



D1.2
Quality management
plan

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CCAM eco-system**

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Meaning
DL	Deliverable Leader
EC	European Commission
KPI	Key Performance Indicator
PC	Project Coordinator
PMBOK	Project Management Body of Knowledge
QA	Quality Assurance
QC	Quality Control process
QM	Quality Manager
QMP	Quality Management Plan
PMI	Project Management Institute
PMT	Project Management Team
SDO	Standards Developing Organisations
ToC	Table of Contents
WP	Work Package
WPL	Work Package Leader

1 EXECUTIVE SUMMARY

The Quality Management Plan (QPM), deliverable D1.2 of IN2CCAM, relates to Task 1.3 – Quality assurance and risk management - of WP1 – Project Management and Quality Assurance. This document describes the process applied within the project to ensure the overall quality of the IN2CCAM project.

The document is structured in two parts: firstly, a description of the quality management process based on the PMBOK (Project Management Body of Knowledge), and secondly, a description of risk management. The Quality management part contains the quality assurance plan, including tasks assigned to the project managers to raise the quality of the output, and of the quality control activities to verify the quality of their output.

The Quality assurance chapter presents the different roles and responsibilities participating in quality assurance, including the participants of the TMT (Technical Management Team), specifically: the Project Coordinator, the Technical Coordinator, the Quality and Risk Manager, the Communication and Dissemination Manager, the Innovation Manager, the Data Manager, the WP leaders and Living Labs leaders. Task leaders, Deliverables leaders and Deliverables peer reviewers are also described.

The quality criteria are defined for the project for each Work Packages (WPs) as well as quality measurements recorded at the project level. The Quality criteria that are defined by the WP leaders include each of the 7 WPs success indicators, and verifiers. They will be used directly by the WP leaders in their WPs. The WP leaders that are responsible of their quality criteria can report on them in the different deliverables of their WP, as well as in official reports. Examples of quality criteria are for instance for WP1 the respect of deadlines for the delivery of milestones and deliverables by each Project Partner (verified by the compliance with GANTT deadlines and Peer Review timeline), the seamless and efficient coordination of the different activities between the WPs (verified by the presence of Lead Partner PM in all the monthly teleconferences of each WP), and the correlation between performed activities and number of PMs (verified with verification of the commitment of the PMs with respect to the half-yearly financial report). The quality measurements measure every 6 months for each task: the global quality evaluation, the communication evaluation, the task follow-up, the WP/Task response to initial requirements objectives and still the COVID-19 pandemic impact if any.

The different steps of the deliverable lifecycle (its process in case of a classical submission and in case of resubmission) and quality criteria to have a deliverable of high quality are presented, as well as. The deliverable lifecycle is a four-months process, starting with setting up the document four months before the deadline, writing the table of content and sharing work between authors three months before the deadline, consolidating the deliverable with contributor's parts and launching the quality and peer review one month before the deadline. The quality and peer-reviews are supposed to be finished twenty days before the deadline and then review comments are integrated by the deliverable leader. A final check is done one ten days before the deadline. The peer-reviewers partners are first identified at the beginning

of the project, they are partners that do not participate in the writing of the deliverable. The peer reviews are equilibrated between each partners: each partner has at least two peer reviews to complete, the partners having more PMs in the project will have more peer reviews to perform. The peer-reviewers are confirmed three months before the deadline, when the peer-review form they have to fill-in in addition with their review is sent to them, as well as an explanation of the peer-review process. The quality criteria should be followed by the writers of the documents, and verified by the peer-reviewers, as well as by the quality manager. They consist in: overall quality of the deliverable (such as consistency with the project scope, or non-redundancies with other deliverables), quality of text (proofread and check language, avoid plagiarism), apply the project MS words template, naming convention and version numbering, cover page with cartridge, authors and control sheet, list of contents, figures and tables, list of abbreviations, executive summary, introduction and conclusion, references and annexes.

Finally, internal tools used to support the quality assurance process are presented: organisation contact details, meetings and meeting minutes, quality assurance tools used during the project (peer review form, templates for deliverables and presentations, Microsoft SharePoint, and the Deliverable register).

The quality control part presents the suggested deliverable life cycle progress percentage to represent the status of a deliverable. Elements relative to peer review are presented: the selection of peer reviewers, the email template to launch a peer review, and the peer review output documents. The project has 12 milestones (see Table 10), they are monitored by the WP leaders during monthly TMT meeting. The deliverable status measurements are updated every 6 months and present the general current status of deliverables, the current status of deliverables per WP and the deliverable status progress per 6 months (including periodic reviews).

The Risk management part presents the methodology used to manage the different risks: identify risks; analyse risks; evaluate risks and monitor & act. Critical risks have been identified during the creation of the project (see Table 12).

Dedicated meetings should take place each six months to identify new risks, this identification can also be done continuously. The risk manager should be informed of any new risk identified during the project, and then the risk added to the risk register.

During the dedicated meetings, an analysis of the risks is done. This is also done during TMT monthly meeting for the top 10. The risk owner identified for each risk can then provide the current status of the risk.

The risks are evaluated according to their severity and likelihood, and grade in function of this. A risk is graded as "A" when both severity and likelihood are high. It is graded "B" when the severity is high and the likelihood medium, or when the severity is medium and the likelihood high. It is graded "C" when severity is low and likelihood high, or when severity and likelihood are medium, and when severity is high and likelihood low. It is graded "D" when severity is medium and likelihood low, or when severity is low and likelihood medium. Finally, it is graded "E" when both severity and likelihood are low.

During the monitoring and act step, actions should be taken for risks from A to C. For a grade of A, mitigation actions should be identified and implemented immediately. For B, mitigation actions should be identified and implemented as soon as possible. And for C, mitigations actions should be identified and implemented when resources exist that enable to reduce the risks.

2 INTRODUCTION

2.1 Project intro

IN2CCAM project, according to the vision of the Horizon Europe 2021-2027 framework program, aims to accelerate the implementation of innovative technologies to make it possible to include autonomous vehicles for the transport of passengers and goods.

