# PoDiUM

**D1.1**

# Project management plan

## PoDIUM

PDI connectivity and cooperation enablers building trust and sustainability for CCAM

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## Legal Disclaimer

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## List of abbreviations and acronyms

| Abbreviation | Meaning |
| --- | --- |
| CCAM | Cooperative, Connected and Automated Mobility |
| DoA | Description of Action |
| EAB | External Advisory Board |
| EC | European Commission |
| FMEA | Failure Mode and Effects Analysis |
| GA | General Assembly |
| IPR | Intellectual Property Rights |
| MEC | Multi-Access Edge Computing |
| PC | Project Coordinator |
| PM | Person Month |
| PU | Public |
| SC | Steering Committee |
| SME | Small and Medium Enterprises |
| TM | Technical Manager |
| TMT | Technical Management Team |
| UC | Use Case |
| UCL | Use Case Leader |
| WG | Working Group |
| WP | Work Package |
| WPL | Work Package Leader |

# Executive summary

The main objective of PoDIUM is to demonstrate and validate the applicability and benefits of connected and cooperative automated mobility (CCAM) in real traffic conditions. To achieve this, we will be using and enhancing the facilities of three well-equipped living labs in Germany, Italy and Spain. A rich set of demanding CCAM use cases will be investigated to identify and assess all the connectivity and cooperation enablers and needs that will allow the proposed higher levels of automation.

The ambition and the challenging requirements of the project, in terms of innovation and diversity/number of partners involved, call for a carefully designed project management plan.

This document fulfils the requirement of deliverable D1.1 – *project management plan* – of PoDIUM within WP1. Deliverable D1.1 lays out the organisational structure and the management procedures and processes that PoDIUM will employ in order to ensure that the workflow is smooth and a good system of internal communication exists to ensure the efficient execution of the project. The plan described in this document has a direct bearing on the performance of task T1.1 – *Administrative and financial coordination* and part of task t1.2 – *Technical coordination and innovation management*.

Deliverable D1.1 is structured as follows:

- Chapter 1 – Introduction – outlines the concept and approach of PoDIUM. It elaborates the purpose of this deliverable as a plan for coordinating the project, intended for consortium members and the European Commission.
- Chapter 2 – project overview – outlines the project's concept and approach, and describes the consortium mix, the project work plan, including work packages as well as the main deliverables and milestones.
- Chapter 3 – project management – describes the management structure covering both operational and strategic management. The responsibilities of the different bodies and the role of the Technical Management Team are described. The chapter also details the management processes and procedures. The overall project management processes relate to progress reporting and evaluation of results, planning and implementation of changes, project administration and contract management, and project meeting procedures. The management procedures described have to do with conflict resolution, resource use and payment rules. Finally, this chapter describes the technical management procedures regarding risk management.
- Chapter 4 – project coordination and communication tools – describes the various tools that are used for organising, monitoring, and controlling the whole project as well as for communication purposes among the consortium members.
- Chapter 5 contains the conclusion remarks.

This deliverable draws substantially from the PoDIUM Grant and Consortium Agreements and together with these documents will serve as a central reference for all project coordination issues.

# 1. Introduction

## 1.1. Purpose of the deliverable

Deliverable D1.1 – *project Management Plan* – outlines the management strategy and tools that will ensure the effective execution of tasks T1.1 – Administrative and financial coordination and T1.2 – *Technical coordination and innovation management* (specifically the Technical coordination sub-task, while D1.3 and D1.5 will deal with the innovation management sub-tasks of T1.2). It describes the governance bodies, relevant meetings, and the internal rules and procedures relating to or complementing the Grant Agreement and the Consortium Agreement, and specifies the risk management procedures.

Deliverable D1.1 is complemented by D1.2 – *Quality management plan*, D1.3 – *Innovation management plan*, D1.4 – D1.6 -Data management plans, and D1.7 – *Innovation management report*, to provide an overall strategy for organisation and execution of core tasks to achieve the objectives of the project management work package (WP1) in terms of both operational and technical coordination.

## 1.2. Intended audience

The dissemination level of D1.1 is 'public' (PU), thus the deliverable is available to members of the consortium, the European Commission (EC) Services and those external to the project. This document is primarily intended to serve as an internal guideline and reference for all PoDIUM beneficiaries, especially the governance bodies such as the General Assembly, the Technical Management Team, and the External Advisory Board.

# 2. Project overview

## 2.1. PoDIUM concept and approach

PoDIUM aims to support advanced Use Cases (UC) of connected and cooperative automated mobility in real traffic conditions. Building on the proposed urban and highway UCs in the facilities of 3 well-equipped Living Labs in Germany, Italy and Spain PoDIUM will tackle all the different requirements for availability and performance of connectivity as well as the different cooperation enablers per UC. The proposed UCs aim to advance a set of key technologies both in the physical and digital part of the infrastructure. In particular, the following non-exhaustive list of contributions will be pursued:

- A multi-connectivity approach to ensure reliability, availability and redundancy of the PDI system.
- Advance data fusion and integration of Multi-access Edge Computing (MEC) to the proposed hybrid data management environment to enable enhanced environment perception models towards digital twins.
- New C-ITS messages for enabling the specific advanced CCAM use cases.
- Ensure software integrity, trust and truthfulness of CCAM data, their exchange and their processing.
- Demonstration of urban and highway use cases in a diverse set of configurations with integration of Vulnerable Road Users (VRU).

## 2.2. Consortium

The PoDIUM consortium comprises of 28 partners from 8 countries. The selection of partners of complementary, multi-disciplinary scientific and operational expertise sets the base for successfully addressing all aspects of the project. PoDIUM involves all the relevant stakeholders, namely major research organizations with extensive experience in national and EU CCAM projects, vehicle manufacturers, tier-1 automotive suppliers, road and traffic management operators, network operators and vendors, highly expertized small and medium enterprises (SME) and local authorities. These partners have not only the expertise to deal with advanced technologies and CCAM services, but also the mandates for leading local and regional research and business development on this EU priority topic. The PoDIUM beneficiaries are presented at Table 1.

Table 1 PoDIUM beneficiaries

| No. | Short name | Organisation name | Country |
|-----|------------|-------------------|---------|
| 01 | ICCS | INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS- project Coordinator | EL |
| 02 | BOSCH | ROBERT BOSCH GMBH – Technical Manager | DE |
| 03 | AAE | ABERTIS AUTOPISTAS ESPANA S.A | ES |
| 04 | ATE | AUSTRIATECH - GESELLSCHAFT DES BUNDES FUR TECHNOLOGIEPOLITISCHE MASSNAHMEN GMBH | AT |
| 05 | BRE | AUTOSTRADA DEL BRENNERO SPA | IT |

