

D1.2: Quality Assurance Plan

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Dissemination Level		
PU	Public, fully open, e.g. web (Deliverables flagged as public will be automatically published in CORDIS project’s page)	✓
SEN	Sensitive, limited under the conditions of the Grant Agreement	
Classified R-UE/ EU-R	EU RESTRICTED under the Commission Decision No2015/ 444	
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* R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc.

DMP: Data management plan

ETHICS: Deliverables related to ethics issues.

SECURITY: Deliverables related to security issues

OTHER: Software, technical diagram, algorithms, models, etc.

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EXECUTIVE SUMMARY

The "Quality Assurance Plan" for the QPIC 1550 project serves as a comprehensive guide and central repository, outlining the standards of quality governance throughout the project's lifecycle. This document is crucial as it delineates the organisational framework of the project, assigning specific roles and responsibilities. A significant focus of the manual is on the quality control and Quality Assurance (QA) activities that will be systematically implemented to maintain and enhance project standards.

In terms of project management, the manual details the various operational aspects, explaining how the project will conduct its daily activities with a quality-centric approach. It ensures that all processes and procedures are not only well-defined but also subject to ongoing scrutiny and refinement, enhancing the project's overall efficacy and responsiveness.

Moreover, the manual establishes the essential mechanisms and structures needed for effective management and administrative coordination of the project. It emphasises governance aspects, integrating change management strategies and a communication plan that supports clear and efficient interactions among all project partners. Additionally, it outlines the project's phases, key milestones, and the specific reporting responsibilities assigned to each partner, ensuring that all stakeholders are aligned and accountable throughout the project's duration. This structure is intended to facilitate smooth execution and continuous improvement, aiming for the highest standards of quality in all project deliverables and outcomes.

ABBREVIATIONS

BTD	Before The Deadline
CP	Contributing Partners
CR	Change Request
CSA	Coordination and Support Action
DL	Deliverable Leader
DMP	Data Management Plan
DMS	Document Management Systems
DoA	Description of Actions
EAB	External Advisory Board
EC	European Commission
ECAS	EC Authentication Service
FM	Financial Manager
GA	General Assembly
GrA	Grant Agreement
KPI	Key Performance Indicator
MS	Milestones
Mx	Month (where x defines a project month, e.g. M10)
MoM	Minutes of Meeting
O	Other
P	Prototype
PC	Project Coordinator
PERT	Program Evaluation and Review Technique
PM	Persons Month
PMCT	Project Management and Coordination Team
PO	Project Officer
PPR	Project Periodic Report
PU	Public
QA	Quality Assurance

R&D&I	Research & Innovation & Development
SME	Small and Medium Enterprises
TL	Task Leader
ToC	Table of Content
WP	Work Package
WPL	Work Package Leader
WPS	Work Package Structure

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1 INTRODUCTION

1.1 DOCUMENT SCOPE

The purpose of the “Quality Assurance Plan” of the QPIC 1550 project is to provide a single point of reference on the quality that will be governed during the project. The deliverable at hand defines the project organisation, roles, and responsibilities with emphasis on the quality control and quality assurance activities that will be carried out. It describes how the project will execute its day-to-day activities from a quality perspective, and ensures that standards, processes, and procedures are defined so that their execution is continuously monitored and improved. This deliverable outlines all essential mechanisms and structures for managing and coordinating the project administratively, focusing on governance, change management, and the communication plan.

1.2 DOCUMENT STRUCTURE

This document is organised into several chapters, each designed to provide comprehensive insights into various aspects of the project. Below is a detailed overview of each chapter:

Chapter 1: Introduction

This chapter introduces the purpose, scope, and objectives of the document. It sets the stage for the detailed discussion that follows, outlining the importance of the document in the context of the overall project.

Chapter 2: Baseline Performance Metrics

Chapter 2 establishes the baseline metrics for the project’s performance in terms of schedule adherence, resource allocation, cost management, and quality standards. This benchmarking will help in monitoring the project's ongoing performance against its initial estimates and standards.

Chapter 3: Change Management

This chapter outlines the procedures for managing changes to the project plans and baselines. It describes the mechanisms in place for identifying, evaluating, and implementing changes in a controlled manner, ensuring that all modifications are beneficial and do not adversely affect the project’s objectives.

Chapter 4: Cost and Effort Management

This chapter provides an overview of how the coordination team plans to manage and monitor costs and efforts. It explains the procedures that intertwine cost control and effort management, highlighting their interdependencies and the strategies for optimising both.

Chapter 5: Procurement

This chapter sets the procurement policy which establishes guidelines and procedures for acquiring goods and services, ensuring transparency and efficiency in project procurement processes.

Chapter 6: Scope Management

In Chapter 6, the focus is on managing the project scope. It describes the process for defining and controlling what is included and excluded from the project, ensuring that the project remains on track and within the defined boundaries.

Chapter 7: Schedule Management

This chapter outlines the techniques and tools used to manage the project schedule. It discusses how the project timeline will be monitored and adjusted as necessary to meet the project deadlines and deliverables.

Chapter 8: Risk Management

This final chapter outlines the processes and techniques for the evaluation and control of potential project risks, focusing on their precautionary diagnosis and handling.

Each chapter builds on the information presented in the previous ones, creating a comprehensive guide for managing the project effectively from start to finish.

2 PROJECT BASELINE

INTRODUCTION

The project's baseline is used to measure how performance deviates from the plan, and it is defined as the original scope, cost, and schedule and must be completely documented before the project execution and control activities are initiated. Of course, the project performance measurement would only be meaningful if an accurate baseline is set. Once the project is initiated, the project's baseline is put under change control to enable the evaluation of any further change and/or impact on the project. If there is a change to the project baseline, the new baseline is redefined as the original plan plus the approved changes.

In addition, a Section is dedicated to the quality baseline that records the minimum project indicators, which are an important performance management tool for the project to help measure progress in achieving the associated goals and meeting the basic requirements.

2.1 SCHEDULE BASELINE

The **Overall Gantt chart** in Section 3.1.1 '**Gantt Chart**' within Part B of the Description of Actions (DoA), presents the schedule baseline of the project. This schedule serves as a pivotal tool for organisational efficiency, ensuring systematic progress, resource optimisation, and adherence to project milestones and deliverables. Moreover, the Schedule Baseline fosters accountability by assigning clear responsibilities and deadlines to each project component. It provides a structured approach to project oversight, enabling effective monitoring of progress and timely intervention in the event of deviations.

