- D8.1 – Project Management Handbook -

- VERSION -

VERSION	*DATE*
V1	21/03/2022

- PROJECT INFORMATION -

GRANT AGREEMENT NUMBER	955930
PROJECT FULL TITLE	INNOVATIVE PHYSICAL/VIRTUAL SENSOR PLATFORM FOR BATTERY CELL
PROJECT ACRONYM	INSTABAT
START DATE OF THE PROJECT	01/09/2020
DURATION	3 years
CALL TOPIC	H2020-LC-BAT-13-2020
PROJECT WEBSITE	www.instabat.eu

- DELIVERABLE INFORMATION -

WP NO.	8
WP LEADER	CEA
CONTRIBUTING PARTNERS	CEA
NATURE	Report
AUTHORS	RACCURT Olivier
CONTRIBUTORS	DANIEL Lise
CONTRACTUAL DEADLINE	01/10/2020
DELIVERY DATE TO EC	
DISSEMINATION LEVEL (PU/CO)	PU

- ACKNOWLEDGMENT -

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 955930.

CEA Deliverable reference	DEHT/LV/2022-037_ D8.1 – Project Management Handbook

Deliverable Review

	Reviewer #1: M. REYTIER		
	Answer	Comments	Type*
1. Is the deliverable in accordance with			
(i) The Description of actions?	☒ Yes ☐ No		☐ M ☐ m ☐ a
2. Is the quality of the deliverable in a status			
(i) That allows it to be sent to European Commission?	☒ Yes ☐ No		☐ M ☐ m ☐ a
(ii) That needs improvement of the writing by the originator of the deliverable?	☐ Yes ☒ No		☐ M ☐ m ☐ a
(iii) That needs further work by the Partners responsible for the deliverable?	☐ Yes ☒ No		☐ M ☐ m ☐ a

	Reviewer #2: L. DANIEL		
	Answer	Comments	Type*
1. Is the deliverable in accordance with			
(i) The Description of actions?	☒ Yes ☐ No		☐ M ☐ m ☐ a
2. Is the quality of the deliverable in a status			
(i) That allows it to be sent to European Commission?	☒ Yes ☐ No		☐ M ☐ m ☐ a
(ii) That needs improvement of the writing by the originator of the deliverable?	☐ Yes ☒ No		☐ M ☐ m ☐ a
(iii) That needs further work by the Partners responsible for the deliverable?	☐ Yes ☒ No		☐ M ☐ m ☐ a

* Type of comments: M = Major comment; m = minor comment; a = advice

- ABSTRACT/SHORT SUMMARY -

This project management handbook contains all necessary information, rules and guidelines for an optimum project execution with fulfilment of objectives. It describes management structures and procedures regarding: organisation of the project and consortium, decision-making, contractual obligations and reporting intervals, communication procedures (internal, external, confidentiality rules), standards for documents, quality control detailed procedures, risk management procedures, publications procedures e.g. release of documents and deliverables. There is no deviation from the description of this deliverable as given in Annexe I of the Grant Agreement.

- TABLE OF CONTENTS -

List of acronyms, abbreviations and definitions

BMS	Battery Management System
CA	Consortium Agreement
EC	European Commission
EU	European Union
EV	Electric Vehicle
FBG	Fiber Bragg Grating
GA	General Assembly
IPR	Intellectual Property Rights
OF	Optical Fiber
PA	Photo Accoustic
PC	Project Coordinator
PDE	Partial Differential Equation
PO	Project Officer
RE	Reference Electrode
TC	Technical Committee
SoX	State of X (X: Charge, Health, Energy, Safety…)
WP	Work Package

1. Project organisation and consortium

1.1 Role and composition of consortium bodies

INSTABAT project aims to develop an innovative physical/virtual sensor platform for battery cells to monitor accurately and operando the States of Charge, Health, Power, Energy and Safety (SoX) cell indicators, and thus improve the safety and the Quality, Reliability and Life (QRL) of batteries. INSTABAT consortium gathers 8 partners (Table 1) from 4 different European countries: 2 R&D organisations (CNRS, CEA), 2 academic partners (INSA, UAVR) and 4 large industrial companies (VMI, BMW, IFAG and FAURECIA) with interdisciplinary profiles and diverse expertise, required to achieve INSTABAT's goals and reach the expected impact of its results at European level. This consortium could cover the whole EU battery value chain, from the supply of smart technologies for cells to cell assembly, module and pack assembly, use, reuse and recycling.

Table 1: Consortium partners.

#	PARTICIPANT ORGANISATION NAME (ACRONYM)	COUNTRY
1	Commissariat à l'Energie Atomique et aux Energies Alternatives (CEA)	France
2	Bayerische Motoren Werke Aktiengesellschaft (BMW)	Germany
3	Centre National de la Recherche Scientifique (CNRS)	France
4	Faurecia Systemes d'Echappements (FAURECIA)	France
5	Infineon Technologies AG (IFAG)	Germany
6	Institut National des Sciences Appliquées de Lyon (INSA)	France
7	Universidade de Aveiro (UAVR)	Portugal
8	Varta Micro Innovation GmbH (VMI)	Austria

The role of each partner is described in the table below.

Table 2: Role of consortium partners.

	Partners	Country	Expertise and Main role in INSTABAT
R&D	**CEA**	France	CEA brings to the project (1) experts in luminescence technology and reference electrode; (2) access to the R&D "Battery" platform and associated expertise for sensor integration; (3) cell assembly and characterisation tests (including abusive tests); (4) access to the R&D "Modelling" platform and associated expertise for models and BMS algorithms development. **Main role:** Project coordination, OF/LumT and OF/LumL sensor development and test, RE sensor development and test, development of models and BMS SoX cell indicators, implementation of multi-sensor platform demonstrator, communication and exploitation, general project management, risk management.
	CNRS	France	CNRS has a vast expertise in developing and characterising battery materials and physico-chemical systems. They have recently added to their field of research the development of in operando battery cell monitoring based on implanted FBG based sensors. This expertise in sensor development and battery characterisation will be very valuable to obtain fruitful results in INSTABAT project. **Main role:** Sensors adaptation and integration study, correlation with physico-chemical degradation phenomena, cell characterisation.
	INSA	France	INSA has a vast expertise in the area of multiphysics modelling and model reduction, state estimation for PDE systems, energy storage systems (battery systems in particular), as well as in including thermal and ageing constraints into energy storage system management.

