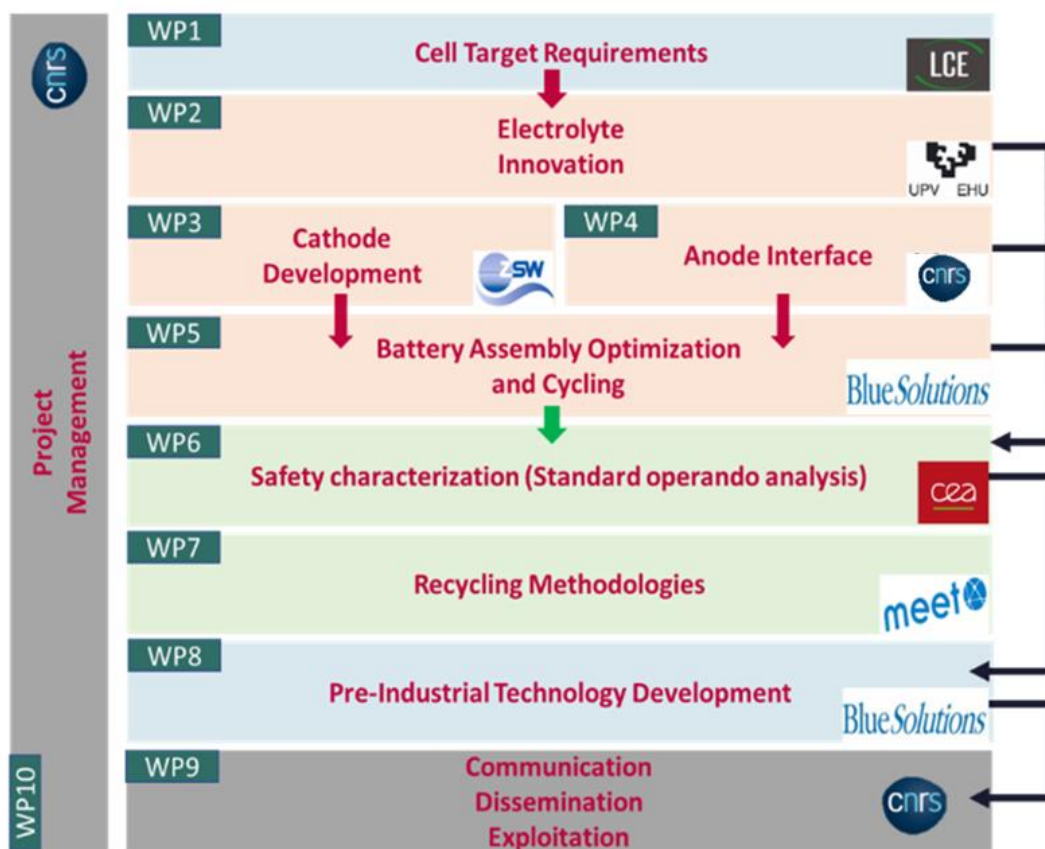


Figure 1. The WP decomposition of the SEATBELT project along with WP leaders. (See page 3 for the definition of the acronyms).

5.2. Project organization

The SEATBELT project is organized in a classical manner for a battery materials and processes related project where all the consortium partners are involved at some levels to ensure its execution and evolution. **Table 2**, displayed below, lists the different organizational roles.

Role	Description	Institutions
Project Coordinator (PC)	Management, coordination, communication, dissemination, interface with funding agency (CINEA) and the EU Project Officer (PO) as well the International Advisory Board (IAB), chair of the Project General Assembly (PGA) and of one WP.	CNRS
Project Engineer (PE)	Support the PC in all its activities, communication, dissemination, exploitation, reporting, financial management, interface with the administration of each partner.	CNRS
Work Package leader	Coordinate WP execution according to the work plan as described in the GA, participation in the PGA and interaction with IAB, work closely with PC and PE for communication, dissemination, exploitation, and reporting. (See Figure 1 for the WP listing and the table on page 3 for the acronym description of the consortium partner).	WP1: LCE WP2: UPV WP3: ZSW WP4: CNRS WP5: BS WP6: CEA WP7: MEET WP8: BS WP9: CNRS WP10: CNRS
Task leader	Each WP is decomposed in a series of tasks led by an institution.	An institution involved in a WP.
Institution leaders	These persons represent a specific institution that is either a WP leader or not, and are also involved in the PGA.	WP leaders and CICE, CRM, CSIC, ES, ICL, ILL, PK, Renault.
Project members	Perform all the foreseen tasks of the project, report on the results and issues (resolution and blocking points) to the WP leader, Institution leader, and/or PC and PE and PGA.	The list of the project members is evolutive and PE will update regularly.
Project General Assembly (PGA)	Online meeting every 2 to 3 months, onsite meeting at different partner locations every 6 to 7 months. Assessment of the project results, exchange between WP and Institution leaders, communication and dissemination reporting, update on project status (technical, risk management, finance), executive decisions are taken during the meeting.	At least one representant per institution.
WP meeting	Lead by the WP leader, meeting all over the year (typically every 2 months) and whenever necessary to share knowledge (results, issues), discuss and decide on the future plan, report to PC and PE and PGA.	At least one partner per institution involved in a given WP.
Internal meeting	Lead by WP leader or an institution leader, follow-up on the project development at each institution scale. Meetings and their frequencies at the discretion of each institution/partner.	Within each institution.