| 06 | CRF | CENTRO RICERCHE FIAT S.C.P.A. | IT |
|---|---|---|---|
| 07 | ENIDE | ENIDE SOLUTIONS, S.L. | ES |
| 07.1 | TENAL | TENALACH CONSULTING SA | ES |
| 08 | ERT | EUROPEAN ROAD TRANSPORT TELEMATICS IMPLEMENTATION COORDINATION ORGANISATION - INTELLIGENT TRANSPORT SYSTEMS & SERVICES EUROPE S.C.R.L. | BE |
| 09 | ETRA | ETRA INVESTIGACION Y DESARROLLO S.A. | ES |
| 10 | FSCOM | FSCOM SARL | FR |
| 11 | i2CAT | FUNDACIO PRIVADA I2CAT, INTERNET I INNOVACIO DIGITAL A CATALUNYA | ES |
| 11.1 | UPC | UNIVERSITAT POLITECNICA DE CATALUNYA | ES |
| 12 | IDIADA | IDIADA AUTOMOTIVE TECHNOLOGY SA | ES |
| 13 | INC | INCITES CONSULTING SA | LU |
| 14 | LINKS | LINKS FOUNDATION – LEADING INNOVATION & KNOWLEDGE FOR SOCIETY | IT |
| 15 | MILLA | MILLA | FR |
| 15.1 | ISFM | ISFM INTELLIGENT SYSTEMS FOR MOBILITY | FR |
| 16 | NOKIA | NOKIA SOLUTIONS AND NETWORKS GMBH & CO KG | DE |
| 17 | RETE | RETEVISION I SA | ES |
| 18 | SWM | SWARCO MIZAR S.R.L. | IT |
| 18.1 | SSC | SWARCO SOLUTIONS CENTER GMBH | DE |
| 19 | TIM | TIM S.P.A. | IT |
| 20 | UDE | UNIVERSITAET DUISBURG-ESSEN | DE |
| 21 | UULM | UNIVERSITAET ULM | DE |
| 22 | VICOM | FUNDACION CENTRO DE TECNOLOGIAS DE INTERACCION VISUAL Y COMUNICACIONES VICOMTECH | ES |
| 23 | BCN | AJUNTAMENT DE BARCELONA | ES |
| 24 | IMI | INSTITUT MUNICIPAL D'INFORMATICA DE BARCELONA | ES |

## 2.3. Project work plan

Work for the PoDIUM project will be carried out over a three-year period (36 months), starting on 1 Oct 2022 (M1) and ending on 30 September 2025 (M36). Work is organised in the eight Work Packages (WPs) as described in Table 2 below.

Table 2 PoDIUM work packages

| WP No. | WP title | Lead partner | Start month | End month |
|---|---|---|---|---|
| WP1 | project management | ICCS | 01 | 36 |
| WP2 | Requirements and specifications | ETRA | 01 | 09 |
| WP3 | Technical innovation and development | BOSCH | 07 | 29 |
| WP4 | LLs integration and data collection | RETE | 13 | 32 |
| WP5 | Use cases evaluation and demonstration | VICOM | 13 | 36 |
| WP6 | Business analysis and CCAM sustainability strategy | INC | 07 | 36 |
| WP7 | Dissemination, exploitation and international cooperation | ERT | 01 | 36 |

To achieve the objectives of the project, a work plan that reflects the different components and phases of development has been developed. WP2-WP5 are dedicated to development and innovation activities, while WP1, WP6 and WP7 are overarching support activities. Figure 1 shows a flow chart based on the project's planned workflow and the expected interaction and interdependencies of the WPs.
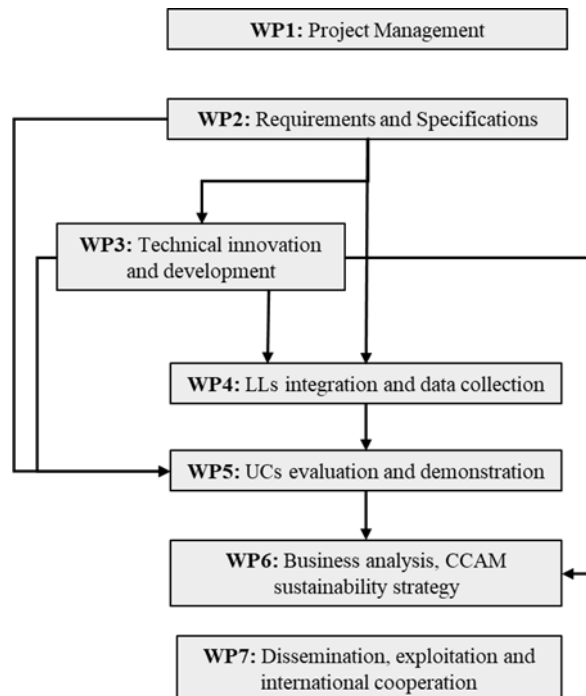


Figure 1: PoDIUM project workflow

All WPs are divided into tasks, with each one being responsible for delivering one or more deliverables referenced in the Description of Action (DoA) of the Grant Agreement. Each task has a leader in charge

of the overall coordination and completion of the Task, who will work in close coordination with the WP Leader (WPL). Task Leaders will conduct the first level of quality control before the deliverables are submitted for internal WP review (see D1.2 for more details).

## 2.4. Gantt chart

The project's work plan is broken down into tasks and displayed against the project timeline in a Gantt chart as per the grant agreement (Figure 2). The horizontal grey bars depict the duration of each task and show when the activity begins and ends. For each WP and task, milestones and deliverables are indicated in the month in which they are due by means of orange and yellow rectangles respectively.



Figure 2: PoDIUM Gantt chart

## 2.5. Project deliverables

The project has scheduled an extensive list of deliverables, in order to capture all project activities and technical progress. The List of deliverables along with their dissemination level are depicted in Table 3.

Table 3 PoDIUM deliverables

| Del. No. | Deliverable Name | WP | Lead | Type | Diss. lvl | Delivery date |
|---|---|---|---|---|---|---|
| D1.1 | Project management plan | 1 | ICCS | R | PU | M03 |
| D1.2 | Quality management plan | 1 | ICCS | R | PU | M03 |
| D1.3 | Innovation management plan | 1 | BOSCH | R | PU | M06 |
| D1.4 | Data management plan | 1 | ATE | DMP | PU | M06 |
| D1.5 | Data management plan mid-term version | 1 | ATE | DMP | PU | M18 |
| D1.6 | Data management plan final version | 1 | ATE | DMP | PU | M36 |

| D1.7 | Innovation management report | 1 | BOSCH | R | PU | M36 |
|---|---|---|---|---|---|---|
| D2.1 | PoDIUM use cases description and specifications | 2 | ETRA | R | PU | M06 |
| D2.2 | PoDIUM platform requirements and specifications | 2 | LINKS | R | PU | M09 |
| D2.3 | PoDIUM availability and cooperation enablers definition and evaluation data specifications | 2 | VICOM | R | PU | M09 |
| D3.1 | PoDIUM platform architecture description | 3 | UULM | R | PU | M12 |
| D3.2 | Initial report on the PoDIUM platform developments | 3 | NOKIA | R | PU | M18 |
| D3.3 | Final report on the PoDIUM platform developments | 3 | ETRA | R | PU | M29 |
| D4.1 | Deployment of PoDIUM architecture to the LLs and development of data collection tools | 4 | IDIADA | R | PU | M24 |
| D4.2 | PoDIUM LLs integration and pre-evaluation testing report | 4 | AAE | R | PU | M32 |
| D5.1 | PoDIUM evaluation methodology | 5 | VICOM | R | PU | M21 |
| D5.2 | Technical evaluation and demonstration of the UCs | 5 | i2CAT | R | PU | M35 |
| D5.3 | Public acceptance and impact assessment report | 5 | ICCS | R | PU | M36 |
| D6.1 | Market and actor-role analysis | 6 | INC | R | PU | M16 |
| D6.2 | Business models for sustainable CCAM service provisioning | 6 | ETRA | R | SEN | M24 |
| D6.3 | Techno-economic analysis and sustainability of PoDIUM business models | 6 | INC | R | SEN | M36 |
| D6.4 | Std. activities, EU policies and regulations recommendations | 6 | FSCOM | R | PU | M36 |
| D7.1 | Brand identity and guidelines | 7 | ERT | DEC | PU | M03 |
| D7.2 | Communication strategy and plan – Version I | 7 | ERT | R | PU | M06 |
| D7.3 | Communication tools – Version I | 7 | ERT | DEC | PU | M06 |
| D7.4 | Dissemination plan | 7 | ICCS | R | PU | M06 |
| D7.5 | Communication strategy and plan – Version II | 7 | ERT | R | PU | M18 |
| D7.6 | Communication tools – Version II | 7 | ERT | DEC | PU | M18 |
| D7.7 | Exploitation plan – Version I | 7 | ENIDE | R | SEN | M06 |

| D7.8 | Exploitation plan – Version II | 7 | ENIDE | R | SEN | M18 |
|------|-------------------------------|---|-------|---|-----|-----|
| D7.9 | Report on the dissemination activities | 7 | ICCS | R | PU | M36 |
| D7.10 | Report on liaison activities and international cooperation | 7 | ATE | R | PU | M36 |
| D7.11 | Exploitation report | 7 | ENIDE | R | SEN | M36 |

## 2.6. Key milestones

In order to keep track of the overall project progress and ensure an effective monitoring plan, a list of milestones has been set, as shown in Table 4.