			Main role: virtual sensor development (E-BASE), integration of physical sensors information, integration of virtual sensors with BMS algorithm, validation in silico.
	UAVR	Portugal	UAVR is well equipped for the implementation of the project with two optical fibre sensor inscription platforms using UV and femtosecond lasers, a high number of optoelectronic components, optical acquisition systems for static and dynamic characterisation, testing and application of the proposed solutions, and optical tables. The team has experience in fabricating and handling such devices to monitor critical parameters of Li-ion batteries for optimised performance. **Main role:** OF/FBG sensor development and characterisation, virtual sensor development (T-BASE).
Industry	**BMW**	Germany	BMW has a valuable expertise on the manufacturing of electric vehicles for selling them to the end-customer. BMW will be one of the key industrial partners of the consortium, linking the R&D project with the industrial implementation in the EU. As OEM, BMW is very experienced in deriving requirements from car needs down to component level, as smart battery cells. **Main role:** definition of requirements for smart batteries, exploitation strategy, IPR survey, business models, identification of suitable supply chains for a final product, end user, recyclability and second life, cost assessment.
	FAURECIA	France	FAURECIA, as one of the world's largest automotive equipment manufacturer, possesses 7 R&D centres dedicated to solving the problems faced by automakers, with clean mobility and near zero emission vehicles being their centrefold. **Main role:** development of 3D thermal model, techno-economic analysis and adaptability to other cell chemistries, environmental assessment (including recyclability, second life).
	IFAG	Germany	IFAG has an encompassing expertise in semiconductor production technologies and more concretely in the development of sensing technologies as well as the collection and processing of data from sensors. **Main role:** definition of requirements, PA sensor development and testing, enabling the processing of data from all sensors considered within the project for usage in battery modelling, state estimation and BMS.
	VMI	Austereich	VMI possesses both the know-how of industrial fabrication and fundamental research on electrochemical energy storage systems and is therefore expert in transferring rapidly and efficiently newly developed technologies into market-ready end products. **Main role:** definition of cell requirements for integration of sensors into the cells, cell material and component supplier, industrialisation study, end user, recyclability and second life.

1.2 Work packages

The INSTABAT project is structured in 8 interrelated work packages (WPs) (Figure 1) and last 36 months. Duration of each work packages and timeline for the associated tasks and deliverables is presented in Figure 2. WP1 (leader IFAG) is dedicated to the definition of requirements for the smart batteries and for the integration of sensors into the cells. WP2 (leader UAVR) is focused on the development and characterisation of four different physical sensors that are needed for the cell monitoring and adapted to the battery/cell environment. In WP3 (leader CNRS), the physical sensor measurements and the virtual sensor estimations are correlated with the physico-chemical phenomena occurring in Li-ion battery cells. WP4 (leader INSA) is dedicated to the development of virtual sensors and BMS SoX indicator algorithms that fully exploit the physical and virtual sensors developed in INSTABAT. In WP5 (leader CEA), a proof of concept of multi-sensor platform should be implemented with the manufacturing and testing of cell prototypes integrating the multi-sensor hardware and also the set-up of data post-processing, data logging and advanced BMS algorithm

integration. WP6 (leader FAURECIA) is dedicated to the industrialisation and scalability study of the multi-sensor platform to ensure its successful commercialisation. WP7 (leader CEA) ensures the exploitation, communication, dissemination of the project results. WP8 (leader CEA) is dedicated to project management with technical, administrative and financial management through all the life of the project.