Cars, buses, and trucks without a driver but under the control of futuristic instruments based on artificial intelligence techniques, will be able to remedy human errors with great impact on society in terms of safety (i.e., the reduction in the number of road accidents) caused by human error; the environment (i.e., reducing transport emissions and congestion by facilitating the flow of traffic and avoiding unnecessary travel); inclusiveness (i.e. ensuring inclusive mobility and good access for all as elderly or disabled people physical problems).

Twenty-one partners from 9 different European countries will collaborate under the guidance of Prof. Maria Pia Fanti and her work team from the Laboratory of Automation and Control (LCA) in Politecnico di Bari, in order to create a series of physical, digital, and operational solutions that will be implemented in 6 pilot cities: Tampere (Finland), Trikala (Greece), Turin (Italy), Vigo (Spain), Bari (Italy) and Quadrilatero (Portugal).

2.2 Purpose of the deliverable

The Quality Management Plan (QPM) consists in procedures and guidelines aiming at achieving the project objectives with high quality via successful collaborative work between the different parties of the project.

Procedures are established at quality management (quality assurance and quality control) and risk management levels and include the following activities:

- Liaising with the Technical Management Team (TMT) about the quality status of project deliverables.
- Defining IN2CCAM's quality procedures and providing guidelines for the production and peer review of project deliverables.
- Supporting the deliverable and work package leaders in producing deliverables of high quality.
- Supporting the coordination team with the risk management by monitoring risks.

2.3 Intended audience

The dissemination level of D1.2 is public (PU) but is meant primarily for (a) all members of the IN2CCAM project consortium, and (b) the European Commission (EC) services.

D1.2 can be used by the consortium to identify the different governance bodies linked to quality management and their role. The partners having the responsibility of leading a deliverable, as well as partners participating in the writing process will find here a description of deliverables lifecycles as well as criterium to write a quality deliverable. Peer reviewers of the deliverables can use this deliverable to know the process of peer review, and associated elements such as the peer review form. Other information is intended to the totality of the consortium such as the quality criteria and measurements.

The consortium can also see in this document the process of risk management.

2.4 Structure of the deliverable and its relation with other work packages/deliverables

The deliverable is structured in two main parts: the first part is dedicated to quality management; the second part is dedicated to risk management.

Quality management part presents first quality assurance plan, it consists in:

- The quality assurance roles
- The quality criteria and measurements in IN2CCAM
- The deliverable lifecycle and deliverables quality criteria both in case of a first submission and in case of resubmission
- The internal tools used within the project

The second part of quality management focusses on quality control activities:

- Deliverable lifecycle progress in percentage
- Information about peer reviews (selection of peer-reviewers, template email to launch a peer-review, and output documents)
- Milestones monitoring
- Deliverable status measurements.

The risk management part presents:

- The different steps of risk management: identify, analyse, evaluation and monitor & act
- The critical risks identified at the creation of the project

It is related to all work packages and deliverables of the project since presenting the quality and risk procedure to put in place in the IN2CCAM project.

3 QUALITY MANAGEMENT PLAN

3.1 Introduction to Project Quality Management

This Quality Management Plan (QMP) is mainly based on the PMBOK (Project Management Body of Knowledge), a set of standard terminologies and guidelines for project management that evolves over time. It is a resource from the Project Management Institute (PMI¹) and its most recent version (7th) was released in 2021².

The PMBOK highlights the importance of quality planning, quality assurance and quality control as essential aspects of project management. The related quality management processes are defined in Table 1. The applied quality criteria specific to IN2CCAM are listed in Chapter 3.2.2.1.

Table 1: Project Quality Management Processes (source: PMBoK Guide, 2021)

Quality management processes	What
<p>Quality Planning</p> <p><i>When?</i></p> <ul style="list-style-type: none"> - Before the production process - When quality assurance activities find a quality issue involving project changes and an update of the project management plan. 	<p>The QMP determines the quality requirements and how to measure and control them. It can be defined in a subsection of the project management plan or, for larger projects, a standalone document.</p> <p>Outputs: The QMP should contain at least:</p> <ul style="list-style-type: none"> • Quality standards that apply to the project • Measurement criteria and frequency <p>Inspection criteria = Quality Control Sheets</p>
<p>Quality Assurance</p> <p><i>When?</i></p> <p>During the production process, throughout the duration of the project.</p>	<p>Quality Assurance is prevention of errors to reach quality. Performing quality assurance ensures that the processes are in place to produce the project deliverables at the applicable level of quality. Quality Assurance asks the following questions:</p> <ul style="list-style-type: none"> • What are the applicable quality standards? • How is quality measured? • Who measures it?

¹ <https://www.pmi.org/>

² PMBoK® Guide – Seventh Edition (2021)

<p>Quality Assurance</p>	<ul style="list-style-type: none"> What is measured? (number of units? types? processes?) When is it measured? What are the criteria for rejection? <p>Quality Assurance creates and analyses the systems to measure and control quality, in order to create confidence that quality deliverables will be produced.</p> <p>Outputs: A quality system is in place.</p>
<p>Quality Control</p> <p><i>When?</i></p> <p>After the production process.</p>	<p>Quality Control is an inspection for quality. Quality control measures the quality level of individual products and deliverables and accepts or rejects them based on the criteria developed by Quality Assurance.</p> <p>Outputs: Quality is monitored on project outputs. Measures are taken to reach the expected quality, which may result in a change to the quality management plan.</p>

3.2 Quality assurance plan

Quality Assurance, along with Quality Control, is a primary component of a project quality system and consists of a set of processes to ensure that project outputs meet the planned quality standards.

In IN2CCAM, the quality assurance plan:

- Defines roles and responsibilities of all parties involved in the quality processes.
- Establishes quality assurance procedures and reference documents to obtain project deliverables with a high-quality standard.

Specifies tools and files that support Quality Management activities.

