



Digital Europe Programme (DIGITAL) Periodic Report

Technical Report (Part B)
for EstQCI project -101113143

Version 1.0
10. February 2024



TECHNICAL REPORT (PART B)

COVER PAGE

PROJECT	
Project number:	101113143
Project name:	Estonian Quantum Communication Infrastructure
Project acronym:	EstQCI

REPORTING PERIOD	
 Please note that you must report on the entire reporting period.	
RP number:	1
Duration:	from 01/01/2023 to 31/12/2023

1. OVERVIEW OF THE PROGRESS

1.1 Summary of work performed and achievements, results and impacts

Work performed and main achievements

Short summary of progress towards the project objectives. Highlight significant activities and achievements. Provide clear and measurable details.

Analyse the outcome of the project (so far) and its (actual and expected) impact (on target groups, change, innovation etc.), including a description of the European dimension and added value. For the Final Report, include the conclusions of the action.

Report on objectives not fully achieved or not on schedule.

 *Do not simply cut and paste the project summary (filled in online on the Summary for Publication screen). Contrary to the summary, this section is for reporting to the EU and will not be published.*

The project has been successfully initiated and the activities are ongoing.

In the beginning of the project the management structure was created and a project amendment was made to move the project management responsibility and corresponding budget from MKM to RIKS. MKM remains as the main coordinator while the everyday project management is driven by RIKS. The consortium agreement has been signed that describes the responsibilities and tasks of each beneficiary, defines the steering committee and project monitoring means. The steering committee meets on a regular basis.

Close cooperation has been achieved with the Finnish QCI project that has resulted in a tradition of joint visits to potential suppliers, joint meetings with other QCI projects and inviting each other to interesting meetings and events. The fruits of this cooperation have already materialized into aligned technical specifications of our networks that will ease the uptake of EuroQCI links between the countries. Good connections have also been achieved with neighboring countries of Latvia and Sweden. Further events and meetings between our 4 countries are being planned in order to share knowledge and prepare for future international connections. Through participation in external events and meetings with other QCI project (43 events in total) a close community of the QCI projects has been achieved.

Four internal events have been organized to gather the main Stakeholders in Estonia. We began with two meetings with experts in the field (PhD J. Stepulveda and PhD H. Griesser in May 2023) to introduce the topic and start the discussions in the community. In the fall 2 information sharing events were organized. The EstQCI days held on the 5th and 6th of October was aimed to introduce the technology principals, describe the project activities and start the discussions on potential use cases with more than 60 participants. The second event was held in cooperation with the State Communications day on the 19. Of October where the target audience was state network architects and decision makers with 107 participants. In total over 85% of the target stakeholders have been reached. Based on the discussions with state network stakeholders a wonderful use case emerged for integrating QKD to the round network between data centers that will house the Estonian State Cloud. With the support from MKM and European Commission this use case has now been integrated to our project with amendment nr 2. The new round testbed will enable us to prove the functionality of quantum technology on a real-life use case and build the foundation and central backbone for the Estonian State Cloud. Through this testbed Estonia can be the groundbreaking example of how to secure the public e-services in the future and lay the building blocks from where future connections and cybersecurity solutions could emerge.

Metrosert and RIKS have made an in dept research into the quantum communication technologies currently available. Deep understanding of the different technologies used has been achieved by Metrosert. Investigations into the technical solutions for building up the networks have been carried out by RIKS. Based on the research and knowledge sharing with other QCI projects the technical solution and detailed description of our network has been created. Based on the technical details, successful tender activities have been achieved despite very short timelines and all of the devices have been delivered by the end of 2023.

Detailed deployment and test plans have been developed and preparations for the network have been made. The physical locations and optical connections are ready and waiting for the installation of the procured devices that is planned to January 2024. Due to the level of complexity that the additional testbed brought to our tender processes an unexpected cost for legal counsel has occurred. The additional cost has been integrated to our budget and will not affect the project activities in bigger picture.

The project activities for communication and dissemination have been cautious as the topic is sensitive in the eyes of our NSA and other state institutions. The Communication and Dissemination Plan is being re-evaluated in order to allow for communication about project and its results without jeopardizing the security aspects. Communication activities towards the general public will start in the beginning of 2024.

Overall, the project activities are on track without major obstacles and we are very proud of the additional testbed that has been integrated to our project.

1.2 Implementation plan and efficient use of resources

Implementation plan

Report on changes to the implementation plan (if any).

The procurement of devices was carried out according to the Estonian Public Procurement Law. The devices arrived in the end of 2023 what is slightly later than planned and therefore pushed back the testing of the devices to the beginning of 2024. We do not see that this will affect the overall project activities.

