Project Handbook

High-Voltage Spinel LNMO Silicon-Graphite Cells and Modules for Automotive and Aeronautic Transport Applications

Horizon Europe | HORIZON-CL5-2021-D2-01-02

Advanced high-performance Generation 3b (high capacity / high-voltage) Li-ion batteries supporting electro mobility and other applications

This project receives funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101069508 (HighSpin).

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Checked by	Estibaliz Crespo (CICE) Helmut Kühnelt (AIT)	24-11-2022
Approved by	Boschidar GANEV (AIT)	01-12-2022
Status	Final	01-12-2022

REVISION HISTORY

Version	Date	Who	Change
0.1	27-09-2022	B. Ganev	Initial version, following kick-off meeting.
0.2	23-11-2022	B.Ganev	First complete draft issued for internal revision
1.0	01-12-2022	B.Ganev	Final, following incorporation of review comments and transposition to project document template.

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PROJECT ABSTRACT

HighSpin aims to develop high-performing, safe and sustainable generation 3b high-voltage spinel LNMO||Si/C material, cells and modules with a short industrialisation pathway and demonstrate their application for automotive and aeronautic transport applications. The project addresses in full the scope of the HORIZON-CL5-2021-D2-01-02 topic, setting its activities in the “highvoltage” line. The project objectives are:

- Further develop the LNMO||Si/C cell chemistry compared to the reference 3beLiEVe baseline, extracting its maximum performance.
- Develop and manufacture LNMO||Si/C cells fit for automotive and aeronautic applications.
- Design and demonstrate battery modules for automotive and aeronautic applications.
- Thoroughly assess the LMNO||Si/C HighSpin technology vs. performance, recyclability, cost and TRL.

The HighSpin cell delivers 390 Wh/kg and 925 Wh/l target energy density, 790 W/kg and 1,850 W/l target power density (at 2C), 2,000 deep cycles, and 90 €/kWh target cost (pack-level). The project activities encompass stabilisation of the active materials via microstructure optimisation, the development of high-voltage electrolyte formulations containing LiPF6 and LIFSI, high-speed laser structuring of the electrodes, and the inclusion of operando sensors in the form of a chip-based Cell Management Unit (CMU).

HighSpin will demonstrate TRL 6 at the battery module level, with a module-to-cell gravimetric energy density ratio of 85-to-90% (depending on the application). Recyclability is demonstrated, targeting 90% recycling efficiency at 99.9% purity. HighSpin aims at approaching the market as a second-step generation 3b LNMO||Si/C in the year 2028 (automotive) and 2030 (aeronautics), delivering above 40 GWh/year and 4 billion/year sales volume in the reference year 2030.

Further information about the project can also be found here: https://cordis.europa.eu/project/id/101069508.

LIST OF ABBREVIATIONS

Acronym / Short Name	Meaning
CA	Consortium Agreement
CINEA	European Climate Infrastructure and Environment Executive Agency
CMU	Cell management unit
DC	Deputy Coordinator
EC	European Commission
EU	European Union
EU-GA	EU Grant Agreement
GA	General Assembly
LNMO	Lithium nickel manganese oxide
M	M1, M2…project months (1, 2, etc.)
MS	Milestone
ORDP	Open Research Data Pilot
PC	Project Coordinator
PM	Person-months
PO	Project Officer
RP	Reporting Period
Si/C	Silicon-graphite
Telco	Telephone conference
Wh	Watt-hour
WP	Work package
WPLB	Work package leader board

EXECUTIVE SUMMARY

This project handbook contains all the relevant information to provide an overview of the HighSpin project (project plans), as well as the procedures that will be employed in the execution of the project (project coordination). These are documented here according to the International Project Management Association (IPMA) standard.

The project management handbook is intended to be a quick reference for the involved project participants and facilitates project management by providing a structured project overview and listing the main processes that are applicable in managing the project.

1 INTRODUCTION

1.1. PURPOSE OF THIS DOCUMENT

This project handbook is intended to give an overview of the HighSpin project, its context, planning and procedures. The handbook (also referred to as "manual") contains the specific information, standards, and "rules" for executing this project. The elements contained in this manual follow the methodology of the International Project Management Association (IPMA). Where necessary, these are supplemented by additional information. Conversely, where extensive information would have to be duplicated from other project documents (e.g. the project Grant Agreement or the Consortium Agreement), such documents are referenced instead of duplicating the information – also, in some instances, for reasons of confidentiality. Where specific methods (e.g. tables, charts, graphics) were not needed or not prepared for this project, these respective sections are either omitted, or a remark explaining the omission is made.

The project handbook is intended to be a source of reference for consortium members covering day-to-day and periodic activities and procedures. The handbook will be updated as required throughout the life of the project, typically as part of project controlling.

Section 2 documents the project plans, which in large part were developed during the proposal preparation phase. Section 3 is a brief reference to the project start, which took place in September 2022. Sections 4 and 5 document the main procedures that will be employed in running the project. Section 6 will be populated at the end of the project.

1.2.PROJECT MANAGEMENT PROCESS

This handbook is based on the understanding of the project management process, including its component processes, as illustrated in Figure 1. This is reflected in the structure of this handbook, which covers the major component processes such as project start, coordination, controlling, and close-down. It should be noted that the project plans were largely elaborated as part of the project proposal *before* project start, and therefore are not shown in the figure. The communication process is handled in part in the section on project plans, and in part under project coordination. Internal communication is encapsulated in WP8, and external communication in WP7 of this project.

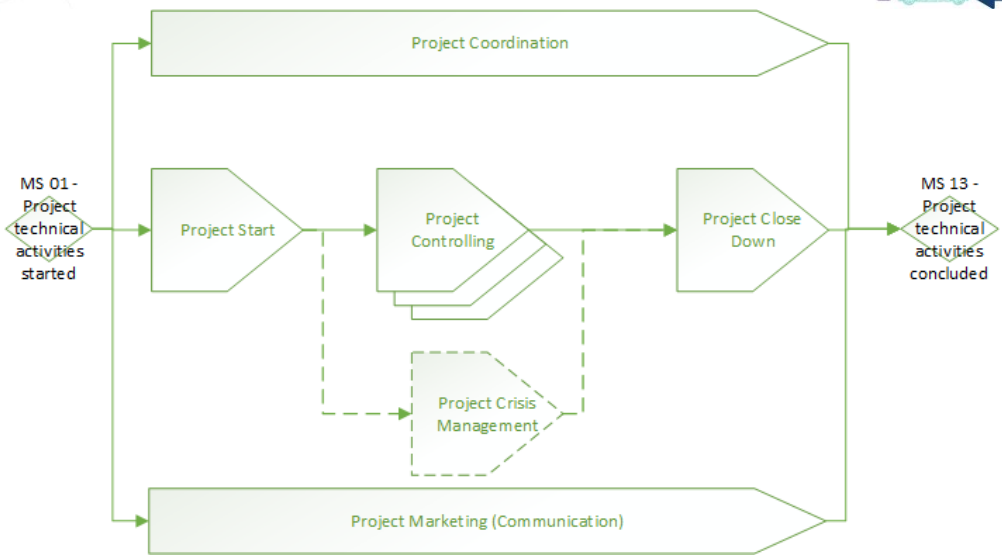


Figure 1: Project management process according to IPMA, with HighSpin-specific start and end milestones

1.3. PRECEDENCE

The general obligations and rules for project execution are defined in the HighSpin Grant Agreement, which also contains the Description of the Action (DoA). This is supplemented by the Consortium Agreement, which regulates rights, responsibilities, and procedures among the members of the consortium. This project handbook does not replace any of these agreements nor any of the EU guidelines for project implementation and documentation. Rather, it supplements these where needed with more detailed operational information, summarizes certain sections, or references them in the original documents.