3.2.1 Quality assurance roles

Below the governance bodies are listed that have a direct responsibility in project quality management, as well as their roles, particularly regarding the completion of tasks and submission of deliverables. The complete project organisation, including the different management structures and contact details will be described in D1.1.

Quality assurance roles in IN2CCAM are distributed to participants according to their responsibilities. These roles are summarised in Table 2, where the **Technical Management Team (TMT)** appears in orange (for project managers) and green.

Table 2: Quality assurance roles in IN2CCAM

Role (Partner)	Responsibility regarding quality management
Project Coordinator (PC) POLIBA	<ul style="list-style-type: none"> Overall responsible to ensure all is being delivered (with high quality).
Technical Coordinator (TC) POLIBA	<ul style="list-style-type: none"> Coordination of technical topics, management of technical scope and final decisions on technical aspects. Collaboration with “Task T1.3 – Quality Management” to ensure deliverable quality.
Quality and Risk Manager LIST	<ul style="list-style-type: none"> Quality control and overall risk and deadlines management. Lead the Quality Management task (T1.3). Act in support to the TMT (in particular WPLs) for implementing the QMP and management of quality processes. Provide a quality review of each deliverable, plus a final check before sending deliverables to the EC.
Communication and Dissemination Manager ERTICO	<ul style="list-style-type: none"> Ensure that the communication and dissemination activities are well coordinated for achieving excellent outreach with public events, scientific publications, and presentations.
Innovation Manager POLIBA	<ul style="list-style-type: none"> Ensure that the innovation activities develop favourable conditions for innovation and takes necessary actions to ensure that the innovations are effectively exploited after the end of IN2CCAM.
Data Manager UBI	<ul style="list-style-type: none"> Raise potential issues and proposes solutions for dealing adequately with data privacy and data protection regulations.
Ethics Manager ERTICO	<ul style="list-style-type: none"> Raise potential issues and proposes solutions for dealing adequately with ethics.
Work Package Leaders (WPLs)	<ul style="list-style-type: none"> WPLs are responsible for monitoring the activities related to WP deliverables and other results (e.g. deployments, tests, demos), including quality aspects and respecting deadlines. WPLs report the progress to the TMT.
Lead Living Labs (LLs) and Follower Living Labs Leaders	<ul style="list-style-type: none"> Ensure the harmonisation of time plans, test scenarios, data management and the continual information about evaluation methods and impact assessment. These measures contribute to the project quality.
Task Leaders	<ul style="list-style-type: none"> Coordinate quality control of the activities related to their task.

Deliverable Leaders (DLs)	<ul style="list-style-type: none"> • Coordinate quality control of their deliverables. • Are responsible for the execution of the activities related to a deliverable. They must liaise with task participants and communicate efficiently and regularly.
Deliverable (peer) reviewers	<ul style="list-style-type: none"> • Review deliverables according to a set of quality criteria, as specified in this deliverable.

3.2.2 Quality criteria and measurements in IN2CCAM

In the IN2CCAM project, we have defined quality criteria specific to the different Work Packages, valid for the duration of the project, as well as quality measurements to be measured every 6 months. Both will help to ensure the global quality of the project.

3.2.2.1 Quality criteria

Quality criteria cover aspects of quality management such as meeting deadlines or producing deliverables. It can also be activities specific to the project such as living labs related activities. Quality criteria are presented by category (WP) and for each category can be found the different defined criteria as well as their verification means. **Verification means** consist of:

- **Success indicators**, that are measurable states that allow an assessment of criteria achievement,
- **Verifiers**, that are demonstrations that the required state is achieved.

The quality criteria, that are defined by the WP leaders, are managed in each WP under the responsibility of the WP leader.

The following table defines minimum criteria for ensuring quality. Target values should be defined for each verification mean that will actually be used.

Table 3: Criteria for ensuring quality in IN2CCAM

Category	WPs	Criteria	Verification means
Governance	WP1	Respect of deadlines for the delivery of Milestones and Deliverables by each Project Partner Seamless and efficient coordination of the different activities between the WPs Correlation between performed activities and number of PMs Innovation Management progresses	Compliance with GANTT deadlines and Peer Review timeline Presence of a Lead Partner PM in all the monthly teleconferences of each WP Verification of the commitment of the PMs with respect to the half-yearly financial report Innovation Tools Catalogue verified
User's needs	WP2	Literature review.	Depiction of the results in D2.1
		Formulate surveys, interviews, on-line questionnaires. Stakeholder/User groups will be divided accordingly and specific questions will target each group.	Collect wide range feedback from the Surveys, interviews and questionnaires and use of those in the LLs. Depiction of the results in D2.1
		GAP analysis using the responses from the questionnaires and comparing existing state to the desirable state.	Analysis of the results in D2.1
Development, Integration, Intermodal interfaces and Interoperability	WP3	Architecture specification in each LL	Make sure that the architecture is defined and available for each LL. Monitor service implementation to make sure the architecture suits the needs.
		Integration of services in each LL using intermodal interfaces	Monitor the number of services integrated in each LL and hold a list of their respective intermodal interfaces.
		Interoperability between LL and services	Organize bilateral interoperability tests for designated services at LLs and analyze of the results. Revise the specifications if needed for interoperability.
		Advanced simulation model availability	Run use case test scenarios in the simulation model and generate simulated log data. Analyze and compare log data to real log data.
	WP4	Demonstrations' set-up and verification activities	Organize short-dry run tests to ensure that everything works according to the specifications (see D4.1).