2.2 RESOURCE CALENDAR

The **resource calendar** indicates the overall envisaged effort resource consumption spent by all WPs in person-months per month for the whole project duration. This is derived by cumulating the individual planned effort resource spent by each partner at the beginning of the project according to the efforts declared within the .xlsx file used for project scheduling as explained in Section 7.2 "**Schedule Management**".

2.3 COST BASELINE

The **cost baseline** concerns the amount of money that the project is predicted to cost and when that money will be used throughout the project's lifespan. This is derived according to the:

Project Budget (as declared in table of Annex 2 of the GrA: 'Estimated budget for the action')

Effort Allocation (as declared in Table 10 (Summary of staff effort) in Annex 1, Part B, of the GrA)

Resource Calendar (described in previous Section 2.2)

In essence, the cost baseline converts efforts to personnel cost per month, including indirect, other costs and subcontracting expenses. QPIC 1550 being a lump sum project, the Granting Authority does not apply a reimbursement rate to the eligible costs but sums up the lump sum shares for the accepted work packages at the reporting period. A party will thus get reimbursed for its work package foreseen lump sum only provided all Parties collectively conducted their corresponding tasks.

Each Party should, therefore, strictly respect its obligation (see article 19.3 of the Grant Agreement) to immediately inform the coordinator about events or circumstances likely to impact compliance with requirements under the Grant Agreement, since improper implementation of project tasks by a Party may lead to lump sum contributions rejections and grant reductions affecting not only the Defaulting Party, but all Parties involved in the affected Work Package.

The Parties need to keep appropriate and sufficient evidence that the actions tasks were properly conducted as described in Annex 1.

Documents that could be provided are technical documents, publications, deliverables, and any other document proving that the work was done as detailed as in Annex 1 of the Grant agreement.

Each Party is responsible for justifying the proper implementation of the action tasks it is responsible for.

2.4 QUALITY BASELINE

Project indicators are an important performance management tool for projects to help measure progress in achieving their goals and meeting requirements, hence, it is important that the chosen success criteria are quantifiable and critical to the success of the project. These indicators are chosen to be direct (no complex calculations), objective, adequate, practical, and reliable. This section provides **performance indicators** for meeting the specific objectives of the project.

The project will be measured against its performance indicators at two stages:

Mid-Term with the first EC project report and reviews

Final Term with the second and last EC project report and review.

The results of performance measurement and evaluation (indicators and their values) will be part of the progress reporting to the EC.

The baseline **Key Performance Indicators (KPIs)** that have been identified for the QPIC 1550 project are detailed in the following table, in agreement with the KPIs included in Sections **1.1 and 2.2 of Part B of the DoA**. It is mentioned that for some KPIs the targeted values are set either on at yearly or project basis (or both).

Figure 1: KPIS PER PROJECT OBJECTIVES

No.	Type	Name	measurement
KPI1	Outreach ▼	Website (Main online information hub, communication of project results, news, events. Generated awareness on project)	Number of website
KPI2			Number of total page views
KPI3			Average session duration
KPI4			Countries reached
KPI5	Outreach ▼	Promotional Materials (Facilitate reach to broader audiences)	Number of brochures and flyers produced
KPI6	Outreach ▼	Social media (Increasing visibility to stakeholders active in social media, raising awareness and redirecting to website)	Number of followers
KPI7			Number of followers
KPI8			Number of posts
KPI9	Outreach ▼	Press release (Communication of project news, events and results)	Number of journalists contacted
KPI10			Number of press
KPI11	Outreach ▼	Newsletters and Mailing List (Communication of main project news, events and results in and understandable manner to the project's subscribers)	Number of subscribers
KPI12			Number of newsletters sent
KPI13	Outreach ▼	Promotional videos (Communication of the project's activities and USP in a captivating and engaging manner)	Number of videos
KPI14			Number of views
KPI15	Outreach ▼	Scientific Publications and White Papers (Scientific validation of project's approach and findings, sharing of knowledge)	Number of papers published
KPI16	Outreach ▼	Participation at External Events (Validation of project's approach and finding, dissemination of the project and its activities)	Number of events attended to disseminate the project
KPI17	Outreach ▼	Final event (Final demonstration and exhibition of the project findings to a large audience)	Number of participants
KPI18	Outreach ▼	Liaison with Related Projects (Establish synergies, information exchange and cooperation)	Number of projects liaised with

Figure 2: COMMUNICATION AND DISSEMINATION KPIS

Objective 1 (O1) – InAs/InP QD single photon and entangled photon pair sources operating at 1550 nm	Responsible partner	status
Deterministic fabrication, nearly on-demand cavity-coupled-InAs/InP QD light sources operating at 1550 nm featuring >200 MHz emission frequency, near-unity photon indistinguishability, and >90% degree of photon pairs entanglement.	DTU	pending
Objective 2 (O2) – InGaAs/InP SPAD detectors integrated with waveguides operating at 1550 nm	Responsible partner	status
InGaAs/InP SPADs to be hybridly integrated with waveguides: photon detection efficiency > 20%, dark count rate < 10 kcounts/s.	POLIMI	pending
InGaAs/InP SPADs to be heterogeneously integrated with waveguides: photon detection efficiency > 40%, dark count rate < 100 kcounts/s	POLIMI	pending
Objective 3 (O3) – InP-SiN heterogeneously integrated QPIC platform operating at 1550 nm	Responsible partner	status
Efficiency of platform interfaces: fiber-to-chip coupling, SiN-to-InP coupling, including insertion loss of fast SiN-InP modulators, QD-to-waveguide, and waveguide-to-APD/SPAD.	TU/e	pending
Performance of ‘classical’ passives and actives in the integrated platform: waveguides’ propagation loss, InP SOA gain, InP modulator bandwidth. Manufacturing and integration yields for each set of technological building blocks.	TU/e	pending
Objective 4 (O4) – Demonstration of multi-node QPICs in Quantum Key Distribution Experiments at 1550 nm	Responsible partner	status
Key rate and QBER of the system.	QTI	pending
Objective 5 (O5) – Demonstration of a network of QPICs in Remote Quantum Computing Experiments at 1550 nm	Responsible partner	status
Low-loss, reproducible, low-crosstalk, low-consumption, high-connectivity receivers for Remote Quantum Computing applications.	DTU	pending
Improved on-chip photon sampling rates due to the combined action of low-loss SiN circuitry and the deterministic nature of QD sources (>100Hz for 4-fold coincidences, >1Hz for 6-fold coincidences).	DTU	pending
Scalable, standardised, low-cost, packaging of the receiver processors in a low-loss, user friendly fashion targeting real-world networks (<3dB IL per fibre-chip optical interface, up to 16 optical channels).	UCC	pending
Process fidelities of multi-qubit controlled operations across qubits that are not physically located on the same quantum computing node (e.g. a CNOT gate of >80% fidelity).	DTU	pending
Process fidelities of testbed algorithms where we evaluate the advantages by operating in a network of quantum computing nodes.	DTU	pending
Objective 6 (O6) – Demonstration of the multi-node QPICs in Quantum Clock Synchronisation Experiments at 1550 nm	Responsible partner	status
QCS with femtosecond-scale synchronisation precision has never been demonstrated before with QPICs at 1550 nm, demonstration of QCS among three nodes with the use of a central node consisting of multiple entangled photon pair sources.	UWA	pending
The latter scenario will be applied in the same experimental setup investigating distributed quantum computing, thus clock synchronisation and distributed computing using quantum technology will be showcased for the first time in the context of QPIC1550.	UWA	pending