Where there are any inconsistencies between these documents, the following order of precedence should be applied:

1. EU Grant Agreement (EU-GA)
2. Consortium Agreement (CA)
3. Project Handbook (this document).

2. PROJECT PLANS

2.1. PROJECT ASSIGNMENT

<table>
<tr><td colspan="2">HighSpin
Grant Agreement
101069508

PROJECT-
ASSIGNMENT</td></tr>
<tr><td>Project start event:
• 21.09.2022 – 22.09.2022 Kick-off meeting held</td><td>Project start date:
• 01.09.2022 technical start of project</td></tr>
<tr><td>Project close down:
• Final project meeting/review, expected in M48
Formal project close down event:
• As above.</td><td>Project close down dates:
• 31.08.2026 end of technical activities
• 31.10.2026 deadline for final reporting
• End of life of the website (tbd)</td></tr>
<tr><td>Project objectives:
HighSpin aims to develop high-performing, safe and sustainable generation 3b high-voltage spinel LNMO||Si/C material, cells and modules with a short industrialisation pathway and demonstrate their application for automotive and aeronautic transport applications.</td><td>Non-objectives:
• Automotive module design
• Pack-level cell integration
• Vehicle integration</td></tr>
<tr><td>Main tasks (Project phases):
Due to the specifics of how projects in Horizon Europe are typically structured, this project is structured not along phases but along work packages dealing with thematic areas of the project. They are:
• WP1– Identification of the end-user requirements
• WP2– Materials development
• WP3–Electrode and cell upscaling and engineering (pilot line)
• WP4–Automotive: cell and module manufacturing
• WP5–Aeronautic: module design, cell and module manufacturing
• WP6–Testing and performance qualification, TRL/MRL ex-post assessment, recycling demonstration, LCA/LCC, 2nd life
• WP7–Dissemination, communication, exploitation and IPR management
• WP8–Project Management</td><td>Project resources and costs:
<table><tr><th>Cost type</th><th>Costs</th></tr><tr><td>Direct personnel costs (876 PM)</td><td>5,141,538.00 €</td></tr><tr><td>Subcontracting</td><td>36,867.00 €</td></tr><tr><td>Purchase costs</td><td>941,618.40 €</td></tr><tr><td>Internally invoiced goods and services</td><td>358,743.00 €</td></tr><tr><td>Indirect costs</td><td>1,520,789.10 €</td></tr><tr><td>TOTAL</td><td>7,999,555.50 €</td></tr></table></td></tr>
<tr><td>Project owner:
European Climate Infrastructure and Environment Executive Agency (CINEA) as funding agency.

On the side of the beneficiaries executing the project, there is a project owner for each one of the 13 beneficiaries involved.</td><td>Project manager:
AIT Austrian Institute of Technology GmbH is the overall project coordinator. The coordinator function is performed by Boschidar Ganev. Furthermore, each beneficiary has its own project manager.</td></tr>
</table>

Project team members:	
• Boschidar Ganev (AIT; Project Coordinator, WP7 and WP8 leader) • Urša Skerbiš Štok (PVS; WP1 leader) • Marcus Fehse (CICE; WP2 leader) • Katja Fröhlich (AIT; WP3 leader)	• Rasmus Himstedt (CICE; WP4 leader) • Alexandre Narbonne (SAFT; WP5 leader) • Sébastien Fiette (CEA; WP6 leader)

2.2. PROJECT OBJECTIVES (OBJECTIVES, NON-OBJECTIVES)

HighSpin Grant Agreement 101069508	**PROJECT OBJECTIVES**	
Type of objective	**Project objectives**	**Adjusted project objectives as of...**
Main objectives	• Further develop the LNMO||Si/C cell chemistry compared to the reference 3beLiEVe baseline, extracting its maximum performance. • Develop and manufacture LNMO||Si/C cells fit for automotive and aeronautic applications. • Design and demonstrate battery modules for automotive and aeronautic applications. • Thoroughly assess the LMNO||Si/C HighSpin technology vs. performance, recyclability, cost and TRL.	• n/a
Non-objectives	• Integration of battery packs into vehicles	• n/a

2.3. DESCRIPTION OF PRE- AND POST PROJECT PHASE

HighSpin Grant Agreement 101069508	**DESCRIPTION OF PRE- AND POST-PROJECT PHASE**

1) Pre-project phase

What triggered the project?

- HighSpin aims to strengthen the position of the European battery industry by delivering the next generation of battery cells for automotive and aviation applications. This is part of an ongoing political and economic drive to build up a European battery industry and can be seen in the context of multiple initiatives such as the European Green Deal, the European Battery Alliance (EBA), the European Horizon Europe research and innovation funding programme, and others.
- To address specific challenges as set out in the EU call for proposals HORIZON-CL5-2021-D2-01, and continue the work begun under the predecessor EU-funded project 3beLiEVE (GA# 875033)
- To support strategic objectives of the involved project partners in conformity with their respective organizational strategies and relative to the domain of energy storage/automotive batteries

Relevant documents for the project

- Project proposal (meanwhile part of the Description of the Action)
- Grant Agreement (GA), which includes the Description of the Action (the project)
- Consortium Agreement
- Project execution documents are stored on the collaboration platform EMDESK.com

Experience from similar projects

- Each member of the project consortium has experience from previous projects that is relevant for the activities in HighSpin. These are listed in the project proposal.