Demonstrations and implementation		CCAM services' integration in each LL	Monitoring the number and diversity of CCAM services integrated in each LL (see D4.2).
		User participation in each LL	Monitoring the number of users or groups that participate to the demonstrations in each LL (see D4.2).
		Data collection in each LL	Monitoring and making sure that data are collected in each LL during demonstrations and tests (see D4.3).
Evaluation and impact assessment	WP5	Literature review of impact assessment methodologies and evaluation KPIs that can be applied Ensure the assessment methodology and KPIS are appropriate for the scenarios. Evaluation of the performance and impact assessment of the approaches implemented in WP4 as an input of WP5. Verification of consistency of data collected in WP4.	Verification that KPIs are correct by the WP5 team, and by TMT. Depiction of the results in D5.1 Verification will be done by WP5 team with agreement from TMT. Analysis of the results in D5.2. Evaluation of performance and impact assessment will be done partly with an automatic tool, and partly manual (WP5 team). Total amount of consistent data as an input of WP5. Analysis of the results in D5.3.
Recommendations	WP6	T6.1-related idea generation workshops with lead LLs	All lead LL team members participating to workshops. Results summary included in D6.1 incorporating views of all attendees.
		T6.2-related scenario building workshop with lead LLs and expert validation workshop.	All lead LL team members participating to workshops and maximise participation also from non-project stakeholders (using project stakeholder registry). Results summary of workshops included in D6.2.
		T6.3-related business and operating models	Highest coverage of stakeholder categories (and number of involved organisations) addressed as part of final versions of business and operating models to be reported in D6.3.
		T6.4-related open consultation process, an online survey and two focus groups meetings	Highest coverage of stakeholder categories involved in the open consultation process, the online survey and two focus groups meetings, to be reported in D6.4.

Dissemination and Communication	WP7	Dissemination register: full involvement of the consortium towards dissemination actions	Presence of partners in the registry
		Increasing engagement on website and social media	Monthly articles and bi-weekly social media posts
		Representative participation of consortium in conferences	Number of presentations and/or papers presented by partners to the conference
		Representative participation in scientific publications	Number of papers published in scientific journals
		Visibility of the project to the stakeholders and local public	Number of awareness events (and visitors) (per site) Feedback by the public of these events
		Stakeholder engagement	Number of stakeholders willing to participate in Task activities

3.2.2.2 Quality measurements

Quality measurements are put in place to measure the project quality for each WP and each task, every 6 months. The objective is to verify the quality level at a certain time, and put in place the necessary measures if needed, such as improving the quality at the level of a specific task. These quality measurements are presented in Table 4. Note that the values for COVID-19 impact are to be filled in the opposite way as other measurements.

Table 4: Quality measurements for IN2CCAM

Quality measurement	To be filled by	Value
Global quality evaluation	Task leader / WP leader	Number between 1 and 4 (1 being bad, 4 being excellent), plus a space for comments.
Communication evaluation	Task leader / WP leader	Number between 1 and 4 (1 being bad, 4 being excellent), plus a space for comments.
Task follow up (completion due time / validity of estimated due time)	Task leader / WP leader	Number between 1 and 4 (1 being bad, 4 being excellent), plus a space for comments.
WP/Task response to initial requirements objectives	Task leader / WP leader	Number between 1 and 4 (1 being bad, 4 being excellent), plus a space for comments.
COVID-19 pandemic impact evaluation on Task / WP	Task leader / WP leader	Number between 1 and 4 (1 being <u>no impact</u> , 4 <u>huge impact</u>), plus a space for comments.

3.2.3 Deliverables: lifecycle and quality criteria

3.2.3.1 Deliverable lifecycle

The deliverable lifecycle of the IN2CCAM project is based upon a 4 months process, as agreed at consortium level: 4 months to build each deliverable and have them ready, and in good quality, before their submission to the EC. The global process is presented in Figure 1 below. Details are presented in the next chapters.



Figure 1: Deliverable life cycle summarised

3.2.3.1.1 Deliverable actions – 4 months before the deadline – 10% of deliverable achievement

The Quality Manager (QM) checks that the DL and the WPL are aware of deadlines and roles (WPL, DL, QM, Reviewers, Contributors), and update the deliverable register based on information sent by the WPL.

The Deliverable Leader (DL) **sets up the document** with the deliverable template and then fill-in the deliverable audience as well as the deliverable purpose. He should then inform the WPL that the document has been set-up and copy the QM.

The Work Package Leader (WPL) is responsible for ensuring that deadlines are met and that the deliverables have the appropriate scope and manage consistency between deliverables.

3.2.3.1.2 Deliverables actions – 3 months before the deadline – 20% to 40% of deliverable achievement

The DL **writes the deliverable's table of content** up to level 3 and with the agreement of all task participants, and **share work between the different authors** at the section level. In the deliverable, they should fill-in the initial table of content, a first version of the executive summary, and then inform the WPL of the document status, copying the QM.

The writing process can then start. The DL then ensures consistency across contributions, monitor the progress of writing, and liaise with the WPL.

The DL also ensures that the deliverable meets its goal, is as short as possible, and focuses on technical results and learning.

At this stage, the QM updates the quality deliverable register based on information sent by the DL.

This deadline also consists in **confirming peer-reviewers and informing them of their tasks**. Peer-reviewers partners have already been identified at the beginning of the project base on the principle that Peer-reviewers should be partners not participating in the writing of the deliverable they have to review, and they have to proceed to at least two peer reviews during the project (and more for partners having more PMs).

The peer reviewers are be informed about their assignment by mail with an indicative date to start the review and a deadline date to end the review. This mail can be sent either by the QM, but both should be in the process.

The DL should be reminded that she/he will manage the peer review process.

The QM should check that reviewers are informed of their roles and of the deadlines and update the deliverable register file on SharePoint with peer reviewers' names.

3.2.3.1.3 Deliverables actions – 1 month before the deadline – 80% of deliverable achievement

One month before the deadline, the DL should **consolidate the deliverable with the contributors' parts**. This should be done by merging input from all authors and performing a final editing of the deliverable draft, but also by ensuring that the deliverable complies with the characteristics described in paragraph 3.2.3.3, including the peer review form criteria described in 3.2.3.3.1. If it is not yet there, the deliverable should be uploaded to be reviewed on SharePoint.

It is time to **launch the peer review and the quality review**. This can be done by the DL or by the QM, and the WPL should be informed.

The QM can now start the quality review by ensuring that the deliverable complies with the characteristics described in paragraph 3.2.3.3, and by updating the peer-review status and the deliverable advancement status (80%) in the deliverable register on SharePoint.