Table 2. Project roles.

5.3. Overview of the management process

The SEATBELT project management is based on a conventional management process comprising *i)* the initiation of the project, *ii)* its coordination, *iii)* its dissemination, communication, and exploitation, *iv)* its execution comprising different phases such as control, risk management, and reporting, prior its *v)* closure. The corresponding organizational scheme is presented in **Figure 2**. In addition, such organization generates a virtuous loop in between coordination, execution, and dissemination, communication, exploitation to ensure a continuous flow and exchange of information between them.

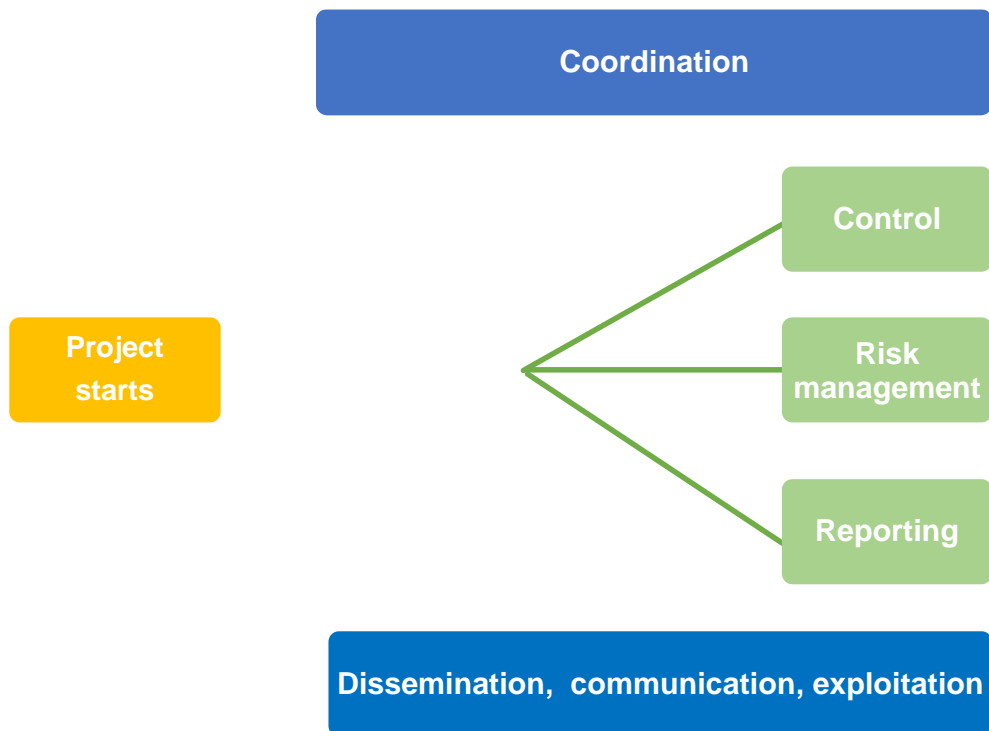


Figure 2. Overview of the management process.

6. External and internal communication principles

6.1. External communication and dissemination activities

External communications correspond to the release of information generated by project partners within the work performed in the SEATBELT project to a selected audience (general public, stakeholders, policy makers, industrials, academics, students, etc.). The guidelines to share information and thus communicate externally to the project consortium are details in the public deliverable D9.1 (Plan for dissemination and exploitation including communication activities) of SEATBELT as well as in the SEATBELT CA for the consortium partners. The goal being to share as much information as possible to foster the exploitation of results without disclosing sensitive ones that could be used in an Intellectual Property (IP) protection (e.g. patent). For this, the PGA acts as a council to disclose or confine (with or without an embargo period) information.