2) Post-project phase

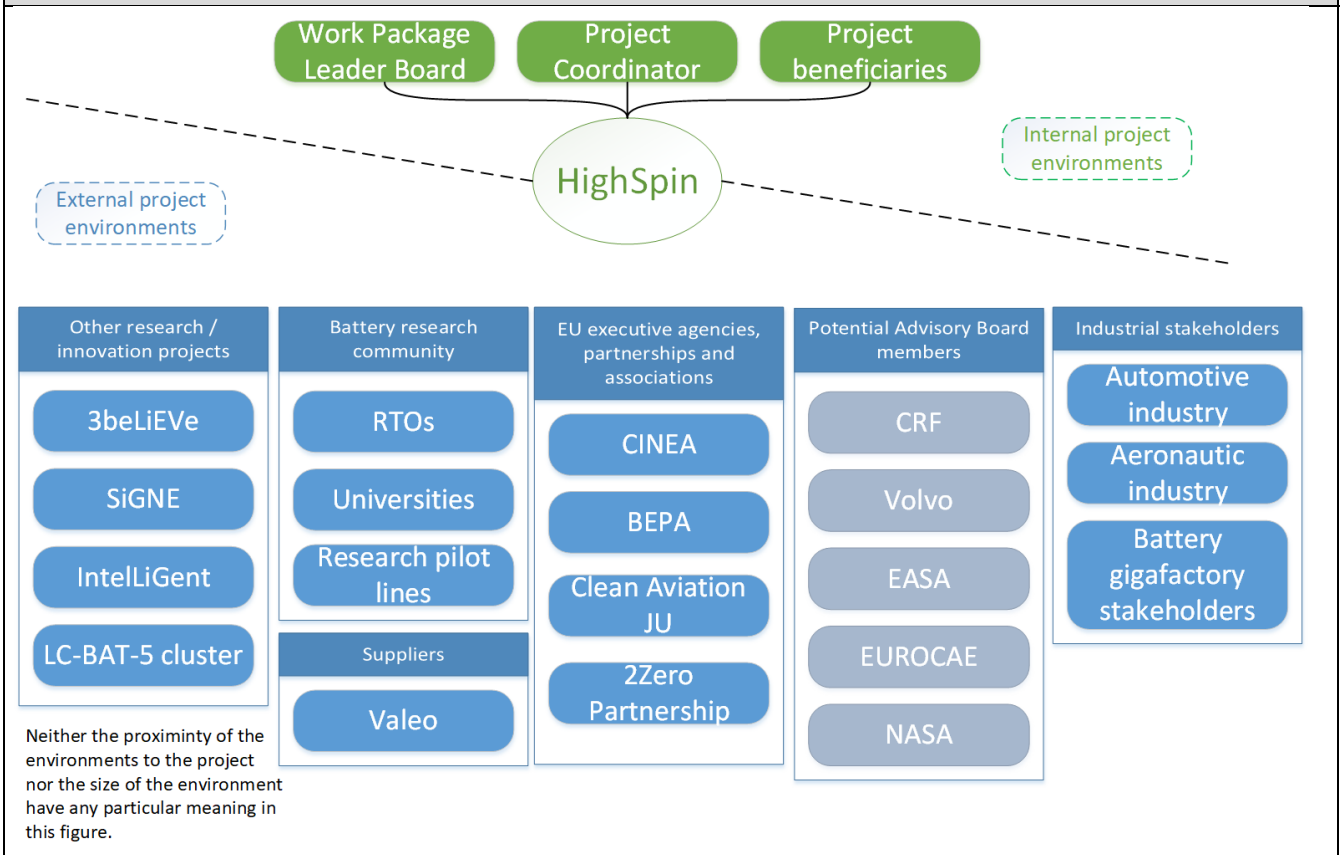
What will happen after the project has ended? (follow-up activities, further projects, …)?

- It is expected that beneficiaries will undertake to exploit the project results according to the exploitation plan, which will be encoded for HighSpin in its deliverables D7.2 and D7.4
- Follow-up research and/or innovation projects in which some of the beneficiaries from the HighSpin consortium collaborate in new constellations are conceivable.

2.4. PROJECT ENVIRONMENT ANALYSIS

HighSpin
Grant Agreement
101069508

PROJECT ENVIRONMENT GRAPHIC



HighSpin Grant Agreement 875033	**PROJECT ENVIRONMENT TABLE**		
Environ-ment	**Relationship** (potential/conflict)	**Measures**	**Who / when** **PSP Code**
Internal project environments			
Project Beneficiaries	These are the 14 partners (13 beneficiaries and one affiliated entity) executing the project. At present they are not individually depicted in the project environment graphic, but some or all members may be shown explicitly if/when particular relationships need to be depicted or examined more closely.	Regular project communication and coordination. PC keeps all beneficiaries up to date on overall project status and progress, reviews with WP leaders and WP leader board (WPLB).	PC 1.8.1, 1.8.2, 1.8.3
External project environments			
Other research / innovate-ion projects	**3beLiEVe** is the predecessor project to HighSpin and is still ongoing. 3beLiEVe delivers important inputs to HighSpin in terms of information and benchmarks. Final materials of 3beLiEVe represent starting point in HighSpin. **SiGNE** and **IntelLiGent** were funded under the same HORIZON-CL5-2021-D2-01 and thus have similar objectives. The **LC-BAT-5 cluster** represents the group of projects, of which 3beLiEVe was one, that preceded HighSpin and also work with generation 3b materials.	Maximise knowledge transfer and lessons learned from 3beLiEVe; manage synergies in terms of materials supply where and as appropriate. Initiate or participate in exchange with SiGNE and IntelLiGent. Include as stakeholders in dissemination	PC, WP2 and WP3 leaders – at project kick-off and within early months of HighSpin PC, WP7 leader 1.7.5, 1.8.1

EU executive agencies, parnterhips and associations	CINEA is the executive agency overseeing HighSpin and administering its funding. HighSpin reports to CINEA at set intervals. Good communication with the project officer at CINEA is key to project support and in case of any difficulties.	Ensure on-time delivery of project deliverables; timely communication in case of issues or needed support	PC 1.7.1, 1.7.2
Potential Advisory Board members	During the project proposal preparation, HighSpin has reached out to several stakeholders who have expressed interest in becoming members of an Advisory Board to HighSpin. At time of writing, these have not been confirmed yet.	Follow up with envisaged AB members and formalise membership.	PC 1.8.1
Suppliers	**Valeo** – is due to provide module parts in the specification/design of 3beLiEVe for cell-to-module integration of automotive cells in HighSpin T4.3	Potential need to formalise supply of parts; follow-up to determine who will be recommended integration provider.	AIT 1.4.3

2.5. RELATIONSHIP TO OTHER PROJECTS AND THE ORGANISATION'S STRATEGY

3beLiEVe is the most important direct predecessor project to HighSpin. As mentioned in the project environment table in the previous section, 3beLiEVe provides benchmark information (e.g. know-how on materials selection and processing, cell performance, module design) to HighSpin, and there is a substantial overlap in the consortia of both projects. 3beLiEVe was ongoing at the time of HighSpin start, with an expected overlap of at least 10 months.

Further/indirect predecessor projects and those from which HighSpin project participants draw experience are listed in the HighSpin project proposal. Since the HighSpin consortium comprises of 14 organizations, it is beyond the scope of this document to detail all the relationships of HighSpin to other projects for each organization. Generally, it can be said that participation in HighSpin is connected to each participating organization's strategy, since every partner is bringing into the project a technology or know-how that is to be further developed. The general objective is to enable each of these actors to better occupy a space along the value chain for automotive batteries.