The Peer reviewers can start the peer review process by ensuring that the deliverable complies with the characteristics mentioned in the peer review form presented in paragraph 3.2.3.3.1.

3.2.3.1.4 Deliverable actions – 20 days before the deadline – 90% of deliverable achievement

20 days before the deadline is the **end of the peer and quality reviews**.

The QM should upload his/her review in the SharePoint, and ensure that each peer reviewer has also uploaded their review on the SharePoint with the peer review form. All parties (QM, DL, WPL) should be informed that the review is available.

The DL should fill-in the deliverable Control Sheet table with peer-reviewers' names and organisations and manage the integration of peer reviewers' outputs by contributors.

3.2.3.1.5 Deliverable actions – 10 days before the deadline – 95% of deliverable achievement

10 days before the deadline is the **end of the integration of peer reviewers' outputs**.

The DL should upload the deliverable in MS Word format in the SharePoint, along with a commented version of the deliverable to justify the rejection of important modifications asked by reviewers or the QM (if applicable). He should also **final check** the deliverable for content and quality by checking that the deliverable meets its goal, is as short as possible, focuses on technical results and learning, and ensure that the deliverable complies with the characteristics described in paragraph 3.2.3.3, including the peer review form criteria (3.2.3.3.1).

The WPL also proceeds with a final check of the deliverable by managing last-minute changes with the assistance of the QM and the DL and checking that the deliverable has the appropriate scope and managing consistency between deliverables.

Finally, the QM proceeds with a final quality check of the deliverable for quality and contacts the DL or the WPL for modifications; contact the PC in case of problem (in case noticing an upcoming delay the PC should be updated anyway).

3.2.3.1.6 Deliverable actions – 2 working days before the deadline – 100% of deliverable achievement

Two working days before the deadline, the **final check is over**. It is time for the QM to generate a pdf version and store it in the Final version folder on SharePoint together with the MS Word version, to send an email with the link to the containing folder in SharePoint to the PC team and copy the WPL and the DL.

The PC will submit the deliverable to the EC, via the EC portal.

3.2.3.2 Deliverable lifecycle in case of resubmission

3.2.3.2.1 6 weeks before deliverable resubmission

The DL and WP should **manage integration of EC comments** and involve contributors.

3.2.3.2.2 2 weeks before deliverable resubmission

It has to be decided between the DL and the QM if an additional review is needed or not for the resubmission. An additional peer-review would be necessary in case of deliverable rejected, but not necessary in case of request for revision. There will be a quality review in any case.

Then the QM should perform a quality review.

Option: it might be necessary, and it is advisable, to plan a meeting with the PO if this is encouraged for a specific deliverable. In that case, the DL and WPL should manage the integration of PO inputs and involve contributors.

After that, the QM will perform a last quality check, generate a pdf version of the deliverable, store it on SharePoint and send the link to the containing folder to the PC team for upload.

3.2.3.2.3 Resubmission time

Finally, the PC will submit the deliverable to the EC via the EC portal.

3.2.3.3 Quality criteria for deliverables

The different quality criteria to be reached for each of the deliverables of the project are presented below, in Table 5.

Table 5: Deliverables quality criteria

°	Quality criteria	Details
1	Overall quality	<p>Please ensure content quality:</p> <ul style="list-style-type: none"> • Consistency with project scope. • Consistency with the expected impact of the task with which the deliverable is associated. • Assurance that all results and learnings of all associated partners are in the deliverable. • Coherent structure. • No redundancies with other deliverables. • Fluff review to have “no fluff, just stuff”: avoid writing lengthy deliverables without a substantial contribution to the project.
2	Quality of text	<ul style="list-style-type: none"> • Proofread and check language. • Avoid copy/paste and plagiarism. • Use dynamic cross-referencing of section numbers.
3	Apply MS words template	<p>Please use the deliverable template available on SharePoint and pay a particular attention to the following points:</p> <ul style="list-style-type: none"> • Cover page, • Numbering, • Header and footer, • Bullet points style, • Executive summary without bullet points, • Tables format, captions, clarity, • Figures caption, figures readability, • Title styles.

4	Naming convention and version numbering	<p><u>Deliverables should be named using the following structure: “IN2CCAM DN.N – Name vX.Y.docx”.</u></p> <p>Version numbering: The (first) version submitted to EC by the PC is V1.0. When a deliverable has been rejected and resubmitted, the subsequent submitted versions should be numbered as V2.0; V3.0, etc. The “y” in Vx.y may be used internally only to number draft versions.</p> <p>A version should be Vx.0 only when it is submitted to the EC, before that the number should be V(x-1).y. It is changed to Vx.0 by the QM when the document is ready to be submitted and the pdf is generated. For instance, if the deliverable is submitted for the first time, it will be V0.y before it is finalised, and V1.0 when it is ready to be submitted.</p> <p>The name of the deliverable in the file title, and in the deliverable title (first page of deliverable) should be the exact name of deliverable and not any other one.</p>
5	Cover page with cartridge	<p>On the cover page, please fill-in the cartridge.</p> <p>Dissemination level mentioned in the cartridge is to be filled. All deliverables of IN2CCAM are Public (PU). No one is marked as Confidential (CO).</p>
6	Authors and Control Sheet	<p>Peer reviewer names and their respective organisations should be filled in by the Deliverable Leader.</p> <p>Mention what organisation/partner contributed to which sections. E.g “Partner AAA: 3.4, 7.1, 7.5 to 7.8.”. The DL is in charge of verifying that each section has at least one contributor.</p>
7	List of contents, list of figures, list of tables	<p>Please update the table of content, the list of figures and the list of tables (if not empty) before submitting the deliverable. Please check numberings. Please make sure that figures and tables are easy to read and not too small and have appropriate titles: captions should be inserted using the automatic numbering in Microsoft Word.</p>
8	List of abbreviations	<p>Please make sure that all abbreviations used in the deliverable are listed.</p>
9	Executive summary	<p>The executive summary sums up the entire document (unlike an introduction). It has <u>no bullet points</u>.</p>
10	Introduction	<p>The deliverable introduction includes:</p>

		<ul style="list-style-type: none"> • An introduction to the project. • Purpose of the deliverable. • Intended audience.
11	Conclusion, References, Annexes	The conclusion is mandatory. References and Annexes sections may be removed if empty.