To share specific data that are releasable as validated by the PGA, the main principle to follow is the EU FAIR (Findable, Accessible, Interoperable, and Reusable) principle. For this, the reader is asked to refer to the deliverable D10.2 (Data Management Plan). Indeed, this deliverable explain the data management, handling and, sharing to the external community (*i.e.*, outside the consortium) and within the consortium. Note, the two deliverables D9.1 and D10.2 will be updated along the course of the project and released to the public.

6.2. internal communication

Communication within the partners is mainly ensured by email, telephone call, and visio meetings. For this, mailing list are distributed to the partners. One mailing list is created for the PGA and one per WP, and a last one gathering all the consortium members. These mailing lists are updated regularly to add or remove any partners. The Project Engineer (PE) is in charge for this task in concertation with all institution leaders and the PC.

For data storage and sharing, they will be stored to the online repository selected for the project and hosted at the University Grenoble Alpes. All procedures to access, upload, and download data are presented in the deliverable D10.2 (Data Management Plan). Moreover, interactions between partners are ensured by the guidelines established in the GA and CA.

7. Reporting activities

7.1. Deliverable reporting activities

Deliverables are reviewed by selected partners of the consortium prior submission to the EU platform dedicated to project management (SyGMA) by PC or PE. The list and deadline for the deliverables are listed in the GA of SEATBELT. This ensures that any confidential and/or Intellectual Property (IP) related information are not included in the submitted documents if the dissemination level is public. Each deliverable is written, check and approved by members belonging to different institutions. Typically, the document is written by the person in charge of the task or WP and check by a teammate or an external consortium member prior being approved by another consortium partner. To maximize the readability of the deliverables, their structures are similar from one document to another, in terms of format and style. In each deliverable, a synopsis table, whose template is provided below in **Table 3**, summarizes the main information necessary to identify the document.

Item	Description	Date (dd.mm.yyyy)
Deliverable No.	D. number	
Related WP	WP number	
Deliverable Title	Title	
Deliverable Date	Data	
Deliverable Type	REPORT / Data / etc.	
Dissemination level	Public (PU) or Sensitive (SEN) as listed in the GA	
Written by	Partner Name 1 (Institution 1)	Date 1
Checked by	Partner Name 2 (Institution 2)	Date 2
Approved by	Partner Name 3 (Institution 3)	Date 3
Status	Final, Final of the initial version, etc.	

Table 3. The synopsis table of each deliverable.

7.2. Milestones reporting activities

Several milestones are foreseen in the work plan of the SEATBELT project. The WP leaders are responsible to achieve them and will report on the PE, PC and PGA when one is reached. Moreover, the verification method of the milestone as listed in the GA will always be verify, checked, and reported in a milestone report submitted to PGA, prior being submitted to PO via the SyGMA portal.

7.3. Reporting period

All instructions regarding the reporting period dates are provided for the consortium partner within the GA. A complete project review will occur which requires a complete periodic report containing all the information related to the technical work performed and its outcomes as well as a financial report of the project for certain period of predefined time range. As for other Research and Innovation Action (RIA) Horizon Europe projects, three Reporting Period (RP) are foreseen:

- RP1 that encompasses work performed between the start of the project until M18.
- RP2 that encompasses work performed between M19 and M36.
- RP3 that encompasses work performed between M37 and M48.

These periodic reports are due 60 days after the end of a given RP. To complete in duly manner these reports, PC and PE will compile the data provided by each consortium partner and review it. Therefore, inputs from all partners are expected to build a complete report. If needed, meeting between the coordinating institution (CNRS) and other partners will occur during these 60 days gap to validate all the information, either technical or financial, embedded in the project.

7.4. Quality management and acknowledgement

In the project, quality is related to the project management processes and the deliverables prior being public. This ensures that *i)* no confidential information is publicly shared, *ii)* the content of dissemination materials is adapted to the targeted audience, *iii)* the project visual identity is respected, and *iv)* EU funding properly acknowledged and that a disclaimer is present. In addition, the acknowledgement and the disclaimer will be displayed typically at the front page and/o last page of any released documents and/or communication materials. To date, the wording for the acknowledgement and disclaimer are presented in the following **Table 4**. At last, the EU emblem will be also displayed in all these documents and communication materials with the reference to the EU funding.