Furthermore, as also pointed out in the project environment table, there is a relationship between HighSpin and the other projects –SiGNE (project ID 101069738) and IntelLiGent (project ID 101069765) – funded under the same topic (*HORIZON-CL5-2021-D2-01-02 - Advanced high-performance Generation 3b (high capacity / high voltage) Li-ion batteries supporting electro mobility and other applications (Batteries Partnership)*). These are requested by the funding agency to cluster and liaise with each other to exploit potential synergies. This activity is encapsulated for HighSpin in *T7.5 Clustering and liaising with other relevant RIA projects and initiatives*.

2.6. PROJECT ORGANISATION

2.6.1. Project Consortium – List of beneficiaries

#	Name	Short name in project	Country
1	AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH	AIT	Austria
2	CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA	CICE	Spain
3	HALDOR TOPSOE AS	HTAS	Denmark
4	FORSCHUNGSZENTRUM JULICH GMBH	FZJ	Germany
5	KARLSRUHER INSTITUT FUER TECHNOLOGIE	KIT	Germany
6	PIPISTREL VERTICAL SOLUTIONS DOO PODJETJE ZA NAPREDNE LETALSKE	PVS	Slovenia
7	SAFT	SAFT	France
8	CUSTOMCELLS HOLDING GMBH	CCI	Germany
9	ARKEMA FRANCE SA	ARKEMA	France
10	SENSICHIPS SRL	SCP	Italy
11	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX	CEA	France
12	LEAD TECH SRL	LT	Italy
13	VIANODE AS	VIA	Norway

2.6.2. Project Organisation Chart

HighSpin Grant Agreement 101069508	**PROJECT-ORGANISATION**	
Role in Project	**Field of duties/Skills**	**Name**
Project Coordinator (PC)	Project coordination, communication, controlling, interfacing with the funding agency (project officer), reporting, contract and financial management. Chair the Work Package Leader Board and General Assembly meetings. Further details are given in section 6 of the Consortium Agreement (CA).	AIT Austrian Institute of Technology GmbH (project short name: AIT) is the Coordinator for the project. Boschidar Ganev holds this role for AIT.
Deputy Coordinator (DC)	Support the Coordinator, particularly in technical issues; take over Coordinator tasks in case of illness/absence. This role was added after project start and is therefore not described in the CA.	Michele de Gennaro (AIT) is the DC.
Work Package Leaders (WP-L)	Coordinate work package according to the work plan. Review risks related to the WP and escalate if necessary. Participate in WPLB (see below); organise feedback with task leaders and involved partners. Report WP progress and contribute/coordinate content to the technical periodic reports.	See section 2.1 Project Assignment → Project team members.
Work Package Leader Board (WPLB)	Progress monitoring, GA support, controlling, preparing decisions for the GA. Meet 4x/year at minimum. Details are given in section 6 of the Consortium Agreement.	Consists of all WP-L, the PC and the DC. (Also referred to as the "Project team" in section 2.1)
General Assembly (GA)	Meet at least 2x/year. Main decision-making body of the project.	At least one representative from each project beneficiary.
Project members	At least one person from each project beneficiary. Execute the tasks of the projects; identify, resolve or escalate issues. Participate in their respective tasks and the GA.	These are listed in EMDESK under 'Contacts', as well as in the mailing distribution lists (cf. section 2.16.1

2.7. WORK BREAKDOWN STRUCTURE

2.8. PROJECT WORK-PACKAGE SPECIFICATION

The work packages are detailed in the Grant Agreement for HighSpin. They are also documented on the project document sharing platform, EMDESK, under 'Workplan', and on SyGMa (see Project Documentation, section 2.16.1). Therefore, this information is not rendered again here.

2.9. PROJECT RESPONSIBILITY MATRIX

The following project responsibility matrix is given on an organization level, not on an individual project (team) member level, as the latter are too numerous to fit and may change over time. Each project partner is responsible for allocating staff to cover the responsibilities in the project responsibility matrix. This matrix can be found on EMDESK under *Documents > WP9-Project Management > T8.1 Project Coordination and management of the Advisory Board*.

HighSpin		PROJECT RESPONSIBILITY MATRIX	1 (PC)	2	3	4	5	6	7	8	9	9.1	10	11	12	13
PSP code	WP/ Task	R= Responsible; A=Approving; S=Supporting; I=Informed; C=Consulting	AIT	CICE	HTAS	FZJ	KIT	PVS	SAFT	CCI	ARKEMA	COA	SCP	CEA	LT	VIA
1.1	WP1	**Identification of the end-user requirements**						R								
1.1.1	T 1.1	Automotive: review, update and supplement requirements	R													
1.1.2	T 1.2	Aeronautic: cell and module safety and performance requirements for propulsive and	S					R					S			
1.1.3	T 1.3	Consolidation of automotive and aeronautic performance, safety and sustainability req	S					R						S		
1.1.4	T 1.4	Definition of testing protocols	S					S					S	R		
1.2	WP 2	**Materials development**		R												
1.2.1	T 2.1	Development of novel electrolytes compatible with both high-voltage LNMO cathode and Si-		S		R			S		S					
1.2.2	T 2.2	Development, selection and processing of high-energy LNMO of cathode material		S	R		S				S					
1.2.3	T 2.3	Development, selection and processing of Silicon-Graphite composite anode material		S			S					S				R
1.2.4	T 2.4	Definition of the final cell chemistry		R			S		S	S						S
1.2.5	T 2.5	Material compatibility, system thermal stabilities and cell degradation assessments		R		S	S		S							
1.3	WP 3	**Electrode and cell upscaling and engineering (pilot line)**	R													
1.3.1	T 3.1	Scale-up from lab to pilot scale	R						S	S						
1.3.2	T 3.3	Electrode-electrolyte interface monitoring	S				R		S	S						
1.3.3	T 3.2	Electrode architecture and 3D design	R				S									
1.4	WP 4	**Automotive: cell and module manufacturing**								R						
1.4.1	T 4.1	Automotive cell design and manufacturing validation	S							R						
1.4.2	T 4.2	Automotive battery cell manufacturing					S			R						
1.4.3	T 4.3	Automotive: cell-to-module integration	R													
1.5	WP 5	**Aeronautic: module design, cell and module manufacturing**							R							
1.5.1	T 5.1	Aeronautic module design	S					S	R				S	S		
1.5.2	T 5.2	Aeronautic pouch cell design, process definition and cell manufacturing					S		R				S			
1.5.3	T 5.3	Aeronautic module manufacturing and cell integration						S	R				S	S		
1.6	WP 6	**Testing and performance qualification, TRL/MRL ex-post assessment, recycling demonstration, LCA/LCC, 2nd life**												R		
1.6.1	T 6.1	Safety and electrochemical assessment of the cell at several Ah scale												R		
1.6.2	T 6.2	Cell testing on final demonstrator scale, addressing electromobility and other applications		S			R							S		
1.6.3	T 6.3	Module testing on final demonstrator scale	S				S							R		
1.6.4	T 6.4	Recycling		R			S							S		
1.6.5	T 6.5	Life Cycle Assessment (LCA) of cells and modules, including TRL and cost assessment												R		
1.7	WP 7	**Dissemination, communication, exploitation and IPR management**	R													
1.7.1	T 7.1	Scientific dissemination	R	S		S	S							S		
1.7.2	T 7.2	Communication towards non-specialist stakeholders and public outreach activities	S												R	
1.7.3	T 7.3	Exploitation			S			S	R	S	S	S				S
1.7.4	T 7.4	IPR management	R													
1.7.5	T 7.5	Clustering and liaising with other relevant RIA projects and initiatives	R													
1.8	WP 8	**Project Management**	R													
1.8.1	T 8.1	Project coordination and management of the Advisory Board	R													
1.8.2	T 8.2	Contract and financial management, controlling and reporting	R	S				S	S	S				S		
1.8.3	T 8.3	Quality, data and risk management	R													