3.2.3.3.1 Deliverable – Peer review forms

The peer review form gives a general appreciation of the deliverable and points out the points to be improved. The empty review form is available on the SharePoint. It addresses the points listed below in Table 6. Reviewers have to rate each point according to the following scale: Definitely, Satisfactorily, Somewhat, Not at all, Not applicable, I do not know / not my expertise; and can add comments. Authors may answer each point.

Table 6: Peer-review form criteria

Peer review form criteria	Description
Missing parts and essence of the deliverable	<ul style="list-style-type: none"> • Are there missing chapters / subjects? • Other changes to the deliverable essence and content
Relevance	<ul style="list-style-type: none"> • Are the deliverable objectives clear and in line with the task activities described in the Description of Action? • Does the deliverable content respond to deliverable objectives?
Conflicts	<ul style="list-style-type: none"> • Are issues at project level properly treated (e.g. conflicts with other WPs and tasks)? <p>NB: conflict resolution is part of the GA and of the Consortium Agreement.</p>
Soundness of methodology and technical approaches	<ul style="list-style-type: none"> • Are the results based on a clear methodology, involving user testing, expert opinions, etc.? If not, why do they seem arbitrary? • Are the technical approaches used appropriate?
Quality of achievements	<ul style="list-style-type: none"> • Are the raised issues relevant? • Are the achievements clearly stated? • Are the achievements sufficiently justified and explained? Is there a link between the methodology and the achievements? • Are the conclusions (if any) valid? • Does the content of the deliverable contribute to the state of the art?
Clarity	<ul style="list-style-type: none"> • Is the content of the deliverable well organised? • Is the language of good quality?

**Deliverable template:
layout, spelling,
formatting**

- Does the deliverable follow the deliverable template format?
Please carefully check qualities mentioned in Table 5

A quality review form is also made available for the Quality Manager to give a general appreciation of the deliverable. The empty quality review form is available on the [SharePoint](#).

3.2.4 Internal tools

3.2.4.1 Organisation contact details

Each of the partners must make sure that their organisation details are up to date. Particularly, the partners must ensure the administrative data on the EC Participant Portal as well as at the project level are accurate.

The PC should be informed of any internal organisation changes. Any change at WP level should be known. It is an important information to know at the deliverable level too, since it may impact the result of the deliverable: each partner should make sure that the new contact point is aware of his/her responsibilities and tasks within the project, in case of any change of contact point during the project. It is WP leader responsibility to make sure new task leaders or new deliverable leaders are aware of their responsibilities. It is the Project coordinator's responsibility to make sure new WP leaders are aware of their responsibilities.

3.2.4.2 Meetings and meeting minutes

The different kinds of meetings will be presented in D1.1, meetings minutes will be stored in the SharePoint of the project.

A chairperson will be responsible for leading the meeting and will produce the meeting minutes. The participants will have 2 weeks to provide feedback on the minutes. In case of no feedback, it will be considered accepted.

3.2.4.3 Quality assurance tools

The following quality assurance tools will be used during the project.

Table 7: Quality assurance tools

Quality assurance tool	Description
Peer review form	As presented in section 3.2.3.3.1
Templates for deliverables and presentations	Deliverable (Microsoft Word) and presentation templates (Microsoft Powerpoint) can be found on the SharePoint.
Microsoft SharePoint	<p>The project SharePoint is used as a storage platform for project documents and include a versioning system for deliverables. All draft and submitted deliverables should be saved on SharePoint, as well as Quality management files.</p> <p>Concerning deliverables, a folder is dedicated to deliverables in progress, and a separate one for submitted deliverables.</p>
Deliverable register	<p>The QM maintains a deliverable register³ presenting the deliverables' status and allocated reviewers. It also includes the milestones' status and their completion.</p> <p>The deliverable register has been initially defined using the list of deliverables and milestones described in Annex I of the Grant Agreement and evolves throughout the project according to amendments, technical reviews, revision needs.</p>

3.3 Quality control activities

3.3.1 Deliverable life cycle progress in percentage

The following table presents the main kinds of percentage of progress to show the status of deliverables. It is used in the deliverable register stored in the SharePoint. The DL is regularly asked by the QM about the status of his current deliverable(s) that is presented during the monthly TMT meetings. Note that the percentage can for instance be between 40% and 80%.

³ Access to the register is restricted

Table 8: Deliverable life cycle progress (percentage)

Percentage	State description
10%	Write Table of Content and share work between authors.
40%	At least 50% of the sections of the ToC are completed.
80%	All content of the deliverable is completed and the deliverable is available for peer review.
90%	Deliverable peer-review is done.
100%	The deliverable is submitted to the EC by the PC.

3.3.2 Peer review

Peer reviewers have already been mentioned in the previous section, such as the presentation of the peer review form criteria (see 3.2.3.3.1), and presentation of the deliverable life cycle (see 3.2.3.1)

This section will focus on presenting how to select the peer reviewers, will present an example of email to be sent to launch the peer-review process as well as the outputs documents of a peer-review.

All deliverables should be peer reviewed by at least two experts within the consortium. The deliverable register on SharePoint shows reviewers' assignments.

3.3.2.1 Selecting peer reviewers

At the beginning of the project, the Quality Manager, with agreement from the PC and WP leaders, selected 2 reviewers for each deliverable. A third reviewer may be appointed. Peer reviewers are two experts on the subject developed in the deliverable to be reviewed. Each peer reviewer:

- Works for an organisation within the consortium and this organisation is not a major author of the deliverable to be reviewed.
- Has not personally contributed to the creation of the deliverable to be reviewed.
- Is technically able to evaluate the content of the document.
- Ideally will use the Deliverable in a follow-up task.
- Is able to evaluate whether the deliverable is aligned with the scope and objectives of the 5G-Mobix project.