3 CHANGE MANAGEMENT PLAN

INTRODUCTION

The **Change Management Plan** sets expectations on how the approach to changes will be managed, what defines a change, the purpose and role of the **Project Management and Coordination Team (PMCT)**, and the overall change control process. All consortium members are expected to submit or request changes to the QPIC 1550 project following this **Change Management Plan** and all requests and submissions will follow the process detailed herein.

3.1 CHANGE MANAGEMENT APPROACH

The **Change Management approach** is not to be confused with the **Change Control Process** which is detailed in Section 3.5. The approach provides the general principles to which the process must adhere. The Change Management approach introduces the following rules:

Ensure changes are within scope and beneficial to the project

Ensure that all proposed changes are described adequately, reviewed, and agreed upon, so they can be properly implemented and communicated to all consortium members

Determine adequately how the change will be implemented

Manage the change and its impacts as it is implemented.

The **Change Control Process** has been designed to make sure this **approach** is followed for all changes. By using this approach methodology, the QPIC 1550 project will prevent unnecessary changes from occurring and focus its resources only on beneficial changes within the project scope.

3.2 DEFINITION OF CHANGE

Several types of change may be requested and considered for the QPIC 1550 project. Depending on the extent and type of proposed changes, changes to the project documentation (i.e. project contract, internal or external deliverables, reports, and other documentation) may be required. Additionally, the communication of these changes may need to include any approved changes in project plan and ensure all consortium partners are notified. Types of changes include:

Scheduling Changes: changes that will impact the approved project schedule, i.e. schedule baseline. These changes may require fast-tracking or re-baselining the schedule depending on the significance of the impact.

Budget Changes: changes that will impact the approved project budget. These changes may require a reallocation of the budget or may require changes to the cost baseline and a

contract amendment. Under any circumstances, no additional overall project funding will be approved.

Effort Changes: changes that will impact the effort allocated to specific tasks. Depending on the size of these changes, they may require a contract amendment. For minor changes to the planned effort allocation partners with the involvement of WPLs can address these issues between them while keeping the PMCT informed.

Scope Changes: changes that are necessary and impact the project scope which may be the result of unforeseen requirements. These changes will be reported and documented in project reports.

Quality Changes: changes that will impact the quality of project deliverables. Depending on the extent of the impact on quality, these changes may require the modification of impact indicators and the contract with the EC. These changes may be reported and documented in project deliverables and reports.

All changes must be communicated to the PMCT and examined for their impact on scope, budget/effort, schedule, and quality.

The PC must ensure that any approved changes are communicated to the consortium partners. Additionally, as changes are approved, the PC must ensure that the changes are captured in the project documentation where necessary and is ultimately responsible for these changes. These document updates must then be communicated to the consortium partners as well.

3.3 CHANGE PROCESS

The PMCT is the approval body for all Change Requests (CRs) pertaining to QPIC 1550. For major changes affecting the contract and/or having overreaching impact on the project, the PMCT will put the changes for approval to the EC -through the PC- and/or consortium. The PMCT reviews all CRs, determines their impacts on the project risk, scope, cost, and schedule, and filters CRs.

As **Change Requests (CR)** are submitted to the TLs and WPLs by the project team members, they rate them and forward them to the PMCT. The PMCT logs the requests in a change log. All CRs will be reviewed during the PMCT meetings. For a CR to be approved, all PMCT members must vote in favour. For changes impacting the contract, the PMCT will consult the EC and initiate a contract amendment. In the event more information is needed for a particular CR, the request will be deferred and sent back to the requestor for more information or clarification. If a change is deemed critical, an ad hoc PMCT meeting can be called in order to review the change prior to the next scheduled PMCT meeting.

3.4 ROLES AND RESPONSIBILITIES

The following are the roles and responsibilities for all change management efforts related to the QPIC 1550 project:

Table 1: TABLE OF CHANGE ROLES AND RESPONSIBILITIES

Entity	Responsible / Participants	Responsibilities
Project Coordinator (PC)	- Logs received or generated CRs from consortium members - Conducts preliminary cost, schedule, and scope analysis of change prior to PMCT meetings - Seeks clarification from CRors on any open issues or concerns - Makes documentation revisions/edits as necessary for all approved changes - Participates in PMCT meeting - Maintains the Change Log - Plans, controls, and monitors the implementation of approved CRs	Authority
Project Management Office (PMO)	- Conducts preliminary risk and quality analysis if change prior to PMCT meeting - Seeks clarification from CRors on any open issues or concerns - Makes documentation revisions/edits as necessary for all approved changes - Participates in PMCT meeting - Plans the implementation of approved CRs	
Work Package Leader (WPL), Task Leader (TL)	- Receives and/or generates, filters all CRs from consortium members and informs the PC - Conducts preliminary cost, schedule, and scope analysis of change prior to PMCT meeting - Seeks clarification from CRors on any open issues or concerns - Makes documentation revisions/edits as necessary for all approved changes - Participates in PMCT meeting	Assign priority (i.e. emergency or not) and level of impact (i.e. high, medium, low) on each CR

	Plans the implementation of approved CRs	
Partners	- Submit all CRs through the project hierarchy - Provide all applicable information and detail - Be prepared to address questions regarding any submitted CRs - Provide feedback as necessary on impact of proposed changes - Implements and tests approved Changes	
Project Coordination Team (PMCT)	- Reviews and prioritises all the CRs - Accepts or Rejects Changes presented by the PMCT	Approves/Rejects Changes provided the PC

3.5 CHANGE CONTROL PROCESS

The PMCT has overall responsibility for executing the change management process for each CR. The Change Control Process for the QPIC 1550 Project will follow the steps below.