Category	Wording
Acknowledgement	This project has received funding from the European Union’s Horizon Europe Research and Innovative Programme under Grant Agreement No 101069726.
Disclaimer	Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. This project also contributes to the objectives of the Batt4EU Partnership under call topic ID: HORIZON-CL5-2021-D2-01-03 (Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries supporting electro mobility and other applications).

Table 4. Acknowledgment and disclaimer for the SEATBLET project.

8. Management of Issues and risks

8.1. Resolution of issues within the consortium

All issues (technical, financial, human resources, etc.) should be taken into consideration and be resolved in a coherent way starting from the base level (task level with the task leader) then to the WP leader prior moving on the PC and PE and finally to the PGA.

8.2. Risk management

Because SEATBELT is a high-risk high-gain project, the probability of failure for some tasks is not null and thus may occur. Since the beginning of the project writing, risk possibilities have been assessed and taken into consideration leading to an anticipation of the risks notably by the listing of the critical risks and their mitigation procedure to ensure continuity in the project development in order to reach the objectives of the project. Therefore, a risk analysis method has been established to ensure rapid communication between the consortium partners, task leaders, WP leaders, PE, PC, and PGA. The PGA is responsible for the risk management and possesses the executive role to apply any corrective actions. In summary, the risks are managed by logical a step-by-step methodology describe in the chart (**Figure 3**) below:

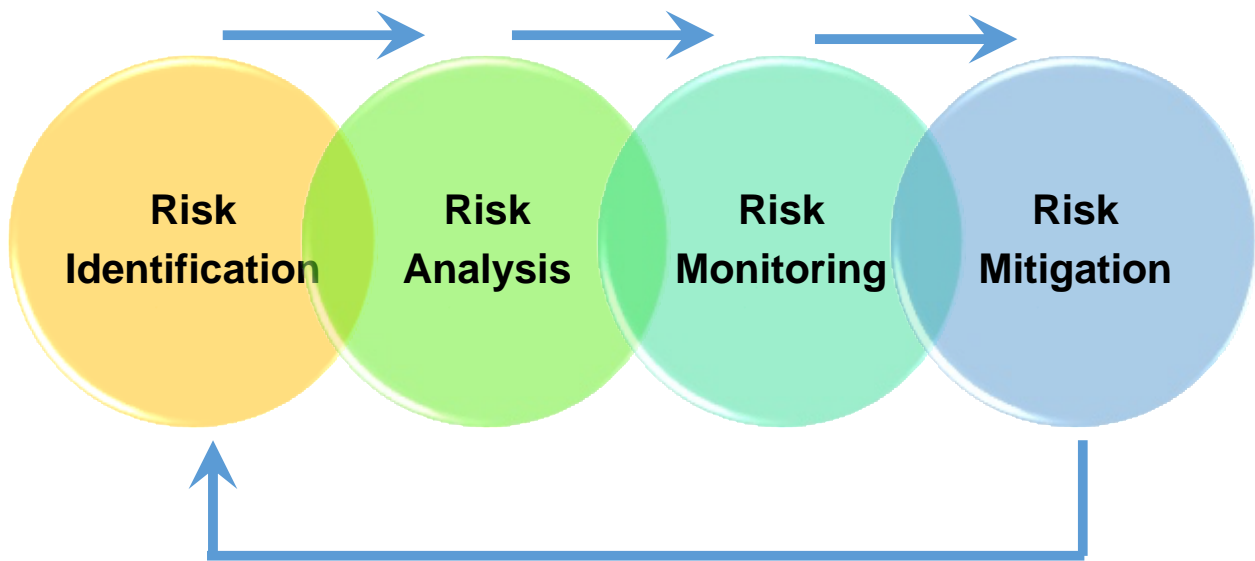


Figure 3. Overall risk methodology.

In **Figure 3**, the risk methodology starts with the identification of the risks via strong interactions between all the consortium partners. Then the risks are thoroughly analyzed to assess on its potential impact and prepare a mitigation plan, and closely monitored to track its evolution. At last, if needed, a risk mitigation is activated to prevent any negative impact on the evolution of the project (in terms of timeline, objectives, results, etc.). This methodology will be applied to the already identified critical risks (listed in the GA) or emerging risks occurring during the project execution.