Table 9: Peer reviewers partners selected for each deliverable

Ref.	Deliverable Name	Reviewer 1	Reviewer 2
1.1a	Project management plan	OKAN	TTS
1.1b	Project management plan	ESYCSA	TTS
1.2	Quality management plan	ERTICO	POLIBA
1.3	Innovation management plan	ETRIK	ICCS
1.4a	Data management plan	ICCS	VICOM
1.4b	Data management plan	ICCS	GLS
1.5	Project management plan	ETRIK	TTS
1.6	Ethics and privacy compliance addresses	ETRIK	GLS
2.1	Existing mobility needs, road infrastructure and governance models	UBI	VTT
2.2	Study questions and KPIs of CCAM ecosystem	LIST	GLS
2.3	Use cases definition	ACASA	CEA
3.1	CCAM services architecture description	TAMP	ERTICO
3.2	Optimization of multimodal mobility services and goods management and delivery systems	5T	QUAD
3.3	Mobility network load balancing solutions	TAMP	ETRIK
3.4	CCAM advanced simulation models and digital twin designs	BARI	ESYCSA
4.1	Demonstrations' set up verification activities	ACASA	ERTICO
4.2	Report on demonstrations activities	OKAN	QUAD
4.3	IN2CCAM data repository and system refinement	OKAN	LIST
5.1	Impact assessment methodology	5T	ESYCSA
5.2	Data and impact assessment for user and social attitudes	AKKA	LINKS
5.3	Scalability study – Simulation and digital twin approaches	BARI	VTT
5.4	Impacts on mobility and traffic efficiency from the usage of CCAM vehicles	AKKA	TTS
6.1	IN2CCAM public engagement strategy	ESYCSA	LIST
6.2	Governance models and regulatory and policy recommendations for future – proof deployment of IN2CCAM innovations	ICCS	OKAN
6.3	Business and operating models	POLIBA	VICOM
6.4	Regulatory and policy recommendations to Local Authorities	LINKS	UBI
7.1	Dissemination and Communication plan	CEA	VIGO
7.2	Dissemination and Communication report	VIGO	CEA
7.3	Liaison plan	POLIBA	GLS
7.4	Exploitation plans	POLIBA	LINKS

3.3.2.2 Template email to launch a peer review

The QM or the DL invites peer-reviews via an email. Below can be seen an example:

“Dear Partners,

We would like to kindly remind you that you are identified as peer-reviewer for <DELIVERABLE NUMBER AND NAME> which is due for submission on <DATE>.

According to Quality Management procedures, we aim at the following timeline:

[DATE (deadline – 1 month)] Upload DX.Y for peer-review in *this folder*. Each review should be uploaded *here* and is composed of two documents:

The deliverable MS Word document, with comments and suggestions made with the "track changes" mode,

The completed review form that can be found attached.

[DATE (deadline – 20 days) EoB] Deadline for peer review. In parallel Quality review will be processed by the Quality Management Team

[DATE (deadline – 10 days) EoB] Send the final version to the Deliverable Leader and to the Quality Manager.

[DATE (deadline – 2 working days)] After a final quality check, the Quality Manager generates the pdf version to be submitted.

[DATE] Deadline for submitting the deliverable to the EC.

Please confirm us the person identified for peer-review <NAME OF PEER REVIEWER] or identify another one.

Many thanks in advance.

Best regards,

Xxx”

3.3.2.3 Peer review output documents

Each reviewer should provide two documents when the review is finalised, and save them on the SharePoint:

- The **deliverable document** (in MS Word format), with peer reviewers' comments and suggested modifications made in **"track changes" mode**.
- The completed peer review form, available on the SharePoint.

3.3.3 Milestones monitoring

Milestones have been defined to ensure that the project progresses and is on schedule. These milestones are monitored using the deliverable register file on the [SharePoint](#) (second tab) and are checked each bi-weekly TMT by project managers and the PC to ensure their successful completion. Note that Milestone 1.1 completed successfully in Month 01 of the IN2CCAM project by the Kick-Off meeting that took place on the 8th and 9th of November 2022 in Bari, Italy. Also, during the Kick-Off meeting, the Communication Manager asked to advance M7.1 due date from M08 to M06.

Table 10: Milestones monitoring

N°	Milestone	WP	Due date	Means of verification
1.1	Kick-off and introduction of partners	1	01 (DONE)	Kick-off meeting is held and all partners had detail introduction and technical work aims explained.
1.2	Project Successfully Completed – final report	1	36	All activities are to finish and all activity reports are being written for final consolidation and review by the EC.
2.1	Use cases completed and validated by the stakeholders groups per pilot site	2	08	Use cases released and validated for each pilot site.
3.1	Complete architecture and specifications for all pilot sites delivered	3	13	Architecture and specifications released and validated.

3.2	A prototype of all systems, services and simulation tools for demonstration	3	15	Software released and validated in each pilot site.
4.1	Verification activities	4	22	Pilot site integration and deployment verified and ready for demonstration.
5.1	Data collection report ready	5	22	The data necessary for starting demonstration are collected.
5.2	Digital Twin evaluation framework ready	5	27	The model for the DT are determined.
6.1	Initial business and operating models	6	27	Initial business models are finalised
7.1	Communication tools deployed	7	08	Website & roll-out ready
7.2	Exploitation plan finalised	7	18	Exploitation plan finalised
7.3	Dissemination, Communication and Final exploitation, Final Event	7	36	Dissemination plan finalised

3.3.4 Deliverable status measurements

The deliverables status measurements will be updated each 6 months, starting at month 6. It will present:

- The general current status of deliverables,
- The current status of deliverables per WP,
- The deliverable status progress per 6 months, including technical and periodic reviews.

4 RISK MANAGEMENT PLAN

According to PMI, a risk is defined as an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objective.