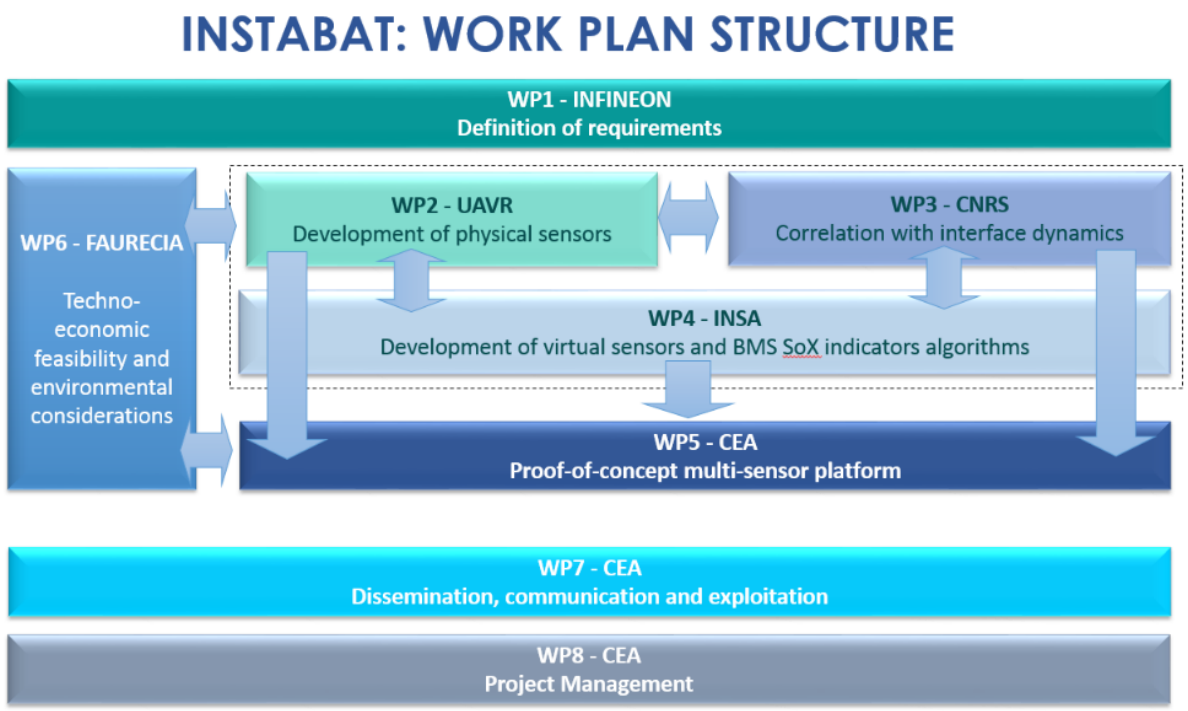

Figure 1. INSTABAT work packages structure

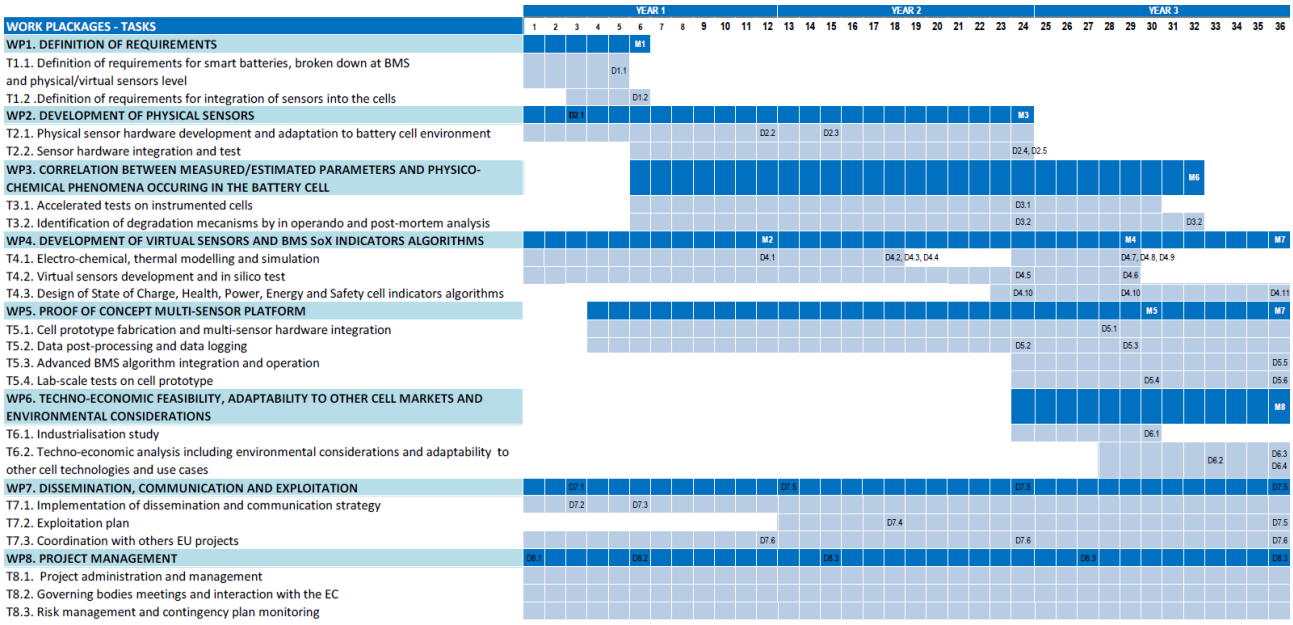

Figure 2. INSTABAT timeline

The list of partners involves in each work packages is given in the table below.

Table 3: Work package leaders and participants.

Work Package	Leader	Participants
WP1	IFAG	BMW, VMI, CNRS, CEA, FAURECIA, UAVR, INSA, IFAG
WP2	UAVR	CNRS, CEA, FAURECIA, UAVR, INSA, IFAG
WP3	CNRS	UAVR, CEA, CNRS
WP4	INSA	FAURECIA, CEA, UAVR, INSA
WP5	CEA	UAVR, CNRS, IFAG, FURECIA, VMI, INSA, CEA
WP6	FAURECIA	BMW, VMI, CNRS, UAVR, IFAG, CEA, INSA, FAURECIA
WP7	CEA	BMW, VMI, CNRS, IFAG, FAURECIA, UAVR, INSA, CEA
WP8	CEA	BMW, VMI, CNRS, IFAG, FAURECIA, UAVR, INSA, CEA

2. Project management

2.1 External project monitoring

2.1.1 Periodic reporting and interaction with EC

In INSTABAT, CEA is the project coordinator and establish the link between the project partners and the EC.

The consortium will prepare 3 technical progress reports and financial reports (D8.3) during the whole project: Period 1 (M1-12), Period 2 (M13-24) and Period 3 (M25-36). The coordinator must submit a periodic report within 60 days following the end of each reporting period.

The periodic report must include the following:

1. A periodic technical report containing:
   - (i) an explanation of the work carried out by the beneficiaries;
   - (ii) an overview of the progress towards the objectives of the action, including milestones and deliverables. This report must include explanations justifying the differences between work expected to be carried out and that actually carried out.
   - (iii) The report must detail the exploitation and dissemination of the results and an updated plan for the exploitation and dissemination of the results.
   - (iv) The report must indicate the communication activities; a summary for publication by the Commission; the answers to the 'questionnaire', covering issues related to the action implementation and the economic and societal impact, notably in the context of the Horizon 2020 key performance indicators and the Horizon 2020 monitoring requirements;

2. A periodic financial report containing:
   - (i) an individual financial statement from each beneficiary and from each linked third party, for the reporting period concerned. The individual financial statement must detail the eligible costs (actual costs, unit costs and flat-rate costs) for each budget category. The beneficiaries and linked third parties must declare all eligible costs, even if — for actual costs, unit costs and flat-rate costs — they exceed the amounts indicated in the estimated budget. Amounts which are not declared in the individual financial statement will not be taken into account by the Commission. If an individual financial statement is not submitted for a reporting period, it may be included in the periodic financial report for the next reporting period. The individual financial statements of the last reporting period must also detail the receipts of the action.