Project management, quality assurance and monitoring and evaluation strategy

Report on changes to the overall project management concept, quality assurance and monitoring and evaluation strategy (if any).

According to the first amendment the project management responsibility has moved from MKM to RIKS and the project coordinator resides in RIKS.

Cost effectiveness and financial management *(n/a for Lump Sum Grants)*

Inform about significant budget overruns or important changes in the financial management (if any).

The public procurement for the projects original devices was successful and the final prices lower than expected. This allowed us to extend the project scope that was approved in the second project amendment.

Critical risks and risk management strategy

Report on the state of play concerning the risks and risk mitigation measures (if any).

See Technical Report (Part A).

Consortium cooperation and division of roles (if applicable)

Report on changes in the way the participants work together (Beneficiaries, Affiliated Entities, Associated Partners, etc.).

The roles have been divided and we see no significant changes.

Project teams and staff

Report and explain deviations from Annex 1 of the Grant Agreement regarding the organisation of staff or project teams.

Additional personnel have been added to the project team to carry out the activities:

Research scientist PhD Matt Rammo at Metrosert

Research scientist, PhD Egon Astra at Metrosert

Consortium management and decision-making (if applicable)

Report on important changes in the management or decision-making mechanisms.

No major changes have occurred.

1.3 Impact

Impact

Report on changes in your impact analysis/strategy (if any) and the effects on the project/need for adaptations.
 Please also describe any innovations or potential innovators emerging from the project with the potential to benefit other activities of the Digital Europe Programme.

Estonia has been in the forefront of digital transformation over the last decades. The addition of the round network testbed between data centers that will house the Estonian Government Cloud will bring the project activities to the forefront of technology development by using the latest technological achievements available. This will enable the us to prove the functionality of quantum technology on a real life use case and build the foundation and central backbone for the Estonian State Cloud. Through this testbed Estonia can be the groundbreaking example of how to secure the public e-services in the future and lay the building blocks from where future connections and cybersecurity solutions could emerge.

Communication, dissemination and visibility of funding

Report on the communication and dissemination activities undertaken (to whom, which format, how many, etc.) as foreseen in your Dissemination and communication plan. Please inform and justify any changes regarding dissemination and exploitation in comparison with the initial plan.

Describe how the visibility of EU funding was ensured.

If you described your project on your website(s) and/or social media accounts, please provide the links.

During the first period of the project several communication and dissemination activities were carried out. From the identified main groups of stakeholders in our communication and dissemination plan the project has within the first 12 months reached and engaged 85% of the target institutions and private sector players with more than 130 stakeholders identified.

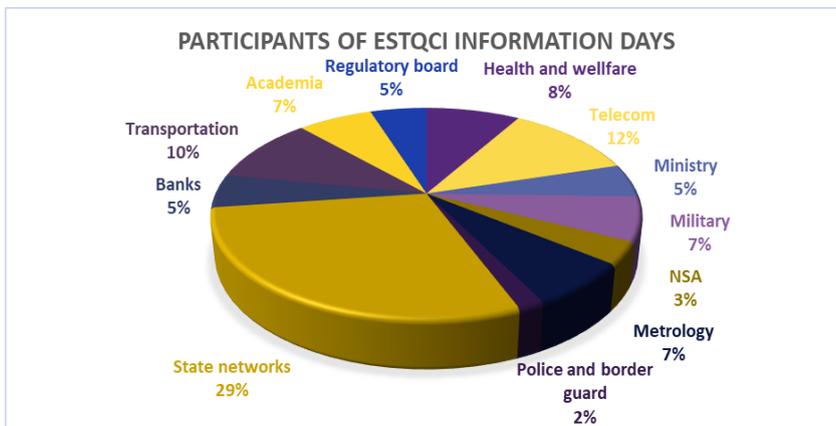
In the beginning of the project meetings and smaller events were held to introduce the subject to the main stakeholders and to raise the awareness of Quantum Technology and the EstQCI project activities.