2.10. MILESTONE PLAN

ID	Milestone title	WP	Lead beneficiary	Due Date (in months)
MS 01	Project technical activities started	WP8	P 1 - AIT	M01
MS 02	Iteration-0 materials received and ready for electrode manufacturing	WP2	P 3 - TOPSOE	M01
MS 03	Reference cells with Iteration0 (=baseline) materials have been built	WP3	P 1 - AIT	M03
MS 04	Iteration-1 materials delivered to WP3	WP2	P 2 - CICE	M12
MS 05	Iteration-2 materials delivered to WP3	WP2	P 2 - CICE	M24
MS 06	Final cell chemistry defined and transferred to WP3	WP2	P 2 - CICE	M30
MS 07	Automotive: electrode design finalised	WP3	P 1 - AIT	M33
MS 08	Aeronautic: electrode design finalised	WP5	P 7 - SAFT	M33
MS 09	Automotive: final demonstrator modules ready for testing	WP4	P 1 - AIT	M36
MS 10	Aeronautic: final demonstrator modules ready for testing	WP5	P 7 - SAFT	M38
MS 11	Automotive: testing campaign completed	WP6	P 11 - CEA	M45
MS 12	Aeronautic: testing campaign completed	WP6	P 11 - CEA	M45
MS 13	Project technical activities concluded	WP8	P 1 - AIT	M48

2.11. PROJECT BAR CHART (GANTT)

2.12. RESOURCE PLAN

The **resource plan** gives the planned effort for each participant, expressed in person-months (PM). This is listed in the Grant Agreement and not reproduced here for reasons of confidentiality. The person-month resources are also given on EMDESK, under 'Resources'.

The **project cost plan** is given in Annex 2 of the Grant Agreement and is not reproduced here for reasons of confidentiality. A high-level summary of the project costs is given in section 2.1. Total funding and funding per beneficiary can also be viewed in the public records: https://cordis.europa.eu/project/id/101069508.

2.13. PROJECT COMMUNICATION (INTERNAL)

This section and its subsections document communication structures and tools inside the project organisation (internal communication). For external communication, please see section 4.2.

HighSpin 101069508	PROJECT-COMMUNICATION			
Title	**Objectives, Content**	**Participants**	**Schedule**	**Location**
Quarterly plenary call	• General project status update • Exchange between WPs • Communicate issues, needs	All	Every 3 months	Online (e.g. MS Teams)
Work Package Leader Board call	• WP and project status • Controlling of tasks, schedules • Review of risks, changes to project environments (if needed) • Preparation of information for GA (if needed)	Project Coordinator, (Deputy Coordinator) WP leaders	1x/month	Telco service or in person
WP meetings	• Coordination of WP or task • Discussion of technical progress, issues, next steps	Members of each WP	Usually once per two weeks, or as arranged by WP leader	Telco service or in person

General Assembly meeting	• General project status update • Decisions and next steps • Workshops, if needed	At least one representative of each project beneficiary	2x /year; alternating in-person and online	MS Teams for online; different project partner location for in-person meetings
Project Review Meetings with PO	• Report and review project progress	PC, WP leaders	After M18, after M36, at or after M48 – as agreed with the PO	As required/ allowed by the PO
Day to day intra-consortium communication	• Coordinate and execute project tasks, progress technical work, resolve issues.	All	Ongoing/ day-to-day	Email, email distribution lists, telephone/video calls

2.13.1. Email distribution lists

Day to day project communication is generally done by email. An email distribution list has been set up for each WP. In this way, all members of a particular distribution list can be easily contacted by simply addressing an email to that list. The list for WP8 can be used to contact all project participants. The available lists can be viewed at the project document repository (EMDESK), under 'Groups' – each group has an email address.

2.13.2. Teleconferencing tools

Teleconferencing applications are the tools of choice for conference calls. Each partner organising conference calls is free to use their tool of choice. The PC organizes calls using MS Teams. The EMDESK document repository also offers a built-in videoconferencing tool (EMDESK > Meetings > Start meeting).

2.14. PROJECT "RULES"

Rule	Description
Documentation	• **Store project documentation on the EMDESK** collaboration platform (don't send large attachments by email). Use the 'versioning' functionality of EMDESK to avoid a large clutter of different versions of the same document • Do not store project information on any other public clouds (confidentiality). Exception: for concurrent collaborative editing of documents, PC provides MS OneDrive (datacenter hosting in Europe). • WP leaders **keep a record** (e.g. minutes of meeting) of the developments in their WP and make sure EMDESK is up to date with this. • Upload presentations and documents from meetings to EMDESK
Communication	• Participants are encouraged to communicate bilaterally as needed: don't hesitate to pick up the phone • Partners respect the confidentiality or sensitive nature of other partners' background or results in the project and apply the proper procedures to obtain clearance for external communication.