Table 2: CHANGE CONTROL PROCESS

#	Steps	Who	To whom	When
1	Identify the need for a change – CRer will submit a CR via e-mail up the project hierarchy. The e-mail should contain at minimum the following information: - Description of the cause of the request - Description of the suggested solution - Impacts on schedule, budget, effort, scope, risk, and quality	Consortium partner	WPL, TL, PMO	Immediately
2	Conducts a preliminary analysis on the impact of the change to risk, cost, schedule, quality, risk, and scope and seeks clarification from team	PMO, WPL, TL	PMCT	Immediately

	members and the CRor. The assigned team members (PMO, WPL, TL) will determine its priority (i.e. Emergency or Standard) and impact (i.e. Critical, Significant, Standard) and forward to the CO along with a decision to continue to discuss the request or not.			
3	Logs the CR and decides to forward to the PTC immediately or wait until next PTC meeting.	PMCT	PMCT	Immediately
4	The PTC members will conduct a full analysis of the impact of the change to risk, cost, schedule, quality, risk, and scope and seek clarification from project partners and the CRor.	PMCT	PMCT	As needed
5	The PTC will discuss the proposed change at the next PTC meeting. It will decide whether or not to approve each CR based on the available information or put the issue for discussion with the Consortium. For changes, that require modification of the Technical Annex I DoA, the CA will be required.	PTC	-	During PTC Meeting
6	If a change is approved by the EC, the PC will update and re-baseline project documentation as necessary. S/he will inform all involved parties and monitor the implementation of the change.	PC	PTC, Consortium	As needed

3.6 CHANGE REQUEST EVALUATION CRITERIA

CRs are evaluated using the following **priority** and **impact** criteria:

Table 3: CR PRIORITY CRITERIA

Priority	Description
Emergency	The CR is time-critical and accelerated authorisation and planning are required.
Standard/Low	The CR can wait until the next scheduled project management meeting.

Table 4: CR IMPACT CRITERIA

Impact	Description
Critical	Presents an extraordinarily high risk that will impact the delivery of the project and/or may require a contract amendment.
Significant	It requires management decisions at the level of the PMCT and may have a broader impact on the project.
Standard / Low	It is presented to the management for informational reasons only. The matter is routine and can be resolved at the WP level.

4 EFFORT AND COST MANAGEMENT PLAN

INTRODUCTION

The **PC** with the support of the **PMO** is responsible for managing and reporting on the project's budget and effort consumption at the project level to the European Commission throughout the duration of the project. During the internal half-year effort consumption table, the PM collects and reviews the project's effort and cost performance for the project partners regarding the preceding period. Performance is measured by comparing actual consumption against planned. The PC is responsible for accounting for cost and effort deviations and presenting the consortium with options for getting the project back on budget.

4.1 EFFORT AND COST MANAGEMENT APPROACH

Effort and costs for this project will be managed at the Task level of the Work Package Structure (WPS). The financial performance of the project will be measured and managed through comparisons between the actual and planned costs and activity effort. Activity effort is detailed at the task level and costs at the WP level. To avoid confusion and complications due to conflicts between National and European Union reporting rules, all efforts are to be reported in Person Months. Euro amounts are to be reported in two decimals.

Effort and cost variances of +/- 10% in the cost and effort performance indexes will change the status of the cost to cautionary. Cost variances of +/- 20% in the cost and effort performance indexes will change the status of the cost to an alert stage. These will serve as input to Risk Assessment and may require corrective action by the PC to bring the cost and/or effort performance variations below the alert level. Corrective actions will require a project change request and must be approved by the PMCT before it can become within the scope of the project.

4.2 PLANNING AND REPORTING EFFORT AND COST CONSUMPTION

4.2.1 Planning Effort and Costs Consumption

Planning effort and cost consumption occur through the completion of the project schedule MS-Excel file referenced in Section 8 for the entire project at the beginning of the project. Additionally, apart from the personnel costs that are reported as envisaged costs that may be consumed under each Task in person hours, all partners should provide a list of planned other direct costs (i.e. travel and other specific costs) for the whole project duration per reporting period. Finally, all partners should report on their average personnel rate, if the one used in the Annex 1 of the DoA is no longer valid. This information is consumed by the PMCT to produce the Cost Baseline and Effort Schedule.

4.2.2 Reporting Effort and Budget Consumption

The following reports are established:

- Progress Reports every 6 months (internal reporting to PMCT on a WP basis)
- Mid-term (M12) Periodic Progress Reports (for external reporting to EC)
- Final (M24) Periodic Progress Reports (for external reporting to EC).

Table 5: REPORTING TIMELINE AND ASSIGNMENTS

#	Steps per period	Who	To Whom	When	Tools
1	WPLs will perform a consistency check between effort and activities taken place by partners in each task and if needed adaptation/rationalization of effort/activities reported may take place; otherwise, this information is transferred to the PMCT	WPL	PMO, PC	4 days after receipt of reports	e-mail
2	For every reporting period, WPLs should manage the collection of task reports from Task leaders. TLs (also in collaboration with the partners involved in each task) should provide a consolidated report and send this to the respective WPL. The reporting should follow the guidelines set by the European Commission for Horizon Europe Programme and the format of the QPIC 1550 Deliverable .docx template. These reports should also reference any deviations that occurred to the project time plan at the Task level along with their contingency planning.	Partner, TL	TL, WPL	TC by each WPL and not later than the end of each reporting period	Interim,final report
3	PMCT consolidates all information received and delivers a complete report to European Commission following the guidelines set by the European Commission within Horizon Europe Programme and the format of the QPIC 1550 Deliverable .docx template	PMCT	EC	60 days after the end of the reporting period (M12 and M24)	Interim,final report
4	Upload of Form C (and Certificate of Financial Statement where needed) to the European	Partners	EC	20 days after the end of the reporting	ECAS

	Commission Participant Portal (ECAS system)			period (M12 and M24)	
5	WPL provides a short WP progress report at each GA (physical or teleconference meeting)	WPL	PMO	2 calendar days before the meeting	Meeting agenda and minutes template

4.2.3 Guidelines for Unplanned Expenses

Annex 1 of the Grant Agreement details a **budget** for each partner and each task or activity in QPIC 1550. Any effort or cost allocation that deviates from this plan presents an unplanned expense. In general terms, unplanned expenses are not allowed. However, due to the realities of implementing a project, there is the possibility that reasonable and justifiable expenses contributing to the project and not contradicting the rules of the project may be eligible.