Date	Subject	Format	Attendees
17.03.2023	First meeting with Finnish QCI team	QCI initiative	10 – Estonian and Finnish QCI projects
26.04.2023	Discussion with TalTech Department of Electronics	Meeting	4 - TalTech, RIKS
04.05.2023	Lecture and discussions with Ph.D. Johanna Sepulveda	Stakeholder event	24 - State critical communication service providers, Academia, Industry and private sector, Policy makers.
24.05.2023	Lecture and discussions with Dr. Helmut Griesser	Stakeholder event	37 - State critical communication service providers, Academia, Industry and private sector, Policy makers.
06.09.2023	Planning day with EstQCI project and RIT – incorporation of new use case	Stakeholder event	15 - MKM, RIKS, Metrosert, NSA, State networks (RIT)
10.11.2023	Quantum Technologies discussion at TalTech	Meeting	8 - TalTech, RIKS, Metrosert
25.10.2023	Meeting with TalTech for discussing Estonian backbone	Meeting	3 - TalTech, RIKS
30.10.2023	Meeting with Master student from TalTech for making a report on the EstQCI activities	Meeting	3 - TalTech, RIKS
28.11.2023	Review meeting for master student's report	Meeting	3 - TalTech, RIKS
12.12.2023	First meeting for preparation of the Estonian Quantum Initiative	Meeting	12 - TalTech, Tartu University, Metrosert, RIKS, KBFI
18.12.2023	Meeting with Finnish and Latvian QCI projects in Riga.	QCI initiative	25 – participants form Finnish QCI project and Latvian QCI project and Quantum initiative.

In the second part of the first period bigger events were held in order to gather potential stakeholders and introduce the technology and its possibilities, identify use cases and map the landscape for future

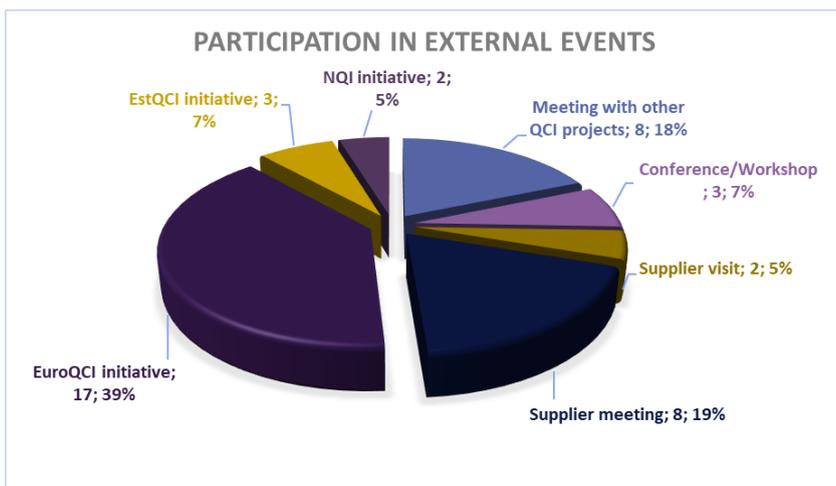
cooperations.

EstQCI Information days were held on the 5th and 6th of October. The two-day conference and workshop was organized with the purpose of gathering the main stakeholders to raise awareness of QCI, share the EstQCI project plans and activities and initiate the discussion around potential use-cases. The event was very successful with over 60 participants representing a wide range of public and private sector.



The project also participated in the State Communications Day, held on the 19.10.2023, what gathered the main stakeholders in the public sector. The one-day conference had 107 participants and the project presentation received high interest from the participants.

One of the activities in our communication plan was participation in external events where to communicate the project activities and disseminate the lessons learned. The project partners have participated in 43 external events with wide variety of functions both online and in person:



The communication of our project has been cautious in the first part of our project as significant security concerns have risen affecting our initial action plan. As the topic is very sensitive in the eyes of our NSA and internal security agency, we have not been able to communicate in large scale. The first period has been used to analyze the situation and to find communication strategies that would allow us to talk about the project and its activities without jeopardizing the security aspects. A detailed communication plan is being developed and major activities towards the general public are planned to start in the beginning of 2024.

During all of the events the European flag and funding statement has been included in the visual material and also on the banners and other advertising materials. During the project presentation the EU funding has always been highlighted and all the devices bought through this project are labelled with the European flag and funding statement.

See also Technical Report (Part A)

Sustainability, long-term impact and continuation

Report on changes in your sustainability analysis/strategy (if any).

For the Final Report, describe the follow-up of the project after the end of the EU grant. How will the results be used or further developed. Describe the strategy to ensure sustainability of results and long-term impact. Comment on possible synergies/complementarities with other (EU funded) activities (if any).

The addition of the round network testbed will hopefully have long-term benefits to the Estonian digital transformation and help to achieve the cybersecurity targets set out in our national Digital Agenda 2030. The aim is to guarantee the protection of our digital government, economy and digital way of life more broadly. The current cyber security capacity of the state is insufficient for preventing risks caused by development of quantum technology. Implementation of QKD will allow Estonia to be a trailblazing and leading country in specific prioritized fields of cyber security in the EU and at a broader international level.