(ii) Each beneficiary and each linked third party must certify that:
   i. the information provided is full, reliable and true;
   ii. the costs declared are eligible;
   iii. the costs can be substantiated by adequate records and supporting documentation that will be produced upon request or in the context of checks, reviews, audits and investigations, and
   iv. for the last reporting period: that all the receipts have been declared;

(iii) an explanation of the use of resources and the information on subcontracting and in-kind contributions provided by third parties from each beneficiary and from each linked third party, for the reporting period concerned;
   i. not applicable;
   ii. a 'periodic summary financial statement', created automatically by the electronic exchange system, consolidating the individual financial statements for the reporting period concerned and including — except for the last reporting period — the request for interim payment.

The project coordinator will prepare 3 review meetings (linked to reports) with the designated EC representatives. The EC representatives will also be invited to the project events. For strategic issues, CEA will ask advice/feedback from the EC. Additional meetings may be organised on EC's request.

2.1.2 Deliverables and milestones

There are 8 milestones (**Table 4**) and 44 deliverables (**Table 5**) planned in INSTABAT project. The coordinator must submit the deliverables identified in the Grant Agreement, in accordance with the due time set out in it. Guidelines for preparation and submission of deliverables and milestones are detailed in Chapter 5 – Quality.

Table 4: List of milestones

MILESTONE	MILESTONE NAME	WP	DUE DATE	MEANS OF VERIFICATION
M1	Smart cells requirements broken down at each WP level	1	M6	D1.1, D1.2
M2	Coupled electro-chemical and thermal models for state estimation (virtual sensing) ready for validation	4	M12	D4.1
M3	Sensors prototypes available and validated in battery cell environment	2	M24	D2.2, D2.3, D2.4, D2.5
M4	BMS SoX algorithms and virtual sensors ready	4	M29	D4.5, D4.6, D4.10
M5	"Lab-on-a-cell" platform ready (cell prototype equipped with physical/virtual sensors, and associated BMS algorithms providing SoX indicators in real-time)	5	M30	D5.1, D5.3, D5.4
M6	Correlation of at least one output signal from each sensor to a physico-chemical phenomenon of the Li-ion cell	3	M32	D3.1, D3.2
M7	Performances of "lab-on-a-cell" platform available	4 and 5	M36	D4.11, D5.5, D5.6
M8	Industrialisation and future of the multi-sensor platform assessed	6	M36	D6.1, D6.2, D6.3, D6.4

Table 5: List of deliverables

#	DELIVERABLE NAME	WP	LEADER	TYPE	LEVEL	DELIVERY
D1.1	List of requirements for smart batteries	1	BMW	R	PU	M5
D1.2	List of requirements for the integration of the multi-sensor platform in cells	1	VMI	R	PU	M6
D2.1	Report on present state-of-art for sensors in Li-ion batteries	2	UAVR	R	PU	M3
D2.2	Protocol for sensors fabrication	2	UAVR	R	CO	M12
D2.3	Protocol for sensors adaptation to cell environment	2	UAVR	R	CO	M15
D2.4	Report on sensor integration feasibility and impact on cell and sensors performance	2	CNRS	R	CO	M24
D2.5	At least twelve prototypes of each finalised sensor delivered for integration in WP5	2	UAVR	DEM	CO	M24
D3.1	Report electrochemical test results of instrumented cells with all the different individual sensors (1 sensor per cell)	3	CEA	R	CO	M24
D3.2	Reports on the correlation between physical/virtual sensor outputs and the identified physico-chemical phenomena of the Li-ion batteries	3	CNRS	R	CO	M24, M32
D4.1	Report on generic structure of electrochemical virtual sensor algorithm	4	INSA	R	CO	M12
D4.2	Version 1.0 of the 1D+1D electrode model	4	CEA	DEM	CO	M18
D4.3	Version 1.0 of the p3D cell model	4	CEA	DEM	CO	M18
D4.4	Version 1.0 of the 3D thermal cell model	4	FAURECIA	DEM	CO	M18
D4.5	Report on temperature-dependent electrochemical virtual sensor algorithm (E-BASE and T-BASE)	4	INSA	R	CO	M24
D4.6	Report on adapted electrochemical/thermal virtual sensor algorithms compatible with BMS	4	INSA	R	CO	M29
D4.7	Version 2.0 of the 1D+1D electrode model	4	CEA	DEM	CO	M29
D4.8	Version 2.0 of the p3D cell model	4	CEA	DEM	CO	M29
D4.9	Version 2.0 of the 3D thermal cell model	4	FAURECIA	DEM	CO	M29
D4.10	Preliminary and final design reports of BMS SoX indicators algorithms architecture	4	CEA	R	CO	M24, M29
D4.11	Performance analysis report on the BMS SoX estimation algorithms	4	CEA	R	PU	M36
D5.1	At least 12 cell prototypes, and report on cell prototype manufacturing	5	CEA	DEM	CO	M28
D5.2	Strategy for data logging on a multi-sensor cell	5	IFAG	R	CO	M24
D5.3	Communications between physical sensor platform, virtual sensors and BMS established; Data logging implemented	5	IFAG	R	CO	M29
D5.4	Proof of concept multi-sensor platform / ”lab-on-a-cell” (cell prototype equipped with physical/virtual sensors, and associated BMS algorithms providing SoX indicators in real-time)	5	CEA	DEM	CO	M30
D5.5	Performance analysis of the BMS algorithms in the context of the defined two use cases for EV applications	5	CEA	R	PU	M36
D5.6	Report about cell prototype performance	5	CNRS	R	PU	M36
D6.1	Market research on components and manufacturing processes for industrial multi-sensor platform	6	VMI	R	CO	M30
D6.2	Environmental assessment and recyclability analysis	6	FAURECIA	R	CO	M33

#	DELIVERABLE NAME	WP	LEADER	TYPE	LEVEL	DELIVERY
D6.3	Techno-economic feasibility: cost, weight and volume analysis for battery cells, virtual sensors and BMS (both software and hardware) and comparison with battery performance gains	6	FAURECIA	R	CO	M36
D6.4	Adaptability of the multi-sensor platform to different cell formats (prismatic, cylindrical and pouch cells), future cathode, anode and electrolyte chemistries	6	FAURECIA	R	CO	M36
D7.1	Dissemination, Communication and Exploitation Plan	7	CEA	R	PU	M3
D7.2	INSTABAT website	7	CEA	OTHER	PU	M3
D7.3	Data Management Plan	7	CEA	R	PU	M6
D7.4	IPR survey and INSTABAT knowledge management strategy	7	BMW	R	CO	M18
D7.5	Exploitation strategy	7	BMW	R	CO	M36
D7.6	Reports on communication and dissemination activities	7	CEA	R	PU	M12, M24, M36
D8.1	Project Management Handbook	8	CEA	R	PU	M1
D8.2	Gender equality action plan	8	CEA	R	PU	M6
D8.3	Periodic and final reports to the EC	8	CEA	R	PU	M15, M27, M36