Table 4 PoDIUM milestones

| MS | Milestone name | WP | Leader | Due | Means of verification |
|----|----------------|----|--------|-----|-----------------------|
| MS1 | Project kick-off | WP1 | ICCS | M01 | Minutes of the kick-off meeting. |
| MS2 | Risk and quality procedures established | WP1 | ICCS | M03 | All necessary documentation and procedures are finalised by the TMT and adopted by WP Leaders (WPL). D1.1 and D1.2 submitted. |
| MS3 | First year progress report | WP1 | ICCS | M12 | Every activity report and cost justification for the first year of the project are delivered in accordance with the quality procedures – Submitted to the EC. |
| MS4 | Second year progress report | WP1 | ICCS | M24 | Every activity report and cost justification for the second year of the project are delivered in accordance to the quality procedures – Submitted to the EC. |
| MS5 | Project successfully completed | WP1 | ICCS | M36 | All activities are finished and all activity reports are submitted for final review by the EC. |
| MS6 | Requirements and specs. defined | WP2 | LINKS | M09 | D2.2 successfully submitted. |
| MS7 | PoDIUM architecture defined | WP3 | UULM | M12 | D3.1 successfully submitted. |
| MS8 | PODIUM PDI system components developed | WP3 | ETRA | M29 | D3.3 successfully submitted. Mid-term progress verifies on M18 with the submission of D3.2. |
| MS9 | PoDIUM integration activities completed in all three LLs | WP4 | AAE | M32 | D4.2 successfully submitted. |
| MS10 | Evaluation plan ready | WP5 | VICOM | M21 | D5.1 successfully submitted. |

| MS11 | PODIUM UCs evaluation results available and demonstrations completed | WP5 | I2CAT | M35 | D5.2 submitted. Demos are achieved and all associated data have been correctly collected to conduct final public acceptance assessment. |
|------|---------------------------------------------------------------------|-----|-------|-----|-----------------------------------------------------------------------------------------------------------------------------------------|
| MS12 | Business models ready | WP6 | INC | M36 | D6.3 submitted. |
| MS13 | Communication and Dissemination Strategy ready | WP7 | ERT | M06 | Strategy and plan for communication, dissemination and exploitation documented and adopted by the consortium. D7.1-D7.4 submitted. |
| MS14 | Final Event | WP7 | ICCS | M36 | The Final event is successfully organised. |

# 3. Project management

## 3.1. Management structure and functions

### 3.1.1. Project management overview

Coordinating the PoDIUM consortium is a complex task that requires an efficient management structure and decision-making processes for the:

- Establishment of a unified view of the overall approach and objectives, at all times.

- Oversight and completion of objectives (within agreed calendar, budget and quality of deliverables) both internally (within the consortium) and externally (i.e., the EC).

- Early identification, management and mitigation of risks.

- Efficient and effective collaboration and synergistic effects between and among involved entities.

PoDIUM has established a cohesive management structure to address the challenge of coordinating a project with partners working in many different locations. The PoDIUM management structure has been defined to:

- Ensure seamless and straightforward coordination of the consortium while fulfilling the EC contractual obligations through the **Project Coordinator (PC)**.

- Ease communication and coordination at the thematic levels of the WPs in the **Technical Management Team (TMT)**.

- Enable efficient and fair decisions about project resources and objectives by the **Steering Committee (SC)**.

- Secure the alignment of the project activities with the industry and the EU political agenda with the help of an **External Advisory Board (EAB)**.

The PoDIUM organisational and management structure is detailed in the sections that follow. Four managers are responsible for the cross-WP coordination of horizontal issues, namely: *Technical & Innovation Manager* (a.k.a. the *Technical Manager – TM* role), *Risk & Quality Manager*, *Data Manager & Protection Officer* and *Communication Manager*. These four managers have been assigned key tasks within the project.

At the top level is the PC monitoring the progress of all WPs and managers, leading the meeting agendas and discussions as well as deciding about the solutions to solve issues. Around the *TMT*, two main activities are supporting the success of the PoDIUM project coordination:

- The External Advisory Board (EAB), supporting the alignment of the project with the current research, societal and industry needs.

- PoDIUM liaison with other related projects on a bilateral basis for exchange of information, planning and coordination of activities. Indicative such examples of liaisons that have been already initiated are with the AUGMENTED CCAM (Augmenting and Evaluating the Physical and Digital Infrastructure for CCAM deployment) Innovation Action and the CONNECT (Continuous and Efficient Cooperative Trust Management for Resilient CCAM) Research and Innovation Action, both funded by the EC under the Horizon Europe Programme.

The *General Assembly (GA)* is the body where all project beneficiaries are represented and, thus, can vote all decisions either relating to changes in the project plans or decisions submitted by the *TMT*, in case of a lack of consensus. The PC chairs the meetings of the *TMT* and the *GA* and is the unique point of contact with the *EC*. The management functions within PoDIUM will be performed at two levels:

- The **operational level**: The PC and the TMT carry out the day-to-day project management responsibilities – the planning, steering, and controlling of the work progress from WPs and UCs, as well as the overall quality of results and the management of risks. The Technical Coordinator (TC) contributes significantly to these matters, as detailed later.

- The **strategic level**: The GA approves the PC and TMT decisions and, if necessary, changes project plans or the consortium. The EAB provides non-binding recommendations and counsel on project functions and activities.

The following sections present in detail the different bodies.

## 3.1.2. Operational bodies

### 3.1.2.1. Project Coordinator (PC - ICCS)

The project Coordinator for PoDIUM is ICCS, represented by the primary Coordinator Contact, Dr. Angelos Amditis, ICCS Research Director and I-SENSE Group Director, who has a wide experience in project and technical coordination from the past 20 years. Dr. Lazaros Gkatzikis is the Deputy PC, and performs day-to-day project coordination. The PC and deputy PC are responsible for the successful and smooth running of the entire project and shall coordinate the project according to EC rules and the terms of the Grant Agreement and the Consortium Agreement of the HORIZON Programme. In more detail, as chairman of all management bodies, the responsibilities of the PC include:

1. Monitor the effective and efficient implementation of the project.

2. Ensure the proper execution and implementation of the decisions of the GA.

3. Organize (methodologies, tools, knowledge management) and pilot at project level the Science and Technology (S&T) management carried out by the WP leaders on WP basis.