5 PROCUREMENT

During the project, partners may be required to acquire from third parties the following services:

- Auditing Services for partners exceeding the threshold funding value.
- Software or hardware equipment (e.g. laptops, license software for additional services, etc.). From the original proposal and QPIC 1550 DoA, we do not foresee such costs. However, the consortium should investigate this possibility, in case hosting services will be necessary.
- Organisation of online or offline meetings for training, dissemination, and project meetings.
- Production of dissemination material.
- Transportation and accommodation for travel.

The number of each item and budget allocation for each category is detailed in **Annex 1 of the DoA**.

The PC and PMO have oversight of the procurement for the project through the Financial Reports. The actual management for procurement activities falls with the budget holding partner and these activities are described analytically in the DoA (experts' procurement procedure, reputation management subcontractor). The partner assigned with a subcontracting budget is responsible for following the procedure agreed upon in the DoA and /or mentioned in the EC guidelines. The partners are required to strictly adhere to Annex 1 of the DoA and GrA guidelines for purchases. For deviations in purchases, partners must obtain approval before proceeding with procurement according to Section 7.2.3.

6 PROJECT SCOPE MANAGEMENT PLAN

INTRODUCTION

The **Scope Management Plan** provides the scope framework for this project. This section documents the scope management approach, verification, and control measures. Roles and responsibilities as they pertain to project scope, scope definition, scope change control, and the project's work breakdown structure have been discussed in earlier chapters. Any project communication that pertains to the project's scope should adhere to the Communication Management Plan.

6.1 SCOPE VERIFICATION

The project deliverables will need to be verified against the original scope as defined in **Annex 1 of the GrA (DoA)** in the '**Work package description**'. The verification against the scope occurs through the peer review and approval process described in Section 6.4.5 of this document. The EC review of the deliverables during the period review meeting is the final checkpoint of the acceptance of the deliverables.

6.2 SCOPE CONTROL

The Partners will work together to control the scope of the project. The project team will leverage Annex 1 of the DoA using it as a statement of work for each deliverable. The project team will ensure that they perform the work described in the Technical Annex of the DoA and generate the defined deliverables keeping as ultimate guide the project vision. When the WP does not seem to serve the project vision, partners will introduce change requests through the project structure. The PC along with the Management Team and the PMCT will oversee the project team and the progression of the project to ensure that this scope control process is followed.

If a change to the project scope is needed the change control process for recommending changes to the project must be carried out. Any partner can request changes to the project scope. All change requests must be submitted to the PC, WPL, or TL in the form of a change request e-mail and the process in Section 5.4 will be followed

INTRODUCTION

7.1 SCHEDULE MANAGEMENT APPROACH

A working version of the current schedule may be found in the following figure. The first column presents the WP and task structure of the project. In the first row, the project months of the projects are shown respectively. Within the area of the two-year duration, the colored cells indicate the months where each task is active and the Deliverables that are planned for each Task and project month.

WP	Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48						
1	T1.1	M01																																																					
	T1.2																																																						
	T1.3																																																						
	T1.4																																																						
2	T2.1																																																						
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3	T3.1																																																						
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4	T4.3																																																						
	T5.1																																																						
	T5.2																																																						
	T6.1																																																						
5	T6.2																																																						

In Annex 1 of the DoA, the project activities were identified and organised in WP which were broken into tasks. The outcomes of one or more tasks are reported in one deliverable. Task

sequencing was used to determine the order of tasks. Task duration estimates were performed to months required to complete tasks within the constraints of the program. Duration and resource estimates are used to assign resources to tasks to complete schedule development.

The project schedule will be reviewed by the PMO, PC, and WPLs on a continuous six-month basis until the project ends. In case of deviations, project partners must agree to the proposed resources, effort assignments, durations, and schedule, and once this is achieved the PMCT will review and approve the schedule which will become the new baseline.

The PC with the support of the PMO and PMCT will be responsible for facilitating the schedule development and adjustments. The PMO will also create the project schedule using MS Excel and validate the schedule with the partners. The PC may obtain schedule approval by the Project Officer before re-baselining the schedule especially when that entails major calibrations of the agreed schedule.

The partners are responsible for participating in activity definition, sequencing, and duration and resource estimating. Partners will also review and validate the proposed schedule and perform assigned activities once the schedule is approved.

The EC will participate in reviews of the proposed schedule through the annual project review and contract amendments as necessary.

7.2 SCHEDULE CONTROL

The **project schedule** will be reviewed as necessary **monthly** by the respective WPLs following recommendations and input received by the PC and TLs. Better control of the project schedule would be anyway performed during the bi-weekly WP and/or plenary online calls, as they are foreseen to take place during the project course. If a variance of **1 month or more** is observed against the Schedule baseline at the WP level, the respective WPL will inform the PMCT and PMO who in turn will review the project schedule. Otherwise, project schedule reviews will be held regularly by the PMCT and partners through the preparation of the internal bi-weekly work package progress status report.

The **PMCT members** are responsible for discussing schedule variances during the **PMCT meetings**, determining impacts; submitting schedule change requests; and reporting schedule status in accordance with the project's communications plan.

The partners are responsible for participating in schedule variance resolution activities as needed.

The PC will communicate to the EC the project schedule status and review/approve any schedule change requests as necessary.

7.3 SCHEDULE CHANGE AND THRESHOLDS

If any partner determines that a change to the schedule is necessary, the **change control procedure** will be initiated. The PC, PMCT, WPL, and PMO must analyse the request and determine:

- Which tasks will be impacted and in what way.
- Variance due to the potential change.
- Alternatives or variance resolution activities they may employ to see how they would affect the scope, schedule, risks, quality, and resources.