R: report ; DEM: Demonstrator; PU : Public; CO: Confidential

2.2 Internal project monitoring

The project management is organised with a project coordinator (PC), a technical committee (TC), work package teams (WPT) and general assemblies (GA) with complementary roles. This management structure and procedures have been defined to guarantee the participation of all partners, while maintaining enough agility in the day-to-day activities by adequate delegation of operative decisions. Management activities have been distributed considering the different levels in the structure, empowering the WP leaders to assume a leading role in the technical management. Critical roles are identified at coordination level (PC) and at operation and supporting level (WP leaders).

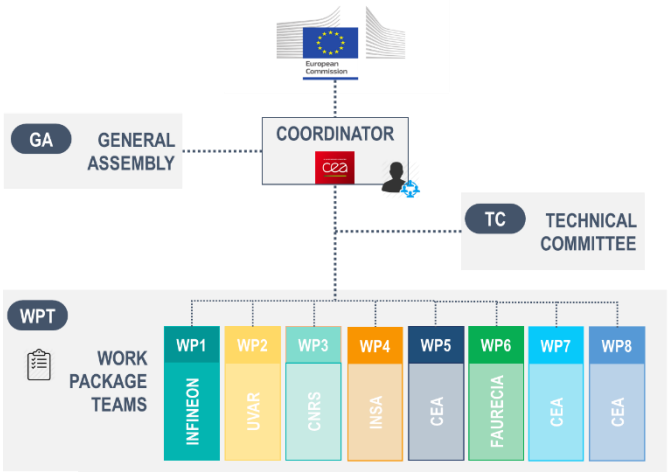

Figure 3. Project management structure

The beneficiaries have full responsibility for implementing the action and complying with the Agreement. The beneficiaries are jointly and severally liable for the technical implementation of the action. If a beneficiary fails to implement its part of the action, the other beneficiaries become responsible for implementing this part

(without being entitled to any additional EU funding for doing so), unless the Commission expressly relieves them of this obligation.

2.2.1 Management coordination

The project coordinator is Maud Priour and Olivier Raccurt is the deputy coordinator at CEA. They are assisted by CEA administration for all financial and legal aspects. The coordinator is responsible for being the European Commission single contact point, thus acting as an intermediary between all parties and the EC. He administrates the EC contribution, e.g. allocates the appropriate EC funds without any unjustified delays. He is monitoring the day-to-day work progress, identifying the risks that need to be referred to the GA and initiating the mitigation actions, informing the EC of proposed dissemination actions, acting as a representative of the project towards external bodies, either scientists, industrial developers, end users, governmental representatives as well as citizens and finally, he ensures compliance of the IPR strategy.

2.2.2 Technical Committee

The Technical Committee consists of the project coordinator and the WP leaders. In compliance with the decisions of the GA, the TC coordinates the technical part of the project. The TC determines the technical directions to fulfil the aims of the overall project and the individual WP. The TC is responsible for ensuring that the work carried out by each WP team meets the defined requirements, proposing potential work plan changes and corresponding budget transfers in accordance with the Grant Agreement, agreeing on dissemination.

Table 6: Technical committee members

Partner	Name	Role
CEA	Maud Priour	Coordinator
CEA	Olivier Raccurt	Deputy coordinator
IFAG	Thomas Roessler	WP1 leader
UAVR	Micael Nascimento	WP2 leader
CNRS	Charlotte Gervillié	WP3 leader
INSA	Federico Bribiesca-Argomedo	WP4 leader
CEA	Romain Franchi	WP5 leader
FAURECIA	Pinar Katayaylali	WP6 leader

This technical committee will be participating to a monthly meeting to monitor the progress of work and discuss to any point that is required for the good technical coordination of the project. Representative members of the consortium partners without WP leader function are also invited to participate to the monthly meeting. The table below presents the complementary list can be participating to the technical committee when it is necessary.

Table 7: Optional technical committee members

Partner	Name	Role
VMI	Martin Schmuck	VMI technical contact
BMW	Jiahao Li	BMW technical contact
UAVR	Joao Pinto	UAVR technical contact
CNRS	Jean-Marie Tarascon	CNRS technical contact

From the initiative of each partner or from the coordinator, additional person of the project can be participating to the monthly meeting if it is required for the treatment of specific technical aspect of the project.

In addition to the monthly meeting, the technical committee can be organised at any time dedicated meeting if specific technical point requires a decision for the project. In this case, every member can ask the coordinator to organise this specific meeting.

2.2.3 Work package teams

Each WP leader will be responsible for monitoring the development and implementation of the technical activities in agreement with the quality requirements set by the Grant Agreement. The WP leaders directly report to the PC. WP leaders can organise technical meetings with the WP team and tasks leaders. A task leader is identified for each task of the project and he is in charge of the technical work implementation in its task. All task leaders report to the WP leader. Each WP leaders report the progress of work to the coordinator and to the other WP leader during the monthly meeting of the technical meeting.

2.2.4 General Assemblies

General Assembly (GA) is the highest level of decision and project coordination committee. The GA is convened every 12 months. It is chaired by the PC and a representative from CEA acts as Secretary. The General Assembly (GA) is formed by one senior representative of each partner. The assembly is responsible for the high-level monitoring and control of the project development. This body is responsible for deciding the overall project strategy: (1) decide any modification of the work plan; (2) approve progress reports, period n+1 budget, milestones and deliverables, ensuring the quality of the submitted documents; (3) resolve in last instance conflicts between partners and define any change to the Consortium Agreement (CA).