4. Monitor the compliance by the partners with their obligations.

5. Assess the compliance of the project with the work plan and, if necessary, propose modifications to it to the GA.

6. Resolve conflicts on technical, financial and strategic issues and consult the GA if needed.

7. Prepare meetings with the EC and related data and deliverables.

8. Prepare plenary meetings where the GA is represented.

9. Collect and consolidate the contributions for the progress and financial reports.

10. Provide the GA with critical analysis on the global technical performance of the project especially through a close follow-up of the project level indicators as well as summarize related recommendations.

11. Ensure on a daily basis the communication among the different partners, as well as arrange recurring GA teleconferences (telcos).

The PC serves as the sole, legitimate intermediary between the PoDIUM consortium and the EC. He is responsible for monitoring the project's progress, providing periodic reports to the Commission, and organising technical reviews. Some specific activities that ICCS will carry out concerning the EC are to:

1. Inform the EC about events likely to significantly affect or delay the implementation of the action or the EU's financial interests, and inform the EC of circumstances affecting the decision to award the Grant or the compliance with requirements under the Agreement.

2. Submit deliverables and reports (periodic and final) to the EC.

3. Coordinate reviews of the EC to the project.

4. Receive EU funding payments from the EC and distribute them to the beneficiaries.

5. Collect, review and verify consistency before submitting reports, other deliverables (including financial statements and related certifications) and specific requested documents to the EC.

In compliance with the Consortium Agreement, the PC is also responsible for keeping the contact list of PoDIUM partner beneficiaries and other contact persons updated and available. He shall organise and chair all meetings of the strategic management bodies described later, and is responsible for the preparation, distribution and recording of the meeting documentation such as agendas and minutes. The PC organizes a recurring GA telco, where TMT attendance is required.

### 3.1.2.2. Technical Manager (TM - BOSCH)

Given the ambitious goals and the expected technical challenges of the project, PoDIUM has designated the leader of task T1.2 – Technical coordination and innovation management – as the Technical Manager (TM) of the project. This role has been assigned to Mr. Mueller Tobias of BOSCH. In keeping with T1.2 responsibilities, the TM will play a crucial and active role in the overall coordination of the technical activities, including monitoring of their compliance with the Grant Agreement, project advancement and use of resources. The TM also needs to ensure that the proposed solutions, and UCs conducted by PoDIUM are technically sound, viable and in line with standardization activities. The TM carries out the technical coordination with the support of the Technical Coordination task partners, and the PC.

Specifically, the TM will:
1. monitor the activities of all WPs and UCs with regular teleconferences;

2. monitor and guarantee timely execution of all project tasks against the project Gantt chart;

3. carefully monitor the deployment plans at the LLs, raise issues during the TMT calls and propose solutions to solve the issues;

4. moderate technical decisions and manage conflicting choices for technical developments;

5. generate close working cooperation between the Work Package Leaders (WPLs) and Use Case Leaders (UCLs) – refine and refocus any activity as necessary;

6. in collaboration with the PC, organise and convene regular TMT meetings for productive interaction among all the leaders;

7. monitor and control the production of the content of the deliverables from a technical and consistency point of view.

In terms of innovation management, the role of the TM is to have constant awareness of the project status with respect to the identified innovative outcomes, to monitor activities with respect to potential innovations (including new innovations driven by market needs), and to identify the readiness to generate new innovation pathways potentially exceeding the project objectives.

### 3.1.2.3. Technical Management Team (TMT)

The TMT is collectively responsible for the operational management of the project and provides a link between the WPLs and the GA.

Through regular meetings, the TMT will monitor risks and identify problems and delays early. This enables the TMT to proactively prevent conflict situations and anticipate deviations from the project plan. In addition, the TMT will meet physically during the GA/Plenary meetings. During these meetings, updates are exchanged among the leadership of the project and towards the PC regarding progress achieved, issues and challenges on a per UC level and on per WP/task levels, as reported by the respective leaders. These regular updates are more targeted towards a higher management level and aim to ensure that all UCs and WPs are following through with their technical tasks towards achieving their objectives on time. In case that the need for a deeper technical session is identified, the matter is passed on to the TMT.

The following bodies are part of the TMT:

1. The Work Package Leaders (WPLs): Each WP has a clearly identified leader responsible for coordinating the work within the WP (cooperating with the TMT) and for setting WP objectives and milestones. The WPLs are also responsible for monitoring progress of tasks within their WP, as well as for inter-WP liaison. Each task has a leader too, who reports to the respective WPL. The WPLs report to the TMT and SC. Task Leaders assist the WPLs in planning, managing and performing their tasks. This structure fits PoDIUM complexity and ensures flexibility as decisions are made at the appropriate level with a well-defined succession of responsibility. After the first few months, most WPs will be active in parallel and frequent exchange of information/results is foreseen.

2. The Technical & Innovation Manager (BOSCH), who leads also the innovation activities of T1.2, will ensure that the project coordination develops favourable conditions for innovation and takes the necessary actions to facilitate that the innovations will be effectively exploited after the end of PoDIUM. More details on this role are also included in Section 3.1.2.2 above.

3. The Data Manager & Protection Officer (ATE), who leads the Data Management Plan of task (T1.3), will coordinate the elaboration of a plan for collection, storage and handling of the validation data, as well as for data publication as part of the Open Research Data Pilot (ORDP). This manager/officer raises potential issues and proposes solutions for dealing adequately with data privacy and data protection regulations, and will liaise with the partners who will perform the trials to establish procedures that ensure proper application of the Data Protection policies at the national level. This manager/officer is responsible for defining procedures to ensure that "openness" will be fulfilled in terms of data produced by the project, in diverse forms (Technical data, Evaluation data, Data on project outcomes and studies). More details about this kind of data will be included in D1.4 – Data management plan.

4. The Risk and Quality Manager (ICCS), who leads the Quality Assurance and Risk Management Task (T1.4), will ensure high quality of deliverables and outcomes of the overall project targets. This manager also supports project coordination in achieving the milestones by monitoring the production of deliverables and by executing the risk management process. They also have the authority to approach the GA directly to ensure that risks related to the TMT and PC can and will be discussed at the highest body for decisions.

5. The UCLs are responsible to coordinate and carry out activities related to the analysis, preparation, and execution of each PoDIUM UC, with the ultimate objective of successfully

conducting the demonstration trials. As members of the TMT, they will represent issues of the UCs and will actively participate in the coordination across trials.

6. The Communication Manager (ERTICO), who leads the Dissemination, exploitation and international cooperation WP (WP7) and the Communication strategy and tools task (T7.1), will ensure that the project is well coordinated for achieving excellent outreach with public events, scientific publications, and presentations.

The main roles of the TMT are as follows:

1. Communicate regularly to monitor WP and UC progress and to discuss potential issues.

2. Hold periodic teleconferences, chaired by the PC on a regular basis, to:

   o Assess the status and progress of all the project activities and results.

   o Discuss issues and try to find solutions and reach a consensus and adapt the project plan as necessary.

   o Assess the needs for changing the allocation of resources.

   o Monitor the risks in the risk register and potential mitigation measures in place, and identify new risks.

   o Discuss the dates of the GA and prepare the agenda and the presentations.

   o Prepare the review meeting with the EC as well as the presentations.

   o Prepare the meetings with the EAB.

   o Discuss feedback from the EC or the EAB and propose corrective actions.

   o Support the dissemination activities and in particular the preparation of events and demonstrations.

3. All members of the TMT will attend the important coordination meetings of the project, particularly the official review meetings with the EC.