2.15. PROJECT RISK ANALYSIS

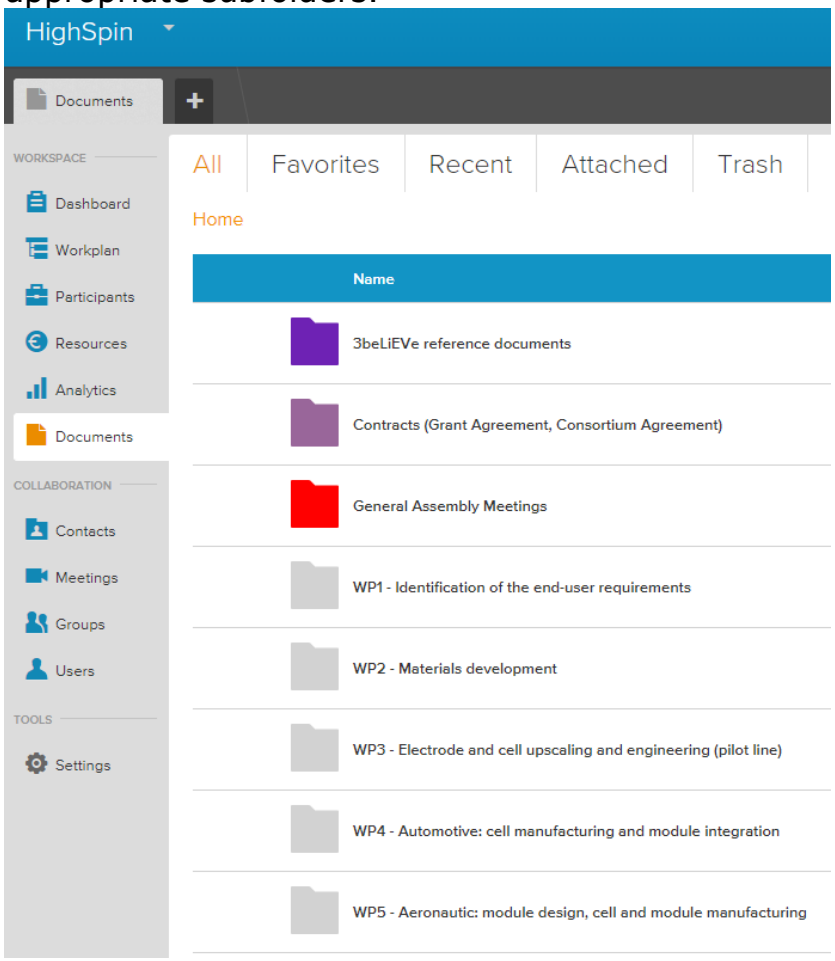
Risk #	Description of risk	WP #	Proposed risk-mitigation measures
1	Handling and/or aqueous processing of LNMO (over-lithiated, coated) or lithiated binders prove intractable. Likelihood: Medium Impact: Medium	WP2 WP3	Standard processing using NMP can be used as a backup option. However, this is less eco-friendly and more expensive.

2	Satisfactory interplay of cell components (high-voltage cathode, high-energy anode, and electrolyte in full cell) cannot be achieved (i.e. unsatisfactory electrochemical performance). E.g. unexpected degradation or side reactions happen. Likelihood: Medium Impact: Medium	WP2	Failure to achieve full system harmonization between the active materials and the electrolyte is one of the main technical risks, although limited by synergy #1 (project proposal section 1.1.2). Anode and cathode materials undergo full system compatibility checks in WP2 and WP6 as part of the material development loop. Screening and multiple validation tests will ensure early detection of such challenges to allow for application of mitigation strategies. Strategies to introduce additional Li are also applied (cf. sec. 1.2.1, Area #1).
3	Unsatisfactory energy performance. Difficulty to achieve very high loadings, despite process modifications. Likelihood: medium Impact: high	WP3	1. Decrease electrode loadings, modifying material morphologies, binder properties, electrode formulation will help to increase energy density of the electrodes. Increase number of layers (e.g., tri-layer configuration) to increase mass loading.
4	Unsatisfactory power performance. Difficulty to maintain power performance on high loading electrodes. Likelihood: high Impact: medium	WP3	Improve electrode wettability. An intensive electrolyte study will help to improve electrode impregnation. Capillary structures will be introduced in electrodes by laser micro-ablation which will help to achieve the requested power performance. (WP2, WP3).
5	Unforeseen difficulty of integrating the HighSpin automotive electrode stack in to 3beLiEVe pouch cell geometry. Likelihood: low Impact: medium	WP3 WP4	Since HighSpin aims to leverage 3beLiEVe cell and module designs to avoid redesign effort, the dimensions for these items are fixed. In case the HighSpin stack designed for best performance cannot be accommodated, an adapted stack could be integrated (with sacrifice on e.g. energy
6	Targeted energy ratio cell/module not achieved, with a higher weight than expected of the module structure. Likelihood: high Impact: low	WP5	Thermal modelling of cell management will help to limit the embedded dead weight for cooling. Swelling study, performed on cells coming from WP3 with iteration-0 materials, will enable an optimisation of the structure mandatory to avoid pouch swelling.

7	CMU does not comply to aeronautics requirements. Likelihood: low Impact: medium	WP5	If this risk occurs, a redesign for fixes is needed. This adds about 10 months delay, and this can be adsorbed extending T5.1 without extending the project. If the delay cannot be accepted, an external commercial protection IC can be added to the CMU.
8	The recycling process proves difficult and does not provide the expected results. Impurities are present in high concentration after the separation. Likelihood: high Impact: low	WP6	Two recycling processes have been included in HighSpin to mitigate this risk: (i) direct recycling, and (ii) material recovery. In case high level of impurities are present after the separation step, the recycling process will include an additional step for their removal via precipitation or ion exchanges resin.

2.16. PROJECT DOCUMENTATION

2.16.1. Document repositories

Area	Description
Files	**EMDESK** is the repository for project documentation. In the 'Documents' section, there is a folder for each WP. Files belonging to that WP should be placed in that folder or appropriate subfolders.  **OneDrive:** PC will share documents on OneDrive as needed to enable concurrent collaborative editing, if/when needed. **SyGMa:** Another instance where some project documentation takes places is the EC's System for Grant Management (SyGMa). Updates on the status of the project (e.g. deliverables submissions, milestone status, risk assessment, gender and SME reporting) as part of continuous reporting are generally made by the PC. For periodic reporting, beneficiaries can and must input their cost claims and use of resources (person-months, costs, explanations) in SyGMa → see section 4.3.3.
Access Author-isation	**EMDESK** • PC is the Admin for EMDESK with all corresponding rights • Deputy PC is Manager for EMDESK with all corresponding rights

	• All other users have access rights for the different EMDESK resources as follows:
	  ○ Activities: regular users can Edit All
	  ○ Participants: regular users can Read All
	  ○ Documents: regular users can Manage All
	  ○ Resources: regular users can Read All
	
	Manage = Edit & Manage (Add, Move and Delete) access
	Edit = Edit access but no Manage (Add, Move, and Delete)
	Read All = Read access but no Edit right
	SyGMA
	For continuous reporting, only the Coordinator and the Project Officer should access this system. For periodic reporting, beneficiaries can and must input their cost claims and use of resources (person-months, costs, explanations) in SyGMa.

Naming convention	• **Final deliverables** are named as per their title in the Grant Agreement, prefixed with the deliverable number, e.g. *Dx.y Deliverable Name.pdf*. • **Work-in-progress files:** good practise is to prefix such documents with the date in the form *YYYY-MM-DD_Document name.ext*
Rules	• Submission of deliverables to SyGMa is done only by the PC or the Deputy PC.