In IN2CCAM, the risks will be managed following the cycle as presented in **Errore. L'origine riferimento non è stata trovata.**

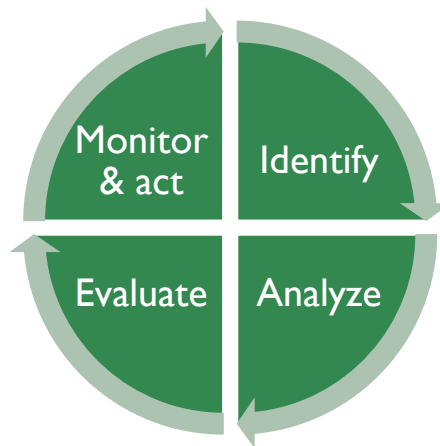


Figure 2: IN2CCAM risk management steps

4.1 Risk management steps

4.1.1 Identify risks

The first step corresponds to the identification of the risks of the project, related to one or several WP(s). Once a new risk is identified, the risk manager must be informed so they can add the risk to the risk register, or the person identifying the risk can directly add the risk to the risk register but must inform the risk manager.

Identification of risks can be done during dedicated risk sessions, every six months, or continuously. The risks will be stored in a risk register that is stored in the SharePoint of the project.

4.1.2 Analyse risks

The analysis of risks is performed during dedicated risk sessions (every 6 months), or during the TMT monthly meeting where the **top 10 risks** can be analysed. It is in this step that risks can be closed when they are not relevant anymore.

A Risk Owner (and only one per risk) should be identified for each risk. It will be the person that can answer on the status of a particular risk.

4.1.3 Evaluate risks

The risks are evaluated according to two characteristics: their Severity (Low, Medium, High), and their Likelihood (Low, Medium, High). With both severity and likelihood, we can identify the Grade of a risk, as presented in Table 11: Risks grade below.

Table 11: Risks grade

Grade		Severity		
		Low	Medium	High
Likelihood	Low	E	D	C
	Medium	D	C	B
	High	C	B	A

Actions relative to the grades are defined in the next chapter.

4.1.4 Monitor & act

The risks top 10 has to be verified more regularly, and particularly risks with a grade from A to C, as indicated below:

- With a grade of A, mitigation actions should be identified and implemented immediately and with priority to reduce the likelihood and the severity. For this kind of risk, one of the following approached will be selected to address it:
 - Avoid – Eliminate the threat by eliminating the cause
 - Mitigate – Identify ways to reduce the likelihood or the severity of the risk
 - Accept – Nothing will be done
 - Transfer – Make another party responsible for the risk (buy insurance, outsourcing, etc.)

- With a grade of B, mitigation actions should be identified and implemented as soon as possible to reduce the likelihood and severity.
- With a grade of C, mitigation actions should be identified and evaluated (e.g. costing) for possible actions if resources permit to reduce the likelihood and severity.
- With a grade of D and E, the risk is to be noted, no action is needed unless grading increases over time.

4.2 Critical risks

The critical risks identified at the beginning of the project can be seen in Table 12.

Table 12: Critical risks

ID	Description of risk (indicate level of (i) likelihood, and (ii) severity:	Likelihood (Low / Medium / High)	Severity (Low / Medium / High)	WP involved	Grade	Proposed risk-mitigation measures
1	Withdrawal of a key partner from the consortium.	Low	Medium	WP1	D	Assign tasks to other partners or find replacement by a new partner; start amendment process.
2	Timing issues related to key inputs from previous WPs coming too late.	Medium	Medium	WP1	C	Close interaction / between WPs and related milestones, Inform Coordinator, Start Amendment.
3	Designed solution turns out to be too expensive.	Medium	Medium	WP1	C	Identify the more important exploitable results; in case yes proceed with cost down research Amendment.
4	Poor knowledge and organisation of existing infrastructures, tools, services and governance models in the LLs.	Medium	Medium	WP2	C	Regular meetings and discussions with the regional and other involved stakeholders. Meetings will be organised in particular with the responsible authorities in order to verify the available infrastructures, vehicles, tools, services and strategies.
5	Integration of the proposed CCAM architecture with existing Traffic Management Systems could be difficult	Medium	Medium	WP3	C	Continuous discussion between the project partners and the TMC owners in each pilot site

6	Integration of the CCAM infrastructure and data on one side and the autonomous vehicle on the other can cause technical issues	Medium	Medium	WP3	C	Continuous discussion between infrastructure providers and autonomous vehicle providers will be organised in each site
7	Interoperability of the defined CCAM solutions between pilot sites can be difficult	Medium	Medium	WP3	C	Continuous discussions between each pilot site technical teams will be organised
8	Problems with data collection from the pilot sites.	Low	Medium	WP4/ WP5	D	This should not happen since pilot site leaders will grant access to all the needed data. In case of an issue, emulation will be used alternatively.
9	The integration of activities takes more time than expected on the pilot sites.	Low	Medium	WP4/ WP5	D	The start date of WP4 is quite early in the project to avoid that risk and establish proper countermeasures. In addition, preparatory work on the pilot sites will start before.
10	Low level of response in participatory processes and local surveys.	Low	Medium	WP5/ WP6	D	Local authorities and cities will be involved to further involve stakeholders and citizens; Incentives will be found in the worst-case scenario.
11	The global risk of a pandemic is not predictable and can have different impact on involved parties.	Medium	Medium	WP7	C	Instead of scheduled live meetings and project presentations, opportunities will be sought to do so online virtually, using a wider range of social media channels, using a variety of tools and methods such as videos, possibly live broadcasts, virtual workshop series and other.

5 CONCLUSION

The quality management plan (D1.2) presents the different procedures, measures and practices relative to quality and to risk management that will enable to ensure a high quality for IN2CCAM results and that we have adequately addressed.

It will act as a guideline for the different Work Packages and Tasks of the project concerning the monitoring of technical and management tasks, and complements information provided in the Project Management plan – D1.1.