4. As necessary, the TMT may create and instruct task forces, particularly to efficiently solve cross-WP issues.

5. Act as intermediary in cases of conflicts that cannot be resolved at the WP level.

6. Assess and approve calls for extraordinary GA meetings (beyond the required meetings).

### 3.1.2.3.1. Use Case leaders

The success of the project strongly depends on the advancements achieved in each Living Lab (LL) as part of the planned UCs. Throughout the project, technical work will progress mainly through the daily communication and ad-hoc meetings organised on a per UC basis. Thus, a Use Case Leader (UCL) is assigned to each UC. The WPLs will work closely with the UCLs, in order to successfully and uniformly materialise all five UCs of the project, respecting and taking full advantage of the PoDIUM potential. The UCLs are presented in Table 5.

The main role of the UCLs therefore spans across the following project management procedures:

1. Convening and chairing periodic meetings. All UCs have setup such regular "internal" UC calls, that take place on a monthly basis. The periodicity is subject to change throughout the course

of the project and some UCs switch from one periodicity to another based on the current needs. Specific LL mailing lists have been setup by the PC that facilitate this communication.

2. Assessing risks that arise within their UCs, and proposing plans to move forward with respect to the comments received during the project reviews, together with the assistance of the TMT.

3. Cross-UC coordination. The UCLs serve as the contact points for such cross-UC collaboration and communication.

Table 5 PoDIUM Use Case Leaders (UCL)

| UC acronym | Use case description | UCL |
|---|---|---|
| UC1-CCMUL | Cooperative Corridor Management in City of Ulm | UULM |
| UC2-CTMUB | PDI for CCAM-enabled TM in Urban Corridors with High Priority Vehicles and VRUs | ETRA |
| UC3-MCBCB | Responsive PDI enabling Vehicles and Road Users to Self-Manage in Real-time for Mixed Traffic in Cross-Border Corridor | AAE |
| UC4-TCP4IMA | Trusted Cooperative Perception for Intersection Manoeuvre Assistance | CRF |
| UC5-RMT | Risk Management in a Highway Tunnel | CRF |

### 3.1.3. Strategic bodies

In addition to the TMT, PoDIUM will rely on three other strategic bodies that will perform a complementary role to guarantee transparency, accountability and expert topical knowledge: the General Assembly (GA), the Steering Committee (SC), and the External Advisory Board (EAB).

### 3.1.3.1. General Assembly (GA)

The GA is the ultimate decision-making and conflict resolution body of the project. It will be chaired by the PC and attended by one representative of each partner. The GA will be responsible for the overall strategic orientation and policy of the project. It will make sure that the adopted strategy is respected in order to reach excellence. Its tasks include:

1. Assessment of and agreement on project progress and status and allocations of resources.

2. Changes of Grant Agreement & technical annex to be submitted for EC approval.

3. Changes to the work programme and its timing.

4. Modifications to the Consortium Agreement notably to Background Included, additions to list of Third Parties for simplified transfer, etc..

5. Evolution of the consortium: conditions of entry and withdrawal of parties, identification of breach by a party or defaulting party.

6. Agreeing on external opportunities.

7. Ensuring the leverage effect of the project and achievement of expected impacts.

The GA is, therefore, the highest decision-making body of PoDIUM where all partners of the consortium are represented. Upon recommendations from the TMT, the Risk & Quality Manager and/or the PC, the GA takes final decisions on the overall policy of the consortium, on proposals for

modifications or extensions of the Grant Agreement or of the objectives of the project. Decisions are reached by a GA vote of two-thirds of the membership voting in favour. The PC chairs the GA, which will meet physically one time per year and one time per year remotely, to report and discuss progress. Attendance at the GA is mandatory and requires at least one representative of each beneficiary to be present at the meetings. Therefore, all partner representatives are expected to participate in GA decisions; any representatives that cannot attend a GA meeting, they may give power to another from the same organisation. The GA meeting will follow a written agenda.

### 3.1.3.2. Steering Committee (SC)

The Steering Committee (SC), consisting of the 4 PoDIUM managers and WPLs, will be responsible for the proper execution and implementation of the decisions of the GA. It will monitor the effective and efficient implementation of the project. In particular, the SC will:

1. Collect information on the progress, IPR, dissemination, communication, etc., and the status of resources of the project.

2. Examine information to assess the compliance of the project with the work plan and, if necessary, propose modifications to it to the GA.

3. Resolve conflicts on technical, financial and strategic issues and consult GA if needed.

4. Support the PC in preparing meetings with the EC and in preparing related data and deliverables.

5. Prepare the content and timing of press releases and joint publications by the consortium or proposed by the EC.

6. Propose and set up internal quality processes, common templates and communication tools.

### 3.1.3.3. External Advisory Board (EAB)

The EAB will act as external reviewer and offer non-binding advice and recommendations to ensure that:

- The project is aligned with market and stakeholder needs and is developing according to industry standards.

- The issues identified in the Grant Agreement that PoDIUM will address, e.g., cross-border aspect, also align with the EAB's views on market deployment needs.

- The overall project results demonstrate the applicability and potential of Cooperative, Connected and Automated Mobility (CCAM) in real-life conditions.

The EAB formation is open to stakeholders from the global telecommunications and mobility community. The PoDIUM EAB members will be defined, with the objective to include regulation authorities, vehicle manufacturers, and telecom industry stakeholders involved in the development of CCAM scenarios. The added value of the EAB will be to offer insights from different links of the value chain.

The EAB will have access to the project deliverables (with confidentiality agreements in place) and be available to answer specific questions from consortium members on their specialty topics.

All recruited EAB members will be approved by the GA and will be asked to sign a non-disclosure agreement (NDA). A travel budget will be managed by ICCS to cover the members' travel costs to participate in EAB meetings, if needed.

## 3.2. Management processes and procedures

The project Management Plan puts in place certain project-management processes and procedures to ensure that the workflow is smooth and that the project delivers high-quality outputs within the defined scope and time. These processes and procedures are intended to facilitate risk and quality management and to ensure that the innovation and deployment objectives of the project are attained.

### 3.2.1. PoDIUM administrative management processes

The following processes contribute to the efficient and dynamic management of the project:

- progress reporting and evaluation of results;

- planning and implementation of changes;

- project administration and contract management;

- project management tools and services (described separately in Chapter 4).

### 3.2.1.1. Project administration and contract management

The conditions and procedures for a Grant Agreement amendment are set in Article 39 of the Grant Agreement. Requests for amendments to the Grant Agreement and significant project changes and deviations must be submitted in writing to the PC. The project beneficiary requesting the change must indicate to the PC the reasons for the proposed amendment and its consequences in terms of budget, work programme, etc. The PC must be informed as soon as a potential need for amendment to the Grant Agreement or a change to the project plan is identified. Examples of subjects for contract amendment include (non-exhaustive list):

- Partners joining or leaving the project.

- Re-allocation of budget.

- Incorporation of requirements from the EC.

- Extension of contract duration.

- Modification of DoA (Annex 1 to the Grant Agreement, Milestones, Deliverables' submission date, Partner tasks, etc.).

The amendment request must be approved by a GA vote. It will then be forwarded by the PC to the EC on behalf of the consortium.
The PC is responsible for updating the amendments in the Participant Portal.

### 3.2.1.2. Planning and implementation of changes

The PC must be informed in writing of any request for change to the DoA of the Grant Agreement. The communication must include the following information:

- The proposed change.

- Whether status of the contract must be changed.

- Justifications for the change.

- Impact of the changes on the project plan.

Minor changes such as slight adjustments or internal shift of resources will be dealt within the periodic reporting and do not require a Grant Agreement amendment. Such changes, however, must always be indicated to the PC and have the approval of the WPL involved.