If the analysis shows that the proposed change may affect the duration of any individual task or the overall project by 2 months, a change request is required. Any other change requests that do not meet this threshold may be submitted for consideration.

Once the change request has been reviewed and approved, the PC and PMO are responsible for adjusting the schedule and communicating all changes and impacts to the consortium and the EC. The PMO must also ensure that all change requests are documented in a change log.

8 RISK MANAGEMENT PLAN

INTRODUCTION

Risk is an “event/issue” that may happen and have an impact on our project. The purpose of the **Risk Management Plan** is to prevent those events from happening or minimise their impact in case they happen.

QPIC 1550 is an ambitious and demanding project and its success highly depends on the effectiveness of the **risk management process**. The objective of the risk management procedure is to provide the processes and techniques for the evaluation & control of potential project risks, focusing on their precautionary diagnosis & handling. The **PC** with the cooperation of the **PMCT** and the rest of the project management roles (WPL and TL) will be mainly responsible for handling risks and informing all partners when necessary.

8.1 RISK METHODOLOGY

Risk management is an overarching process that encompasses **risk planning** (identification, assessment, analysis, mitigation planning) and **risk abatement** (mitigation plan implementation, tracking, risk reassessment), in an **iterative cycle** until the end of the project, to ensure that risks are identified promptly, and handled proactively.

In more detail, this involves the **identification** of a risk, the **assessment** of its importance, and the **evaluation** of whether the risk level is higher than the risk that could be accepted for the project. In case a risk exceeds the acceptable levels, a risk **analysis** activity will be instantiated that will define the required actions to set the risk within acceptable levels. In addition, the management of risks also involves the planning of the required activities to handle the risk, the redistribution of resources, the evaluation of the results, as well as ensuring the stability of the new status.

Timely awareness and reaction to potential problems are crucial to effective risk management. That is why it is essential for QPIC 1550 to effectively manage changes. Changes may arise in **project scope, project cost, time schedule or techniques employed**. In QPIC 1550, change management will be realised with standard activities (as described in Chapter 3) ensuring that potential changes will happen only if necessary and that they will be reported appropriately. This involves the **evaluation** of the **necessity** of a change and the assessment of its **consequences**. The primary objective is to avoid reasonless project breaks, budget excess, and uncontrolled time-schedule extensions, and for that purpose, several internal and external risks were identified even from the beginning of the project and will be constantly updated; these are described in the following subsections.

Internal risks will be minimised and managed by using well-established methodologies for project planning and project control. The splitting of project work into individual packages also minimises internal risks. The PC in cooperation with the project management roles will be mainly responsible for handling internal risks and informing all partners when necessary.

The management of external risks lies primarily on the hands of the PMCT. External risks will be minimized by following closely on technological and business development in the field as well as on pertinent regulatory issues.

8.2 RISK IDENTIFICATION

Risk Identification is the first key activity that examines each element of the program to identify associated risks and set the stage for their successful management. The risks that will be documented in the context of QPIC 1550 will be classified according to their probability and severity following the below **three axes**:

Administrative and organisation risks: including lack or shortage of availability of key resources, withdrawal of the participation of a partner having a key role, and lack of communication

Technical implementation risks: including methodologies and tools replacement issues, inadequate tools integration and collaboration, inadequate project results, and;

Communication and business risks: like low interest of the targeted community/stakeholders, insufficient impact in standards liquidation of a partner business during the course of the project.

A baseline set of risks shall be identified and entered as a risk statement through a Risk Information Form. Each risk is identified by number (for configuration control) and has a responsible partner/person (s) assigned as a risk owner. The risk owner has the overall responsibility for risk management activities until the final closure of the risk.

8.3 RISK ASSESSMENT AND ANALYSIS

Once the Risks have been identified they should be analysed and assessed as to the likelihood (what's the "chance" it will go wrong) and consequence of occurrence (what's the "effect" on the project if it does go wrong).

The level of likelihood of each risk is established utilising the following specific criteria.

Table 6: LEVEL OF RISK LIKELIHOOD

Level	Likelihood	Probability of occurrence
1	Not likely	~10%
2	Low likelihood	~30%
3	Likely	~50%
4	Highly likely	~70%

5	Near Certainty	~90%
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The level of consequence of each risk is established utilizing many criteria related to a concrete situation or a recognised hazard. Finally, the overall impact is assessed, and the level of consequence is calculated as follows:

Table 7: LEVEL OF RISK CONSEQUENCE

Level	Impact of occurrence
1	Negligible
2	Minor
3	Moderate
4	Significant
5	Severe

Each partner should contribute to the risk assessment process by the definition and the identification of the different kinds of risks and hazards that might be generated by a specific module of the QPIC 1550 platform. The collection and classification of the risks need specific description and formulation in a unique matrix for each subsystem/module, to make their systematic analysis feasible. The following matrix calculates quantitatively the risk “score” as illustrated in the matrix below. The matrix is not symmetric as consequence values are weighted more than likelihood values.

Figure 4: ASSESSMENT OF THE IDENTIFIED RISK ACCORDING TO ITS LIKELIHOOD AND CONSEQUENCE LEVEL

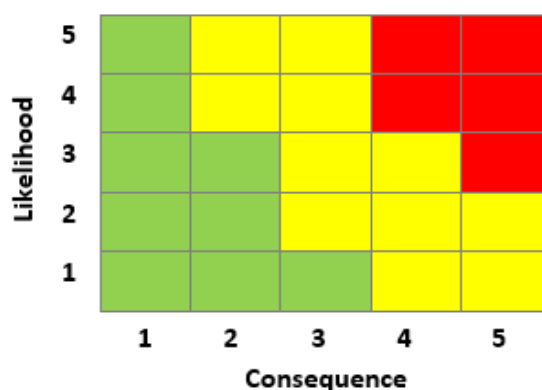


Table 8: RISK SCORE ASSESSMENT

Risk Level	Definition
Low	Has little potential to cause disruption of schedule, increase in cost, or disruption of performance. Normal company effort will probably be able to overcome difficulties
Moderate	Can potentially cause some disruption of schedule, increase in cost, or disruption of performance. However, special effort will probably be able to overcome difficulties.
High	Likely to cause significant serious disruption of schedule, increase in cost, or degradation of performance even with special effort and close monitoring of the contracting activity.