2.16.2. List of Deliverables

PU = public; SEN = sensitive (not public, only visible to consortium and EC)

ID	Name	Responsible (Owner)	Reviewer	Calendar due date	Dissemination Level
D1.1	Requirements for automotive application	AIT	PVS	31 Dec 2022	PU
D1.2	Requirements for aeronautic application	PVS	SAFT	31 Dec 2022	PU
D1.3	Consolidated requirements and guidelines for battery cell/module demonstrator manufacturing and qualification	PVS	CEA	31 Jan 2023	PU
D1.4	Cell and module-level testing objectives and protocols	CEA	AIT	31 Mar 2023	PU
D2.1	Materials development report	CICE	HTAS, VIA, ARKEMA	31 Aug 2024	PU
D2.2	Final report on materials development and definition of final HighSpin cell chemistry	CICE	SAFT	28 Feb 2025	PU
D2.3	Final internal report on materials and lab-scale cells safety assessment and degradation mechanisms	CICE	tbd	28 Feb 2025	SEN
D3.1	Electrolyte-CEI-SEI formation analysis of reference materials	AIT	tbd	28 Feb 2023	PU
D3.2	Feasibility studies of 3D electrode design	KIT	CCI	29 Feb 2024	PU
D3.3	Formation gas and post-mortem analysis	AIT	Tbd	28 Feb 2025	PU
D3.4	Final electrode designs for automotive and aeronautic cells	SAFT	AIT	31 May 2025	SEN
D4.1	Report on automotive cell design and manufacturing	CCI	Tbd	30 Jun 2025	SEN
D4.2	Automotive: final demonstrator modules	AIT	Tbd	31 Aug 2025	PU
D5.1	Aeronautic battery module concept and preliminary design	PVS	Tbd	31 Aug 2024	PU
D5.2	Aeronautic battery module detailed design	SAFT	Tbd	28 Feb 2025	SEN

D5.3	Report on aeronautic cell manufacturing	SAFT	Tbd	31 Aug 2025	SEN
D5.4	Report on aeronautic module manufacturing	SAFT	Tbd	31 Oct 2025	SEN
D5.5	Aeronautic battery module demonstrator	SAFT	Tbd	31 Oct 2025	PU
D6.1	Report on the safety and electrochemical assessments of the cell at several Ah scale	KIT	Tbd	28 Feb 2025	SEN
D6.2	Report on the final cell and module assessment	CEA	Tbd	31 May 2026	PU
D6.3	Report on the recycling demonstration results	CICE	Tbd	31 Aug 2025	PU
D6.4	LCA of the developed technology plus TRL and cost assessment	CEA	Tbd	31 Aug 2026	PU
D7.1	Dissemination and communication plan	AIT	Tbd	28 Feb 2023	PU
D7.2	Preliminary exploitation strategy (including IPR)	SAFT	Tbd	30 Sep 2024	PU
D7.3	Final dissemination and communication report	AIT	Tbd	31 Aug 2026	PU
D7.4	Final exploitation strategy (including IPR)	SAFT	Tbd	31 Aug 2026	PU
D8.1	Project handbook	AIT	WPLB	30 Nov 2022	PU
D8.2	Data management plan	AIT	Tbd	28 Feb 2023	PU
D8.3	Data management plan (updated)	AIT	Tbd	31 Aug 2026	PU

Where reviewers for a deliverable have not been defined yet ("…tbd"), these will be defined either in the next iteration of this project handbook, or when the drafting of the deliverable begins.

3. PROJECT START

3.1. MINUTES – PROJECT START

The technical project start for HighSpin was on 01 September 2022. The project kick-off meeting took place on 21 and 22 September 2020 at the premises of the Project Coordinator, AIT Austrian Institute of Technology GmbH in Vienna, Austria. The minutes of meeting as well as presentations and any other documentation relating to the kick-off are stored on the project file repository. With the completion of the kick-off meeting, *MS1 Project technical activities started* was achieved (cf. section 2.10).

3.2. FOLLOW-UP WORKSHOP

A follow-up workshop to the kick-off meeting was not held. Besides ongoing project management, the work packages WP1, WP2, WP3 and WP7 were launched at the kick-off meeting. Further project activities will unfold in these work packages. The other WPs will be launched as per their planned start dates.

4. PROJECT COORDINATION

4.1. MINUTES

Minutes of meetings for project coordination are all stored on the EMDESK document sharing platform as follows:

- **Minutes from General Assembly meetings and quartery plenary telcos** → 'EMDESK > Documents > General Assembly Meetings (incl. quartery plenary telcos)' section under *Meetings & Telcos.*
- **Minutes of meeting from WP meetings** should be placed in the respective WP folders on EMDESK.

4.2. PROJECT COMMUNICATION

Regular **internal communication** for coordination purposes takes places as described in section 2.13.

External communication in the sense of dissemination and communication about the project and its wider context is done as part of WP7. For external communication including scientific dissemination, the measures will be developed and executed in *T7.1 Scientific dissemination* and *T7.2 communication towards non-specialist stakeholders and public outreach activities,* and documented in deliverable *D7.1 Communication towards non-specialist stakeholders and public outreach activities*.

A **project website** will be set up at the domain *highspin.eu* and/or *highspin-project.eu*. Furthermore, selected social media channels (primarily LinkedIn) will be set up for the project and will be used to communicate with the identified stakeholders.

Furthermore, for reasons of quality assurance and IPR/confidentiality, it is important to follow the **approval procedures** for external communication. See →section 4.2

4.3. PROCEDURES AND PROCESSES

4.3.1. Review of Deliverables

Purpose: Ensure IPR/confidentiality is respected and quality of the deliverable is adequate prior to submission to CINEA (and publication in case of deliverables with dissemination level is "public" (PU), see section 2.16.2).

Responsibilities: After creating a readable draft, the Deliverable Owner submits it to the partner who is responsible for review (cf. →2.16.2). After review, the Deliverable Owner makes any needed corrections and sends again to the reviewer. Once the reviewer approves the document, it is sent to the PC for final review. The PC uploads the document to SyGMA, thereby submitting it to CINEA.

Procedure and timing: Indicatively, up to 3 weeks should be reserved for the review process. In other words, Owner should send the document to Reviewer around 3 weeks before its due date.

Indicative timing below, T is the due date for delivery. Numbers represent calendar days.

- [T-20] Deliverable Owner sends deliverable to Reviewer (put WP-L for the deliverable in cc)
- [T-20] to [T-05] Reviewer provides comments to Owner in track changes mode. Owner updates as appropriate and resends to reviewer. Continue this until reviewer accepts the document.
- [T-05] Deliverable Owner sends revised Deliverable to PC. PC reviews.
- [T-00] PC uploads final deliverable to SyGMa.

4.3.2. Notification of dissemination and communication measures

In the context of this project, external communication is any project-related information released by the consortium or any member of it to parties outside the consortium, regardless of the form it may take (e.g. deliverable, press release, scientific publication, PowerPoint slides for conference presentation, etc.).

Information shared by the partners within the project consortium and designated for external communication must be handled with proper care and diligence. This is of utmost importance to maintain confidentiality of sensitive information, safeguard intellectual property and generally support a trustful atmosphere for collaboration. This applies particularly where one partner plans to externally communicate information that may also include another partner's background or results.

Regulations and procedures relating to external communication are contained in the Consortium Agreement in section *8.5 Dissemination*. Without rendering the full content here, the key message is that…

"Prior notice of any planned publication shall be given to the other Parties at least 60 calendar days before the publication. Any objection to the planned publication shall be made in accordance with the Grant Agreement in writing to the Coordinator and to the Party or Parties proposing the dissemination within 45 calendar days after receipt of the notice. If no objection is made within the time limit stated above, the publication is permitted.