## 3.2.1.3. Progress reporting and evaluation of results

PoDIUM is bound by the Grant Agreement to provide periodic reports on its progress towards the project objectives. A Technical Report reflecting the progress within the reporting period M1-M18 and a Final Report at the end of the project in M36 must be provided to the EC. To complement these reports, PoDIUM will produce six Internal Reports.

### Internal Reports

These reports entitled project Coordination Internal Reports (numbered IR1.1 - IR1.6) will be produced every six months (M06, M12, M18, M24, M30, M36) to provide the status of each WP in terms of:

- Objectives of the period.

- Progress towards objectives in the period, including milestones and deliverables.

- Justification and impact of delays and objectives not achieved.

- The situation regarding personnel and other costs.

- Any changes or deviations in the use of project resources or organisation.

The Internal Reports will be used to detect any need for corrective actions and will also be the basis for preparing the EC periodic reports. A risk register will be presented to the EC as part of the periodic reporting process. Recommendations arising from project periodic reviews will also be added as items to be addressed in the following reporting period.

Except for these 6-monthly reports, the PC sends a monthly report in the form of an e-mail to the whole consortium, summarising the activities of the past month per WP, reminding the milestones and deliverables for the next six months, and setting an action plan for the next month. This activity has started in M01 of the project, immediately after the project's technical kick-off meeting.

WPLs will be responsible for compiling the reports on work done by collecting status reports from their Task Leaders. When the timing overlaps with the official periodic report, the official report will serve as internal report as well.

Recommendations arising from project periodic reviews will also be added to be addressed in the following reporting period.

### Interim and final periodic reports for the EC

The Grant Agreement obliges the PC to submit technical and financial reports to the EC. As with the Internal Reports, WP Leaders will work closely with Task Leaders to produce complete records of their activities and achievements towards objectives as well as the contribution of all the partners involved, as required by the Grant Agreement. These reports will also serve to justify Person Month (PM) costs reported by the beneficiaries. The reports will be sent to the PC for submission to the EC.

Information for all project activities (per WP) will be provided to the project Officer and EU experts (reviewers) before each project review, namely, even if there are no planned periodic reports available just before a review. The PC will provide reviewers the necessary reports of the project activities for the period under review at the latest two weeks in advance of a review meeting. Reporting will also include information about any tasks whose work may not be reported in any deliverable during the period under review.

### 3.2.2. PoDIUM management procedures

PoDIUM has defined a set of procedures to support the coordination tasks and to ensure the above processes are efficiently executed. These procedures relate primarily to conflict resolution, resource management, and quality and risk assurance. Project meetings are the main tool for the coordination of work. The corresponding procedures for organising meetings are also described below.

### 3.2.2.1. Conflict resolution

Consensus will be pursued as the general principle in the decision-making processes of PoDIUM. Decisions in the project will generally be taken at the lowest organisational level possible, i.e., starting with the Task Leaders. The TMT will be the preferred entity to solve most of the issues in a consensus-based manner. If the conflict remains unresolved at the TMT level, the GA will be consulted and will vote for a decision to resolve the issue.

### 3.2.2.2. Procedure for resource reporting and management

project resources are managed by the PC based on the Grant Agreement. PoDIUM will provide the periodic reports required by the EC and also generate an internal report every six months about the progress of the work, the achievements, the risks, as well as an overview of the resources spent. These internal reports (IR1.1 to IR1.6) will help in monitoring and controlling the project and will be the basis for the provision of the EC periodic reports. They will also help in mitigating performance issues from participants or anticipating the need for updating the project plan, including the reorganisation of resources.

The internal reporting procedure will be based on the official periodic reporting requirements and include input from all project beneficiaries. These reports will comprise two parts:

- Part A will contain resource management reports for the period.

- Part B will describe the work done during that period.

In more detail:

- Towards the end of each reporting period (M01-M06, M07-M12, etc.), the PC, ICCS, will send out a request to all partners to provide input in the dedicated templates.

- For Part A, each beneficiary partner will report their resource use for the period based on a per task estimation of expected resource use; a summary of the activities performed will be provided along with justification for deviations.

- For Part B, WPLs will collect input from Task Leaders and other beneficiaries and report the progress made in the provided template. The contribution of all beneficiaries involved in the WP will be briefly summarised.

- The PC will use this report to ensure that project activities are on course and all beneficiaries are contributing as expected.

- Corrective action may include shifting resources (PMs) from non-performing partners.

### 3.2.2.3. Project meetings procedures

The procedures for organising meetings are part of section 6.2 – General operational procedures for all Consortium Bodies – of the PoDIUM Consortium Agreement. It is essential to follow these procedures closely to ensure the validity of all decisions and actions of the consortium.

**Convening meetings**

PoDIUM meetings will be convened at various representation levels from a GA to Task level.

In order to create synergies, cooperate and organize activities, periodic meetings have been scheduled at the task and WP levels. The frequency and timing of these meetings is set by the task and WP Leaders as needed by their activities.

Management meetings will be held periodically to review the overall status of the project. Such meetings are meant to ensure that the project is on the right track and that the pace of work is on schedule. The following meetings take place on a regular basis:

- GA telcos: These are chaired by the PC.

- TMT telcos: These are chaired by the PC and TM.

- WP telcos: These are chaired by each WPL. They also occur on a regular basis. Specifically, their average periodicity is bi-weekly.

- UC telcos: These are chaired by each UC leader. They occur on a bi-weekly or monthly basis based on the identified coordination needs.

Ad-hoc meetings may occur, on demand, to discuss specific matters.

Moreover, as the project tries to form and maintain strong liaison activities with the overall community, participation to the following online meetings is pursued:

- Cross-project telcos: A liaison activity with other related projects has been initiated, where PoDIUM PC and TC participate.

- EAB telcos: Meetings with the EAB will take place on an ad-hoc basis. The TMT will participate in these meetings.

**Notice of a meeting**

The chairperson of the consortium shall give notice in writing of a meeting to each consortium member as soon as possible and no later than the minimum number of days preceding the meeting as indicated below. These notices apply to physical/virtual/hybrid plenary meetings.

Table 6 Management meeting notification period

|  | Ordinary meeting | Extraordinary meeting |
|---|---|---|
| General Assembly | 45 calendar days | 15 calendar days |
| Technical Management Team | 30 calendar days | 15 calendar days |

**Sending the agenda**

The chairperson of the consortium shall prepare and send each consortium member a written (original) agenda no later than the minimum number of days preceding the meeting as indicated below. This mainly applies to physical meetings.

Table 7 Agenda availability for management meetings

|  | Ordinary meeting | Extraordinary meeting |
|---|---|---|
| General Assembly | 21 calendar days | 10 calendar days |
| Technical Management Team | 7 calendar days | 7 calendar days |

**Adding agenda items**

Any agenda item requiring a decision by the Consortium must be identified as such on the agenda. Any Consortium member may add an item to the original agenda by written notification to all of the other members up to the minimum number of days preceding the meeting as indicated below.

Table 8 Agenda modifications for management meetings

|  | **Ordinary meeting** | **Extraordinary meeting** |
|---|---|---|
| General Assembly | 14 calendar days | 7 calendar days |
| Technical Management Team | 2 calendar days | 2 calendar days |

During a meeting the Members of a Consortium Body (either present or represented) can unanimously agree to add a new item to the original agenda.

**Representation in meetings**

With the exception of UC meetings, all consortium members should be present or represented at any meeting. They may appoint a substitute or a proxy to attend and vote at any meeting. Virtual representation, when possible, is permitted. Consortium meetings may also be held by teleconference or other telecommunication means. A meeting may be recorded after the consensus of all participants, and the recording will be shared with the partners.