Several general assemblies will be held during the project: (1) Kick-off meeting (M1): Review of the project regarding time schedule and deliverables. This review takes into account the terms, the cost or time scale and the termination date of the Grant Agreement. (2) Project management board meetings (M6, M12, M18, M24, M30 and M36): Monitoring the fulfilment of the work programme, the achieved work progress and the quality of the results obtained by the project during the previous months, taking into account milestones and expected results, as well as the foreseen deliverables. Discussing the results obtained, implementing corrective actions, preparing and approving the consecutive reports. Planning in detail the tasks to be implemented before the next meeting. Reviewing the dissemination plan. (3) Final meeting (M36): Assess the fulfilment of the achieved work and the quality of the results obtained. Establish lessons learnt.

The GA meeting calendar has been established at the beginning of the project to supervise the progress of the activities. The GA assembly will be done every 6 month and all the participants of the project will be invited to participate. Due to the COVID situation, the GA meeting will be online by default. If the situation is favourable, a physical GA meeting will be organised. The GA meeting will be organised by the coordinator. In the case of physical meeting, the decision of the location will be taken during the previous monthly meeting with the technical committee and all the partners.

The Project Coordinator (PC) assisted by the Technical Committee (TC) and CEA administration will implement the decisions taken by the GA.

Each WP leader will be responsible for monitoring the development and implementation of the technical activities in agreement with the quality requirements set by the GA. The WP leaders will directly report to the PC.

2.2.5 Internal reporting

There will be technical meetings, internal reporting every six months as well as monthly teleconferences, in order to guarantee the synchronisation between WPs, solve potential conflicts among partners and define dissemination policies. The PC will summarise the overall progress and update planning charts and manpower records.
Biannual internal reports will be prepared to monitor the project advancement at technical and financial level. They will contain a summary of the tasks developed and costs within each WPs and they will be used mainly for an internal control of the project.

Monthly consortium-wide teleconferences will be held to ensure smooth communication and project management with all the partners.

Each WP Leader will report on the project progress to the PC every 2 months, covering technical progress, results and deliverables, monitoring identified risks, etc. The WP progress will in particular be reported in terms of percentage of completion, deviations and corrective actions.

2.3 Decision-making

The top-level decision-making body is the GA that is composed of representatives from all participation organisations and is chaired by the PC. The representatives at the GA should have the authority to commit their organisations to the decisions of the GA. Each partner will have one voting representative in the GA. The GA aims at planning, organising and monitoring the integrated effort to achieve the project objectives within the consortium constrain of budget and time schedule. Decisions to be taken by the GA are those described in the attributions of this body in the previous section. The details of the governance procedures are internally regulated by the Consortium Agreement signed by all partners. The CA describes responsibilities of the parties, liabilities, voting rules, joint ownership, background knowledge, intellectual property rights, knowledge management, grant distribution, rules for publishing information, conflict resolution, admission of new partners, etc.

In case of conflict, there are two levels for conflict resolution: WP level and GA level. The general method foreseen for the resolution of any conflict or issue raised is a discussion between the involved parties until an agreement is reached. If no agreement can be reached, or if the conflict can affect the progress of other WPs, the WP leader reports the conflict to the PC, and the PC attempts to find a solution together with all the involved parties. If this fails, a positioning paper will be prepared by the PC (with possible help of involved WP leaders) and circulated to all the partners. A decision will then be taken during an extraordinary GA meeting (face-to-face or teleconference).

The voting rules are the same: each partner will have one voting representative in the extraordinary GA. The details of governance procedures are internally regulated by the Consortium Agreement signed by all the partners.

2.4 Change management

Willingness and initial commitment of the partners at the initial stage of the project are understood. However, unpredictable changes about the partner situation may pose a risk hindering the achievement of the project goals. In such situation, each partner is requested to report immediately to the coordinator and provide a detailed report.

When a participant is not following the agreed work plan and the PC has tried all possible options to solve the problem, an extraordinary GA meeting can be summoned to analyse the situation. Any revision of the work plan, due to the acceptance or rejection of the proposed solution and corrective actions, will be communicated to the EC for approval.

2.4.1 Changes in technical program (content and/or timing)

Each change related to the technical content and timing needs to be reported to the Project Officer (via the Project Coordinator). Minor replanning and realignment of the activities may be implemented but in case of changes in the scope/objectives of a specific WP an Amendment to the Grant Agreement will be necessary. Partners are requested to immediately report possible changes to the WP Leader who will evaluate the situation and inform the management team.

2.4.2 Changes in budget

Each proposals for changes related to the budget needs to be reported to the coordinator and discussed in General Assembly (GA). The coordinator and the full TC with WP leaders and optional participant examine the changes requirement and the impact of the project related to the grant agreement and the consortium agreement. Proposals for changes to Annexes 1 and 2 of the Grant Agreement need to be discussed in General Assembly and to be agreed by the funding Authority.

2.4.3 Changes in personnel or roles

A project contact list is available on SharePoint. Changes in personnel need to be communicated to the project management team by the primary contact of the partner concerned by these changes. The coordinator informs the other partners to the changes in personnel or roles and remove his/her access to the project document database and to the collaborative space (SharePoint).
In case of change of the WP leader, the coordinator informs all the partners.
In case of change of the Coordinator, the CEA informs all the partners and the project officer.

2.5 Intellectual property management

For greater consistency, IPR protection and IPR strategy tasks are defined in D7.4 and managed by CEA. The consortium currently counts on solid individual IPR strategies preserving their background under diverse IPR mechanisms. Several patents are already owned by the consortium and will serve as up-scaling basis for INSTABAT.

3. Risk management

3.1 Risk analysis and mitigation actions

A list of risk has been identified at the beginning of the project for all work packages (see table below).

Table 8: Risk list of the project for each WP and risk mitigation measures.