1.4 Follow-up to EU recommendations

Follow-up to EU recommendations

Highlight corrective actions taken as a result of EU monitoring activities (including follow-up to EU project reviews, if any). List each recommendation/comment and explain how they have been followed up.

No recommendations have been issued so far.

2. WORK PLAN, WORK PACKAGES, ACTIVITIES, RESOURCES AND TIMING

2.1 Work packages, activities, resources and timing

Work Package 1

Work Package 1: Project management and procurement coordination			
Activities			
<i>Report on the implementation status of the activities that were to be implemented during the reporting period and explain <u>deviations</u> from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.</i>			
Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)
T1.1	Project management	Yes	Project management is running according to the changes made in amendment 1. As the project management moved from MKM to RIKS the participation of MKM has been minimal in the first period of the project. The project activities are ongoing without major issues. Communication and cooperation between beneficiaries is good and productive. The project steering committee has been established and is meeting on a regular basis. All partners have clear understanding of their activities and responsibilities.
T1.2	Procurement coordination	Yes	The procurement activities are completed and all devices have arrived. The technical documentation was prepared by RIKS and Metrosert. All beneficiaries performed their own procurements. Considerable legal counsel was needed for the successful procurement action for the main devices acquired by RIKS. Slight delay in the delivery of the main devices but this will not affect the overall project activities.
Other issues <i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i>		Slight delay for the deliverable of Technical documents for the 1st review meeting as the closing of the financial year and final accounting is released in the end of January and precise financial figures were not available before end of January. No significant impacts foreseen as delay was aligned with project officer in the European Commission.	
Milestones and deliverables (outputs/outcomes)			
See Technical Report (Part A).			

Budget implementation — Use of resources (deviations) *(n/a for Lump Sum Grants) (n/a for Additional Prefinancing Report)*

Explain deviations from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel).

Include explanations on transfers of cost categories in the estimated budget (if applicable)

/If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.

The procurement legal procedure was more complicated than expected due to the novelty of the devices and the latest extension of our project. In order to make sure that we comply with the Estonian Procurement Law the need for legal counseling became evident. Therefore, the project has an unexpected expense for legal counseling and preparation/translation of the procurement documentation.

In addition to changes covered with amendment no 2, changes in the original procurement plan occurred due to reevaluation of the test plan of the devices (some devices for Metroseret were not procured). The changes have been described in the deliverable "Procurement overview" D1.4.

Slightly larger personnel man months due to the two amendments to the project over the first period. No significant impact for the rest of the project is foreseen.

Other issues

No other issues detected

Work Package 2

Work Package 2: Development of trustworthy quantum communication network topology in metropolitan area

Activities

Report on the implementation status of the activities that were to be implemented during the reporting period and explain deviations from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.

Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)
T2.1	Preparation for the networks	Yes	Thorough research into the quantum communication technology has been performed by RIKS and Metroseret. Deep understanding of the different technologies used has been achieved by Metroseret. Investigations into the technical solutions for building up the networks have been carried out by RIKS. Cooperation with other QCI projects contributed to a better understanding of the needed ecosystem and alignment with the Finnish technical solution will lay the foundation for successful future EuroQCI connections between the countries. Based on the research, knowledge sharing and supplier visits the EstQCI testbeds technical description was developed which was the basis for the procurement procedures. A thorough test plan has been developed by RIKS and Metroseret. The test plan addresses the functionality, sustainability and safety of the devices through metrological and environmental tests by Metroseret and integration and performance in existing optical networks by RIKS.

T2.2	Testing of the devices	Partially	In the original plan the testing of the devices was planned to the end of 2023 but due delays in the procurement, caused by the addition of the second testbed with project amendment no 2, the delivery of the devices was delayed to the end of 2023. The testing will start in the beginning of 2024 and we do not see a significant affect for our overall activities.
Other issues <i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i>		No other major issues occurred.	
Milestones and deliverables (outputs/outcomes)			
See Technical Report (Part A).			
Budget implementation — Use of resources (deviations) <i>(n/a for Lump Sum Grants) (n/a for Additional Pre-financing Report)</i> <i>Explain <u>deviations</u> from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel). Include explanations on transfers of cost categories in the estimated budget (if applicable) /If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.</i>			
No significant deviations from last amendment			
Other issues		No other issues detected	