**Minutes of meetings**

The PC shall produce written minutes of each meeting which shall be the formal record of all decisions taken. He shall send the draft minutes to all members within fifteen (15) calendar days of the meeting. This mainly applies to physical (plenary/review) meetings, while for online telcos the meeting minutes are generally to be prepared within the same or the next day.

The minutes shall be considered as accepted if, within ten (10) calendar days from sending, no member has sent an objection in writing to the chairperson with respect to the accuracy of the draft of the minutes.

## 3.2.2.4. Management of risks and quality assurance

The purpose of Quality & Risk Management is to guarantee the timely delivery of the project results with high quality. In PoDIUM, there is a specific quality management plan (deliverable D1.2) while Risk management is part of this deliverable.

Risk management with a thorough analysis of potential risks and close monitoring of the defined corrective actions is an important factor in the PoDIUM project management plan. This is not only important in order to reach the objectives of PoDIUM within the given time, budget and with high quality, but also to achieve the maximum of synergies with related projects.

For the above reasons, PoDIUM will use the Failure Mode and Effects Analysis (FMEA)[1] as the basis for risk-management. Although this process is usually employed for high-risk projects (where loss of life may be an effect), this structured approach offers PoDIUM tools for discovery of potential failures in the design and processes of the project's activities. The process within PoDIUM has been visualized in Figure 3, and as shown risk management is a cyclic process. For PoDIUM, the periodicity is related to the internal reports. As part of reporting, the risk management cycle will be executed as well. During the process, a dedicated risk session is held to identify and analyse the risks. A 'risk' is defined as a

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[1] Raymond J. Mikulak, Raymond J. et al. 2017. The basics of FMEA (2nd ed.), Taylor and Francis; ISBN: 9781439809617.

future event precluding the achievement of the objectives of a certain activity or task. Risks can be identified by any consortium member.

Within the risk management cycle the following steps are executed:

1. Identifying risks:

    o WP and Task Leaders will identify the risks relevant to their activities or tasks and subsequently properly and promptly inform the Risk & Quality Manager who will add them to the risk register.

    o Identification of risks is performed continuously during the last step (monitoring and acting upon risks) and periodically in dedicated risk sessions.

2. Analysing risks:

    o Analysing risks is performed during the dedicated risk sessions.

    o During this step, all risks are assessed for their relevance. If a risk is no longer relevant it may be closed.

    o Risks are assigned a risk owner/caretaker, being the person who will be able to detect and/or manage the risk best.

3. Evaluating risks:

    o All risks are rescored using the FMEA scoring methodology, assessing Severity (S) and Occurrence Probability (O).

    o The risk register is constantly revisited and mitigating measures are defined by the owner in cooperation with the TMT.

4. Monitoring and acting upon risks:

    o The risks are actively monitored during the TMT sessions.

    o Certain risks that are identified as critical or highly probable will be actively managed. This means that preventive mitigating measures will be put in place.

    o If a risk materialises, upon detection the necessary mitigating measure(s) will be put in place.

The risks are tracked in a Risk register. The risk register is updated by the Risk & Quality Manager. The complete list of quality management procedures is documented in D1.2 – Quality management plan. By defining clear procedures and establishing deadlines for deliverable production, review and submission, the Risk & Quality Manager will ensure low exposure to risk and the highest possible quality of PoDIUM outcomes.

Table 9 in the Annex presents the risks identified. The risks are included in a shared collaboration space (Redmine), where they will be continuously monitored and updated.
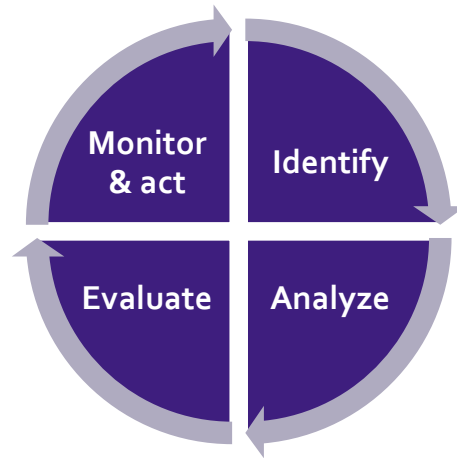
Figure 3: PoDIUM risk management steps

# 4. Project coordination and communication tools

The successful execution of a project depends to a large extent on participants having good tools and services at their disposal to facilitate project-internal communication and streamline workflow. For a large project such as PoDIUM such management tools are indispensable, and, thus, the project has chosen a combination of tools for various purposes. The main ones are:

- **Redmine**: The project uses the Redmine web-based tool as a document repository and file exchange system, ensuring both safe storage of documents and supporting collaboration among partners (such as public deliverables, minutes and agendas, and for the various project Registers).

- **GoToMeeting**: This is the main platform used for the project regular or on-demand telcos. Doodle is usually used in order to setup new meetings, so that all required attendees have the chance to vote their preferred timeslots.

- **Website**: The main project vehicle for communication and dissemination activities will be available at: https://www.podium-project.eu/.

- **Sympa**: A listserv for targeted group-based internal communication (Figure 11). The [PoDIUM] tag is used in all communication. Available at: https://lists.podium-project.eu/wws. On top of per admin and WP lists, a list for each LL has been created to facilitate coordination and and problem resolution for issues specific to the country or UC. All lists are open to members of the consortium and new members can be easily added (e.g., new colleagues joining PoDIUM).

To ensure that the consortium receives relevant information in a timely manner, without an excessive use of email, project communication will reflect the structure of the project and will target the smallest possible group of members (via email or listserv). Targeted information sharing will be based on the classification of internal communication as 1) communication related to project activity execution, or 2) communication related to administrative matters.

Communication relating to administrative matters (financial statements, signature of contracts, payments, etc.) will be targeted to the administrative staff of each organization, which is not necessarily involved in the execution of project activities. To make sure that the information reaches all the staff involved in the administrative management of the project, the communication will be distributed to the contact persons identified as PoDIUM contacts in the EC participant portal.

When the PC needs to communicate on administrative matters with the whole consortium, he will address the list of contact persons downloaded from the EC participant portal. Therefore, in order not to miss any important administrative information, each partner has the responsibility to maintain this list up to date.

# 5.    Conclusions

This document, deliverable D1.1 – project management plan, is closely aligned with and takes as its starting point the Grant and Consortium Agreements of PoDIUM. It details the roles and responsibilities of governance bodies as well as all beneficiaries and members of the project Consortium. It describes the structures, tools, processes, and procedures that WP1 (project management) has instituted to ensure that the project runs smoothly and effectively and in accordance with the Grant Agreement.

An integral part of the project management plan is PoDIUM's risk management strategy based on the Failure Mode and Effects Analysis.

D1.1 is specifically relevant for the execution of Tasks T1.1 (Administrative and financial coordination) and T1.2 (Technical coordination management sub-task). This deliverable will be complemented by the other deliverables of WP1.

Together with the Grant Agreement and the Consortium Agreement, this document is to be regarded as a reference for the overall project management of PoDIUM, to ensure good organisation of work effort and high quality of project results.

# 6.    Annexes

## 6.1.  Risk management by failure mode and effects analysis

PoDIUM uses the Failure Mode and Effects Analysis (FMEA)[2] for its risk-management as a basis. This structured approach enables discovery of potential failures in the design and processes of the project's activities. By analysing the harmful effects of failures, the FMEA can identify, prioritise and ultimately help mitigate the failure modes.