DESCRIPTION OF RISK AND LEVEL OF LIKELIHOOD		WP	PROPOSED RISK-MITIGATION MEASURES
Requirements for integration of the multi-sensor platform are not well identified.	Low	WP1	Use partners' (VMI, CEA, and CNRS) valuable expertise on the integration of components such as sensors in the cells.
Some of the key parameters are not capable to be acquired through the sensors.	Medium	WP2	Possible strategies are improving the sensor capabilities, exploring commercial solutions, tuning sensors to measure other parameters.
Signal output from the sensor (any sensor) is too low for detecting key parameters.	Medium	WP2	Routes for amplifying the signal of the sensor will be considered, e.g. by increasing the size of the measurement probes, implementing a higher number of sensing points per probe or multiple sensing probes per sensor.
Implementation of a sensor (any sensor) in a cell disrupt the cell functioning (accelerated degradation, lower performances, etc.).	Medium	WP2	Work towards further miniaturisation and reduction of chemical reactivity of components. Explore different positioning. Increase efforts on other sensor types.
These risks apply to OF/FBG sensor 1. Short lifetime of sensor (fast degradation of polymer fibre). 2. Fibers fragility on handling could make cell assembling process too difficult.	High	WP2	1. Test different polymer materials. 2. Test different structuring strategies such as coating or reinforcement of the fibers.
These risks apply to RE sensor 1. Coating of reference electrode degrades too fast to reach an acceptable number of cycles. 2. Parameters signal not stable enough because of electrochemical instability of the reference electrode material.	High	WP2	1. Manage the coating resistance by improving material stability and/or chemistry. 2. Improve in situ repair strategy and diagnostic by external electrochemical methods.
This risk applies to OF/Lum sensor Luminescent probes cannot be implemented or do not correctly detect the expected parameters.	High	WP2	Explore other luminescent molecules and deposition techniques; explore different strategies of probe positioning (surface, inside porous protective coating); manage and adapt probe chemistry to electrolyte species.
This risk applies to PA sensor 1. Sensing functionality of the CO_2 sensor cannot be confirmed in the battery cell environment 2. Adaptation to the battery cell environment of CO_2 sensor cannot be fully implemented.	Medium	WP2	Explore other IR-absorbing gases. Increase efforts on other sensor types.
Physico-chemical phenomena cannot be properly characterised by the mentioned characterisation techniques.	Low	WP3	Use of other characterisation techniques not already described in the proposal.
Physico-chemical phenomena cannot be properly correlated to any of the sensors' outputs.	Medium	WP3	Investigate if the physico-chemical phenomena can be indirectly deduced from another sensor output signal.
Post-mortem analysis reveals a negative impact of the sensors on the cell degradation.	High	WP3	Improve integration of sensors and development of sensors materials and chemistry (retroaction on WP2 for sensor development).
Low correlation between virtual sensors outputs and actual values.	Medium	WP3	Perform more validation against models and characterisation tests to improve the virtual sensors.

DESCRIPTION OF RISK AND LEVEL OF LIKELIHOOD		WP	PROPOSED RISK-MITIGATION MEASURES
Interplay between thermal dynamics and electrochemical parameters might reduce reconstruction accuracy at some points in the battery.	Low	WP4	A modular approach is considered (not beginning with fully coupled dynamics between electro-chemical and thermal models).
Spatially inhomogeneous behaviour may not improve quality of reconstruction when only extremely localised measurements are available.	Medium	WP4	FBG sensor adds previously unavailable information.
Flat open-circuit potential curves and low-sensitivity of other outputs to variable and parameter variation may have a negative impact on sensitivity of the algorithms to measurement and model uncertainties.	High	WP4	Data from reference electrode available, as well as measurements in the electrolyte coming from Li^+ concentration sensor.
Implementation of multiple sensors in a single cell disrupt the cell functioning (accelerated degradation, lower performances, etc.).	High	WP5	Integrate sensors gradually. Discard defaulting sensor.

.

This risk analysis will be updated along the project during the general assembly. Each WP leader is responsible to the risk management in his WP (identification and risk-mitigation procedure). When a new risk is identified in the WP, the WP leader informs the coordinator immediately and proposes a risk-mitigation procedure. This new risk and the associate mitigation procedure will be discussed with the technical committee during the monthly meeting. In the case of the necessity to manage the risk urgently, a specific meeting will be organised by the coordinator with the technical committee. During this meeting, the following procedure will be used:

- Identify the risk
- Analyse the effects and consequences of the risk to define its criticity (probability and impact are considered)
- Plan for management of the specific risk
- Monitor the status of the risk along the project by including it in the reporting procedure
- Respond with actions to prevent the risk from happening or to avoid undesired consequences of the risk.

The coordinator informs the project officer on the identification of the new risk and the mitigation procedure adopted by the technical committee.
A report of the status of risk will be done in every GA and integrated to the progress report to the project officer.

3.2 Role of partners and coordinator in risk management

CEA will monitor the risks during the project in close cooperation with the WP leaders. CEA will monitor the management and technical risks identified, as well as the efficiency of the contingency measures associated. CEA will also request feedback from WP leaders to identify additional risks discovered during the implementation phase. Furthermore, CEA will steer the project to address all unexpected situations.

The roles and responsibilities in risk management are:

- Task leaders: identify risks, develop mitigation strategies and contingency plans for their tasks and monitor risks. Report potential risk factors to their Work Package Leader.
- Work Package Leaders: consolidate risk and develop mitigation strategies and contingency plans on WP level. Report potential risk factors to the Project Coordinator and other WPLs.

- Project Coordinator: responsible for the risk management of the whole project. Identifies risk, develops mitigation strategies and contingency plans, monitors risk and reports risk status in the periodic progress reports to the EU, including planned contingency measures.

4. Communication

4.1 Confidentiality rules

Any confidential information along the project needs to be used in the conformity of the rules defining in the consortium agreement (see section 10 p24 to 26) and signed by all the partners.

4.2 Release of deliverables

There are two kinds of deliverable in the project depending on the confidentiality of the content: Public or Confidential (see Table 5). Public deliverables will be disseminated via the European Commission portal by the project officer when they are validated. Public deliverables will also be published on the public INSTABAT website after submission and acceptation by the PO.

4.3 Internal communication

A good communication is required to ensure adequate collaboration, fulfilment of goals and an overall satisfactory functioning of the consortium. In teleconferences, email and web exchanges are used as the primary forms of communication and exchange of documents among the partners. A website has also been set up with two distinct areas with different access rights levels. A document repository has been set up on the website, offering the consortium a workspace e.g. for exchange of information and files. Finally, the consortium will also hold face-to-face meetings (depending on the COVID situation) once a year and monthly teleconferences.