8.4 RISK MITIGATION

Risk mitigation planning identifies, evaluates, and selects options to lower risk at acceptable levels given program constraints and objectives. This can be accomplished through a reduction in likelihood, a reduction in consequences, or a combination of both. It includes the specifics of **what** should be done, **when** it should be accomplished, **who** is responsible, and the **resources** required to implement the risk mitigation plan.

8.5 RISK MITIGATION PLAN AND IMPLEMENTATION

The next key activity is the Risk Mitigation Plan Implementation which ensures successful risk mitigations occur. It:

- Directs the teams to execute the defined and approved risk mitigation plans
- Outlines the risk reporting requirements for ongoing monitoring
- Documents the change history.

Implementing risk mitigation should be accomplished by risk category (technical performance, schedule, cost) and this process needs to be worked through the WP level to scrub and endorse the risk mitigations of lower levels. It is important to mitigate risk where possible before passing it up to the next WP level.

8.6 RISK TRACKING

The final key activity is risk tracking which is the activity of systematically tracking and evaluating the performance of risk mitigation actions. The PMCT monitors progress and

regularly updates risk status and information. Risk tracking is a feedback procedure where risk abatement plans may be revised or updated based on risk status updates. If the plan is not effective, alternative plans must be put in place to ensure that risk is appropriately handled.

A project **Risk Register** is to be kept and reviewed at the physical meetings. For each identified risk the Risk Register shall detail at least:

- Risk title
- Risk description
- Description of the risk impact
- Log date
- Likelihood
- Its potential consequence on the project
- WP in which the risk is managed
- Risk owner
- Risk status (Open / Occurred / Not occurred / Cancelled).
- A list of envisaged solutions/mitigation plan:
 - action number
 - action description
 - target date for action
 - current action status.
- The deadline for decision
- Progress/comments.

The given document is available at Appendix D ([HERE.](#))

8.7 RISK DELIVERABLE PREPARATION AND PEER REVIEW PROCESS

All deliverables should be formed according to the Deliverable template (Appendix A) maintained in the document repositories. The template provides a deliverable identity sheet and specifies formatting for the most used elements of the deliverable report. The partners

responsible for the deliverable are required to ensure that before releasing the first deliverable draft to partners, it is in the correct template, and specified format and the identity sheet is complete. The table below shows the process to be observed for preparing deliverables.

Table 9: DELIVERABLE PREPARATION PROCESS (DL = "DELIVERABLE LEADER", BTB = "BEFORE THE DEADLINE")

Who	Action	To Whom	Deadline
DL	- Prepares Table of Contents (ToC) and circulates for agreement by partnership and QA Manager - Proposes Assignments on the ToC and agrees with the contributors - Presents timetable for intermediate versions	CP, Review Team, QA Manager	> 6-7 weeks PTD
DL	Updates Toc according to gathered comments	CP, QA Manager	> 1 month BTB
CP	- Work on the document - Issue intermediate releases	CP	Ad Hoc
DL	- Consolidates all input - Issues initial complete draft - Circulates for comments	CP, WPL, Review Team, QA Manager	2-3 weeks BTB
CP, WPL, Review Team	- Review the document - Provide comments	DL	2 weeks BTB
DL	- Document update addressing comments received - Consolidates all input - Issue updated complete draft	CP, WPL, Review Team, QA Manager	1 week BTB

	Returns document for internal Peer Review		
CP, WPL, Review Team	- Review the document - Provide comments	DL	1 week BTD
DL	Final editing: Update document addressing comments received	CP, WPL, Review Team, QA Manager	5 days BTD
QM	Final approval (if not approved it returns immediately back to the DL for revision)	PC, QA Manager	3 days BTD
3	- Submits Deliverable to the EC - Places the submitted PDF version on the DMS under the respective WP folder	EC	2 days BTD

Deliverable Reviewers

QPIC 1550 consortium will take all the necessary measures to make sure that only internal members will have access to the deliverables in Table 2 (List of Deliverables) are listed with dissemination level SEN, i.e., the deliverables listed in the following Figure 13 which also shows the reviewing partners.