The risk assessment procedure comprises the following main steps:

- Step 1 – Identification and definition of the risks

- Step 2 – Risk validation

- Step 3 – Identification of risk mitigation strategy

### Step 1 - Identification and definition of the risks

WP, UC and Task Leaders will identify the risks relevant to their activities or tasks and subsequently properly and promptly document them in the risk register. In addition to technical and organisational issues, possible risks will pertain to behavioural and legal issues as well.

### Step 2 - Risk validation

All risks will undergo a validation process to rank them and assess their priority. This step involves assessing each risk based on severity, and occurrence probability.

- Risk Severity (S): The severity levels for technical and organisational failures range from Low to High.

- Risk Occurrence Probability (P): The occurrence probability index, ranging from Low to High, provides a ranking based on the probability that all the risk causes related to the risk modes described in the analysis can occur.

### Step 3 - Mitigation strategies identification

The risk register will indicate the WPs or UCs implicated by the risk and, if needed, assign a caretaker for each risk, who will follow its analysis and mitigation. Mitigation of the risks adverse effects will rely on a risk reduction strategy by way of an iterative process. Some ways to do this will include:

- Reducing the probability of the hazard occurring.

- Increasing failure detection speed and probability.

- Reducing the magnitude (severity) of the consequences of the potential hazard.

- Protecting against the risk-mitigating strategies to compensate for a failure (e.g., back-ups).

Table 9 presents the risks identified at the time of submitting this deliverable. A risk register document in Redmine will be continuously monitored and updated.

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[2] Raymond J. Mikulak, Raymond J. et al. 2017. The basics of FMEA (2nd ed.), Taylor and Francis; ISBN: 9781439809617.

Table 9 Risk register- description of critical risks and mitigation actions

| Risk Id | Description of Risk | WP | Prob. | Sev. | Risk-Mitigation measures |
|---------|---------------------|-----|-------|------|--------------------------|
| 01 | Discrepancies in the technical visions: project delays, etc. | 1 | L | M | Frequent communication within WPs (through meetings, telcos, etc.) and at the TMT level to resolve issues. Good cooperation between Coordinator, Technical Manager, TMT and the Consortium. |
| 02 | Requirements and specifications are not ready on time. | 2 | L | L | The PoDIUM platform architecture, the proposed UCs and the different PDI components (T2.2-T2.5) are already well defined and commonly agreed among partners. The requirements and specification activities will be continuously monitored through periodic conference calls to check possible issues and delays. |
| 03 | Lack of cooperation of the different partners that lead to an incomplete definition of the technical, legal and operational requirements and specifications in WP2. | 2 | L | H | A collaborative and online tool based on Volere methodology will be used for the definition, revision and validation of the requirements and specifications in order to involve the different stakeholders (developers and end-users) to ensure its suitability for the development and demo phase |
| 04 | Requirements and specifications not adequate for the development phase. | 2-3 | M | L | The requirements and specification activities and the development activities are planned with a partial time overlap in the scheduling. This will allow interaction among the two activities and ease the identification of possible not adequate aspects in the specifications. |
| 05 | Technical innovation work diverges from the project's initial goals. | 2-3 | L | M | All development activities will be closely monitored at various levels (Task, WP, TMT) to ensure that the proposed components are delivered according to the precise specifications. EC review feedback will be adhered to as closely as possible at all stages. |
| 06 | Technical challenges in the development of the PoDIUM platform architecture, the communication infrastructure, the automated vehicles etc. | 3 | L | H | Although this is highly improbable to happen, since there is significant expertise in the consortium in this field and several supporting tools exist, it will be handled with additional iterations of the development cycle and with intermediate deliveries. |

| 07 | In the German LL, the frequency bands used in the cellular test network are granted for a period of 6 months by mobile operators. This temporary allocation may be revoked. | 3 | L | H | All used base station implementations and 5G modems used in the German LL support multiple bands in Frequency Range 1 (FR1). If the use of certain frequency carriers is revoked or restricted, the operation can be switched to other available carriers. NOKIA is in contact with all German MNOs. In the rest of the LLs, the participation in the project of key MNOs (i.e., TIM and RETE) guarantee the availability of the frequency bands. |
| 08 | The use of 5G mmWave in the German LL requires 5G mmWave capable modems and MIMO-antenna systems. These are currently not available in the market. First announced pre-production 5G mmWave modems currently cost about 2.500€ and delivery may be impacted by the current global microchip shortage. | 3 | L | H | Close contact with potential suppliers of 5G mmWave modem, including reporting of malfunctions detected during testing in the LL to ensure fast software and firmware updates from them. |
| 09 | Inadequate integration of the different components and mechanisms in the three LLs. | 3-4 | L | M | Where necessary, use of formal system modelling methods (e.g., SysML) to clarify interfaces and architecture before integration. If needed, an extension will be evaluated if the technical results fail to be delivered on time so as to deliver a fully functional platform to the demonstrators. |
| 10 | Evaluation trials are not successful/Data cannot be used. | 4-5 | L | H | Multi-phase evaluation and pre-testing methodology. Trials and demos are implemented to ensure the data collected is according to expectations. Clear and comprehensive data management plan. |
| 11 | Legal restrictions imposed in the execution of the testing/demonstrations with higher levels of automation. | 3-5 | L | H | Both, the data collection and the PoDIUM demonstration and evaluation trials will be handled in an ethical manner and based on the National and European legislation. The data collection procedure will be planned within PoDIUM thoroughly by its General Assembly. In case of restrictions in testing L4 vehicles automated manoeuvres, the strategies for motion control of vehicle up to L4 will be implemented and will be tested in real traffic without acting on vehicles' actuators, but logging data on vehicles' data |

| | | | | logger for real time processing to verify the extent to which the corresponding KPIs are matched |
|---|---|---|---|---|
| 12 | No or partial testing permissions in any of the three LLs | 5 | L | H | Early contacts with authorities. Engagement from multiple sides. Local authorities at the different LLs are either members of the consortium (Barcelona City Council in Spanish LL), have provided a letter of support (City of Turin in Italian LL) or subcontracted to provide support (City of Ulm in German LL). |
| 13 | Conflicts of interest between partners on business/exploitation model. | 6-7 | L | M | The PoDIUM consortium was built with a variety of complementing stakeholders. All project beneficiaries will have the possibility to contribute towards the development of a sustainable business model and list their interests. An IPR registry will be maintained to clearly list ownership and rights. |
| 14 | Business models will reveal poor sustainability. | 6 | L | M | Different variations from use cases will be examined, all roles and interactions will be evaluated and adapted based on realistic assumptions. Partners have experience and expertise in commercialization strategy. |
| 15 | Poor match between project outcomes and market needs, that can lead to poor adoption of project outcomes | 2-7 | L | M | The market potential is high for the moment; TM will take input for market needs (WP6) and will guide the other WPs to match them. The exploitation plan will be adapted to match the market needs. |
| 16 | Dissemination and communication has limited impact (stakeholders engagement, publications, etc.). | 7 | M | H | KPIs are clearly defined and monitored. The Dissemination plan includes a sound selection of channels and planned activities to keep all stakeholders in the value chain informed on a regular basis. The plan will be re-evaluated periodically and updated as needed. Encourage the submission of papers around specific targeted events. Identify relevant deliverables that could be candidate topics. Use meetings as internal information channel for reminders. |
| 17 | Delays due to external factors (e.g., a pandemic lockdown). | 1-7 | L | H | During the proposal preparation, the consortium partners experienced lockdown in several EU countries. However, they were still able to telework from their homes, thus minimising the risk. Also, for the development phase the involved LLs have provision for remote and secure access while the same approach will be followed for the PoDIUM. |