4.4 Collaborative space

A collaborative space has been created at the beginning of the project (SharePoint). This collaborative space is secure and accessible on the web with a login and password. Each member of the project has received access codes and procedures and can deposit document or numeric materials and read it. This SharePoint is located on a secure server from CEA and is monitored by the competent services at CEA in secure way.

Figure 4: Login page for access to the SharePoint

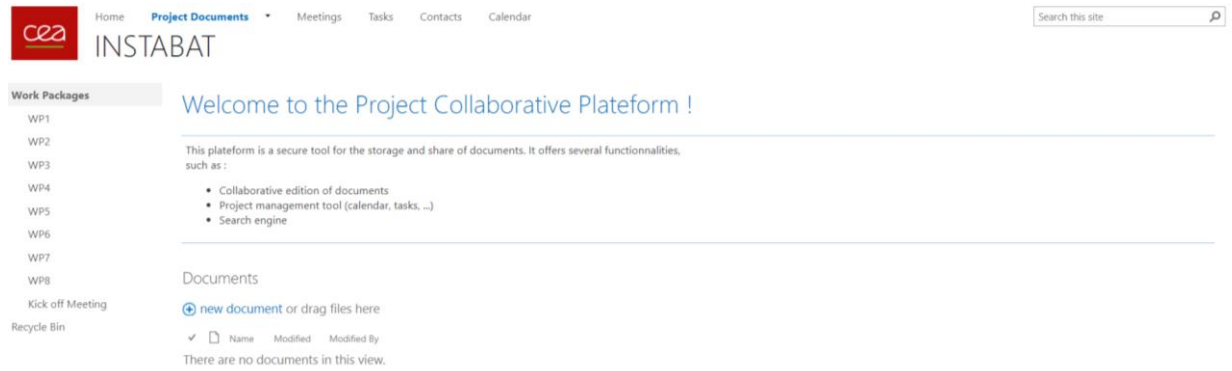

Figure 5: Frontpage of the INSTABAT collaborative space (SharePoint)

The SharePoint contains different repository, one for each WP, one for General Assembly and one for the deliverables and other documents.
Information and documents are shared on a web-based secure collaborative space (SharePoint). All the partners will have a secure access and can deposit new document and read it. All the documents from the project such as reports, deliverable, meeting reports, publication, will be deposited on the SharePoint. This collaborative space will be used to exchange the drafts of the report for collaborative works during the preparation of the document.

4.5 External communication

Instabat project is on the umbrella of Battery2030+ initiative. The communication between INSTABAT consortium and BATTERY2030+ will be managed by the coordinator and the deputy coordinator. These two people will participate to the collaborative board meeting organised by Battery 2030+ to communicate the progress of INSTABAT to the Battery2030+ community. In the same time, the coordinator will immediately communicate to INSTABAT consortium all the information from BATTERY2030+ by email or during the monthly meetings.

4.5.1 Dissemination procedures

A beneficiary that intends to disseminate its results must give advance notice to the other beneficiaries of — unless agreed otherwise — at least 45 days, together with sufficient information on the results it will disseminate. Any other beneficiary may object within — unless agreed otherwise — 30 days of receiving notification, if it can show that its legitimate interests in relation to the results or background would be significantly harmed. In such cases, the dissemination may not take place unless appropriate steps are taken to safeguard these legitimate interests. If a beneficiary intends not to protect its results, it may need to formally notify the Commission before dissemination takes place. Each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results.

The bibliographic metadata must be in a standard format and must include all of the following:

- the terms “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

4.5.2 EC guidelines to publication

Unless the Commission requests or agrees otherwise or unless it is impossible, any dissemination of results (in any form, including electronic) must (a) display the EU emblem and (b) include the following text:

"This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 955930".

When displayed together with another logo, the EU emblem must have appropriate prominence. For the purposes of their obligations under this article, the beneficiaries may use the EU emblem without first obtaining approval from the Commission. This does not, however, give them the right to exclusive use. Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

5. Quality

5.1 Documents templates

A template of the technical document will be established at the beginning of the project and shared to all the participants of the project. This template will be deposited to the collaborative workspace. Technical deliverables should contain

- Frontpage with visual identity of the project (logo, colour, font, etc.); title, reference to the deliverable number, author, contributor, the logo of Europe, the reference to the grant agreement
- Public executive summary
- A review tracking page
- Core part: technical developments, results and discussion
- Conclusions and recommendations for future work

The authors should use the deliverable template as provided on the SharePoint.

A template for presentation will be deposited on the share point and should be used for all the presentation for internal and external meeting.

5.2 Deliverables review procedures

Review procedure steps: two reviewers from the consortium are required for each report and should be not on the author's list. The choice of reviewers can be done by the authors, the WP leader or the coordinator. When the first version of the report is ready, the principal author of the document send the report to the reviewers. Reviewers have two weeks to give their review at least. Each reviewer must fill in the standard review form. After reviewing, the reviewer sends his/her comments to the authors of the deliverable. The author(s) revises the deliverable according to the review results. The Project Coordinator ensures that requested improvements are implemented by the author(s) and performs the final review. Once the deliverable is approved by the Project Coordinator, the Project Coordinator then submits the deliverable to the Commission. The project management team stores the submitted deliverables on the SharePoint.

5.3 Milestones approval

WP Leaders are responsible for the achievement of WP related milestones. WP Leaders report to the coordinator for approval. The coordinator should ask the technical committee to assist him with technical expertise for approval if it is required. When the Milestone is approved, the coordinator informs the project officer on the achievement of the Milestone.

5.4 Quality assurance procedure

Quality management will be applied to guarantee any activity or task within the project is performed with regard to the expected quality level. Any publication, report, deliverable or outcome produced, will be revised and will require WP leader and PC approval prior to its submission to the EC. All the guidelines described in this Project Management Handbook should be respected.

5.5 Archiving

All the documents and data will be archived from the SharePoint by the CEA through the internal quality process.