See also the subsequent regulations in section 8.5 of the Consortium Agreement for the details regarding Dissemination.

Dissemination and communication are part of the contractual obligations of projects funded under Horizon Europe. To be able to properly track and report dissemination and communication measures that have been undertaken, a register of these will be kept. **To this end, any partner planning, or having already undertaken dissemination or communication measures should notify these to the PC**.

4.3.3. Periodic reporting

Periodic reporting is required by the Grant Agreement and is due for each reporting period (RP) of the project. There are three RPs in HighSpin:

- Reporting Period 1 (RP1): M1-M18 (September 2022 – February 2024)
- Reporting Period 2 (RP2): M19-M36 (March 2024 – August 2025)
- Reporting Period 3 (RP3): M37-M48 (September 2025 – August 2026).

Sixty days after the end of each reporting period, a periodic report is due. It consists of a technical report, which summarises the technical activities and outcomes, and financial reporting by each beneficiary.

The Online Manual gives an overview of the process and the procedure: https://webgate.ec.europa.eu/funding-tenders-opportunities/display/OM/Online+Manual → Grant Management → Report & payment requests

Procedure for technical reporting:

(T is the submission due date for the periodic report.)

1. T-60: At the end of each RP, the PC issues reporting template for technical report to all WP-L;
2. T-30: WP-Ls compile inputs from participating partners and submit WP technical report to PC;
3. PC compiles and edits the final technical report;
4. T-20: PC submits draft final report to WPLB for review;
5. T-10: SC provides feedback, if any. PC incorporates feedback into the report as appropriate;
6. T-0: PC submits complete reporting package (technical + financial reports).

Procedure for financial reporting:

1. T-60: At the end of each RPx, PC notifies all beneficiaries to begin compiling their financial figures and use of resources for the RP that has just ended.
2. T-20: By this time, all beneficiaries have input and submitted to PC (using the SyGMa functionality) their financial data and use of resources. PC reviews the financial reports. If necessary, PC sends back to the beneficiary for review and resubmission to PC.
3. T-5: all beneficiary financial reports are finalised, ready to be submitted by the PC in SyGMa
4. T-0: PC submits complete reporting package (technical + financial reports).

4.3.4. Issue resolution and escalation

Issues should always be resolved on the lowest possible level and should be escalated to the next higher level if a resolution is not possible, risks taking too long, or if in any case the next higher instance in the chain of escalation should be informed due to the (potential) severity of the issue.

The chain of escalation is: Task leader → WP leader → Project Coordinator → Work Package Leader Board→ General Assembly → Issue resolution according to CA.

4.4. QUALITY

Quality here relates here to the quality of project processes and deliverables. Quality control is important to ensure, for instance:

- no confidential or other restricted information leaves the consortium without proper clearance;
- content correct, and comprehensibly expressed (language);
- visual appearance adequate and in-line with project branding
- Acknowledgement of EU funding has been properly done.

4.4.1. Deliverables and publications

Deliverables = public or confidential (cf. section 2.16.2).

Publications = abstract, scientific paper, presentation, press release or similar documents going to any individual or group outside of the consortium

The following should be checked as part of the process "Review of Deliverables" (→ section 4.3.1). The deliverable…

- uses the current project template, if applicable (location: EMDESK → *Documents* > *Document templates*)
- contains an acknowledgement of EU funding
- features proper spelling and grammar (project standard is UK English)
- has properly captioned tables and figures
- makes consistent use of terminology and abbreviations
- its abbreviations are explained in the list of abbreviations
- uses an agreed citation format.

4.4.2. Acknowledging EU funding

EU funding should be acknowledged in all publications and official project documents. Acknowledgements with proper wording about EU funding are already included in the project document templates for Deliverables and for PowerPoint presentations, usually on the cover page or on the last page. The wording is:

"This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement no. 101069508."

When acknowledging EU funding, it should also be checked that the publication conforms to the guidelines of the use of the EU emblem, which can be found here: https://ec.europa.eu/info/sites/info/files/use-emblem_en.pdf.

Deliverables should include this disclaimer:

"This publication reflects only the author's view. The European Commission and the European Climate Infrastructure and Environment Executive Agency (CINEA) are not responsible for any use that may be made of the information it contains."

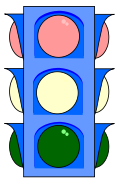
5. PROJECT CONTROLLING

Project controlling is done periodically by the WPLB as part of its regular meetings (Project Steering Committee meeting → cf. section 2.13). The PC prepares the draft project status report card (see section 5.1 below) prior to the WPLB meeting and reviews it with the WPLB. This controlling is on project level, not for every individual partner, except where the partner-specific evaluation is needed for the overall evaluation, for instance in part 7 of the project status report, see below. Each beneficiary is responsible for their own financial and resource controlling. The financial and person-month figures are reported as part of periodic reporting (cf. section 4.3.3).

Once a controlling session is completed:

- The PC updates the project status report in the project handbook
- The PC issues an updated version of this project handbook
- The PC updates, if applicable, the Risks section in SyGMa.

5.1. PROJECT STATUS REPORT

<table>
<tr><td>HighSpin
101069508</td><td colspan="2">PROJECT STATUS REPORT
as of DD.MM.YYYY</td></tr>
<tr><td> 
Project crisis
Project in difficulties
Project according to plan ✓</td><td colspan="2">1) Overall Status:
• …
• …
• …</td></tr>
<tr><td colspan="2">2) Status Project objectives
• …</td><td>Activities:
• …</td></tr>
<tr><td colspan="2">3) Status Project progress
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<tr><td colspan="2">4) Status Schedule (WPs and/or milestones)
• …</td><td>Activities:
• …
• …</td></tr>
<tr><td colspan="2">5) Status Resources/costs
• …
• …
• …</td><td>Activities:
• …
• …</td></tr>
<tr><td colspan="2">6) Status Context (incl. other projects, environments)
• …</td><td>Activities:
• …</td></tr>
</table>

7) Status Organisation/culture (incl. LE topics, partner participation) • … • … • …	**Activities:** • … • … • …

5.2. ADDITIONAL PROJECT STATUS REPORTS

None at present. Additional project status reports will be issued by the PO following review meetings after the end of every reporting period and are available in the EU Participant Portal.

5.3. MINUTES – PROJECT CONTROLLING

Minutes of meeting for project controlling will be saved at EMDESK > *Documents* > *WP8* > *meetings*.

6. PROJECT CLOSE DOWN

Activities and outcomes relating to project close down will be documented by or shortly after the project close down event, cf. section 2.1.

6.1. PROJECT CLOSE DOWN REPORT

To be done around project close down event.

6.2. MINUTES – PROJECT CLOSE DOWN

To be written after close down event.

7. CONCLUSIONS

This project handbook outlined according to IPMA standard format the main documentation applicable at the current phase of the project (project plans, project start, project coordination, controlling) including procedures for the HighSpin project. The handbook will be updated as part of regular project controlling.