Figure 5: LIST OF PEER-REVIEWERS zu

Title	WP	Leader	Reviewer 1	Reviewer 2	Type	Diss level	Submission month	Month in the project
Project Handbook WP1	WP1	1 - QTI SRL	Martel NL	DTU	R — Document, report	PU-Public	M03	Feb. 2024
Quality Assurance Plan	WP1	6 - MART	QTI SRL	DTU	R — Document, report	PU-Public	M06	May. 2024
Initial Data Management Plan	WP1	6 - MART	QTI SRL	DTU	DMP-Data Management Plan	PU-Public	M06	May. 2024
Interim review of the Data Management Plan	WP1	6 - MART	QTI SRL	DTU	DMP-Data Management Plan	PU-Public	M24	November.2025
Final revision of the Data Management Plan	WP1	6 - MART	QTI SRL	DTU	DMP-Data Management Plan	PU-Public	M48	November.2027
Initial specifications for QPIC1550 devices and use cases	WP2	1 - QTI SRL	DTU	UWA	R — Document, report	SEN-Sensitive	M03	Feb. 2024
Final system specifications relying on 1st generation evaluation results	WP2	1 - QTI SRL	DTU	UWA	R — Document, report	SEN-Sensitive	M20	July. 2025
Epitaxy of QDs with FSS <30µeV	WP3	4 - DTU	PWR	UCC	R — Document, report	PU-Public	M12	November.2024
QD-based non-classical light source at 1550nm	WP3	4 - DTU	PWR	UCC	R — Document, report	PU-Public	M24	November.2025
Report on the first released SiN wafers	WP4	7 - LGTF	POLIMI	UWA	R — Document, report	SEN-Sensitive	M14	January. 2025
Report on the first-generation SiN prototypes	WP4	7 - LGTF	POLIMI	UWA	R — Document, report	SEN-Sensitive	M20	July. 2025
Surface-normal InGaAs/InP SPAD for hybrid integration to waveguides	WP5	3 - POLIMI	LGTF	UCC	R — Document, report	SEN-Sensitive	M20	July. 2025
ASIC for surface normal InGaAs/InP SPAD	WP5	3 - POLIMI	LGTF	UCC	R — Document, report	SEN-Sensitive	M20	July. 2025
Package design document	WP6	9 - UCC	POLIMI	QTI	R — Document, report	SEN-Sensitive	M20	July. 2025
Intermediate-temperature package and process design	WP6	9 - UCC	POLIMI	QTI	R — Document, report	SEN-Sensitive	M20	July. 2025
First-generation packages for QKD	WP6	9 - UCC	POLIMI	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M25	December.2025
First-generation packages for quantum computing	WP6	9 - UCC	POLIMI	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M25	December.2025
First-generation packages for quantum clock synchronisation	WP6	9 - UCC	POLIMI	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M25	December.2025
Cryogenic Packaging Process	WP6	9 - UCC	POLIMI	QTI	R — Document, report	SEN-Sensitive	M24	November.2025
Process flow for QPIC1550	WP7	2 - TU/e	POLIMI	LGTF	R — Document, report	SEN-Sensitive	M09	August. 2024
APD design	WP7	2 - TU/e	POLIMI	LGTF	R — Document, report	PU-Public	M18	May. 2025
First PDK version	WP7	2 - TU/e	POLIMI	LGTF	R — Document, report	SEN-Sensitive	M20	July. 2025
Evaluation of discrete QPIC1550 devices in QKD	WP8	1 - QTI SRL	DTU	UWA	DEM-Demonstrator, pilot,	SEN-Sensitive	M36	November.2026
Evaluation of discrete QPIC1550 devices in QCS, Q-PUF	WP8	5 - UWA	DTU	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M36	November.2026
Theoretical framework for remote Quantum Computing	WP8	4 - DTU	UWA	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M36	November.2026
Testing first-generation SiN prototypes for Remote Quantum Computing	WP8	4 - DTU	UWA	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M36	November.2026
Testing telecom QD devices, for Remote	WP8	4 - DTU	UWA	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M36	November.2026
Design and fabrication of SPS	WP9	4 - DTU	UWA	QTI	R — Document, report	PU-Public	M30	May. 2026
Heterogeneous integration of SPS to SiN platform	WP9	4 - DTU	UWA	QTI	R — Document, report	PU-Public	M36	November.2026
Report on the second-generation SiN prototype chips	WP10	7 - LGTF	DTU	UWA	R — Document, report	SEN-Sensitive	M30	May. 2026
Fabricated and tested waveguide InGaAs/ InP SPAD	WP11	3 - POLIMI	LGTF	UCC	R — Document, report	SEN-Sensitive	M36	November.2026
ASIC for waveguide InGaAs/InP SPAD	WP11	3 - POLIMI	LGTF	UCC	R — Document, report	SEN-Sensitive	M36	November.2026
Second-generation packaging design document	WP12	9 - UCC	TU/e	POLIMI	R — Document, report	SEN-Sensitive	M34	September.2026
Second-generation packages for QKD	WP12	9 - UCC	TU/e	POLIMI	DEM-Demonstrator, pilot,	SEN-Sensitive	M44	July. 2027
Second-generation packages for quantum computing	WP12	9 - UCC	TU/e	POLIMI	DEM-Demonstrator, pilot,	SEN-Sensitive	M44	July. 2027
Second-generation packages for quantumclock synchronisation	WP12	9 - UCC	TU/e	POLIMI	DEM-Demonstrator, pilot,	SEN-Sensitive	M44	July. 2027
Plan for Demonstrator PICs	WP12	2 - TU/e	UCC	POLIMI	R — Document, report	SEN-Sensitive	M26	January. 2026
D12.6 Second PDK version	WP12	2 - TU/e	UCC	POLIMI	R — Document, report	SEN-Sensitive	M36	November.2026
Demonstrator PICs	WP12	2 - TU/e	UCC	POLIMI	R — Document, report	PU-Public	M39	February. 2027
Evaluation of QPIC1550 prototypes in QKD	WP13	1 - QTI SRL	DTU	UWA	DEM-Demonstrator, pilot,	SEN-Sensitive	M48	November.2027
Evaluation of QPIC1550 prototypes in Quantum Clock Synchronisation	WP13	5 - UWA	DTU	QTI	DEM-Demonstrator, pilot,	SEN-Sensitive	M48	November.2027
Testing of second-generationSiN prototypes for Remote Quantum	WP13	4 - DTU	QTI	UWA	DEM-Demonstrator, pilot,	SEN-Sensitive	M40	March. 2027
Évaluation of implementation of a QPIC1550 Remote Quantum network	WP13	4 - DTU	QTI	UWA	DEM-Demonstrator, pilot,	SEN-Sensitive	M48	November.2027
Dissemination and Communication Strategy and Plan 1	WP14	6 - MART	QTI	TU/e	R — Document, report	PU-Public	M06	May. 2024
Initial Exploitation and Sustainability Plan	WP14	1 - QTI SRL	Martel NL	TU/e	R — Document, report	PU-Public	M12	45597
First Dissemination and Communication Report (P1)	WP14	6 - MART	QTI	TU/e	R — Document, report	PU-Public	M24	November.2025
Update of the Dissemination and Communication Strategy and Plan (IT-2)	WP15	6 - MART	QTI	TU/e	R — Document, report	PU-Public	M26	January. 2026
Final Dissemination and Communication Report (IT-2)	WP15	6 - MART	QTI	TU/e	R — Document, report	PU-Public	M48	November.2027
Final Exploitation and Sustainability Plan	WP15	1 - QTI SRL	Martel NL	TU/e	R — Document, report	PU-Public	M48	November.2027

External Advisory Board

The project will establish an External Advisory Board (EAB). The EAB will provide external advice on the long-term strategy of the project as well as on the impact of the project itself from the scientific point of view. In practical terms, the members of the EAB will provide feedback on the key Project results through virtual and face-to-face meetings with the members of the WPLs Group. By the time of submitting this proposal, the project received confirmation from the following renowned experts as members. If confidential information is provided to the AB members, the Coordinator will ensure that a Non-Disclosure Agreement (NDA) is executed between the consortium and each AB member.

9 CONCLUSIONS

The QPIC 1550 "Quality Assurance Plan" lays out a comprehensive change management plan, providing protocols for assessing, implementing, and communicating changes throughout the project lifecycle.

Additionally, the reporting plan outlined the risk mitigation strategies, providing a roadmap for navigating potential challenges and uncertainties.

As a living document, the handbook remains dynamic and responsive, evolving in tandem with the project's progress and requirements. Regular updates and revisions ensure that it remains a relevant and reliable resource, guiding stakeholders with precision and clarity as they work towards the achievement of project objectives.