Work Package 3–

Work Package 3: Testing of deployed QCI in metropolitan area			
Activities <i>Report on the implementation status of the activities that were to be implemented during the reporting period and explain <u>deviations</u> from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.</i>			
Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)
T3.2	Identification of use cases	Yes	Even though the work package is not planned to start before 2024, the activities to identify use cases have already been started. The first stakeholder Events have been organized and the discussions around possible use cases has already materialized into a new round test bed

			that has been incorporated to this project.
Other issues <i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i>	No other major issues occurred.		
Milestones and deliverables (outputs/outcomes)			
See Technical Report (Part A).			
Budget implementation — Use of resources (deviations) <i>(n/a for Lump Sum Grants) (n/a for Additional Prefinancing Report)</i> <i>Explain <u>deviations</u> from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel). Include explanations on transfers of cost categories in the estimated budget (if applicable) /If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.</i>			
No significant deviations from last amendment			
Other issues	No other issues detected		

Work Package 4

Work Package 4: Demonstration of long-distance quantum communication network			
Activities <i>Report on the implementation status of the activities that were to be implemented during the reporting period and explain <u>deviations</u> from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.</i>			
Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)
T4.1	Evaluation of technologies	Yes	The theoretical evaluation of the long-distance testbed technological selection has started according to the timeline by RIKS and Metroserf. The results from our testbeds will give valuable insights into the actual capabilities of the devices. We are also in close discussions with other QCI projects to share knowledge of devices working based on different QKD protocols with the purpose to map the tested performance of all available

			device types. This cooperation will give valuable information for planning the long-distance network.
T4.4	Planning of the long-distance network in the field	Yes	The planning for the long-distance network in the field has begun and discussions are ongoing with fiber and security experts in the field. Tallinn University of Technology has been included in the discussions of potential fiber connections. The activity is driven by RIKS and active discussions are ongoing for potential options for the future network.
Other issues <i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i>		No other major issues occurred.	
Milestones and deliverables (outputs/outcomes)			
No deliverables or milestones in the first period.			
Budget implementation — Use of resources (deviations) <i>(n/a for Lump Sum Grants) (n/a for Additional Prefinancing Report)</i> <i>Explain <u>deviations</u> from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel). Include explanations on transfers of cost categories in the estimated budget (if applicable) /If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.</i>			
No significant deviations from last amendment			
Other issues		No other issues detected	

Work Package 5

Work Package 5: Regional coordination and EuroQCI integration			
Activities <i>Report on the implementation status of the activities that were to be implemented during the reporting period and explain <u>deviations</u> from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.</i>			
Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)

T5.1	Planning of cross-border connections	Yes	Close cooperation has been achieved with our neighboring countries. Very close and fruitful collaboration is with the Finnish QCI project, where we have visited potential suppliers together and invite the other side to interesting meetings with other QCI projects, potential suppliers and other technical experts. A joint meeting has been held between Latvia, Estonia and Finnish projects to discuss potential cross border connections and their technical solutions. Connection to Swedish QCI project has been established and future cooperation plans and events between the 4 countries are being discussed. The activities have been driven by the project manager with active participation from RIKS and Metroseret
T5.5	Participation in the EuroQCI initiative and collaboration with the DIGITAL topic 3 project (co-ordination and support action CSA) and with other EuroQCI projects.	Yes	<p>The EstQCI project has created good relations with most of the other QCI projects in the DEP call. The relations have been established through participation in the EuroQCI initiative events or workshops and through separate meetings with the NatQCI project leaders (in total 43 events). The project coordinator is part of the EuroQCI working group, the EuroQCI Technical working group and also the Estonian representative in the NQI's.</p> <p>The participation in the initiatives, collaboration and knowledge sharing with other QCI projects has given valuable insights into the development of our national and EuroQCI network.</p> <p>Detailed description of attended events can be found in the Communications report chapter 6.</p>
Other issues <i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i>		No other major issues occurred.	
Milestones and deliverables (outputs/outcomes)			
See Technical Report (Part A).			
Budget implementation — Use of resources (deviations) <i>(n/a for Lump Sum Grants) (n/a for Additional Prefinancing Report)</i> <i>Explain <u>deviations</u> from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel). Include explanations on transfers of cost categories in the estimated budget (if applicable) /If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.</i>			
No significant deviations from last amendment			
Other issues		No other issues detected	

Work Package 6: Creating impact and dissemination			
Activities			
Report on the implementation status of the activities that were to be implemented during the reporting period and explain <u>deviations</u> from Annex 1 of the Grant Agreement. In case an activity was not implemented or a deliverable not produced, please explain why.			
Task No (continuous numbering linked to WP)	Task Name	Implemented? (Yes/No/Partially)	Justification (explain what was done and by whom; explain what was not done and why not; indicate how you intend to handle the situation and new timing; indicate if it was a one-off issue or how you intend to avoid similar issues in the future)
T6.1	Implementation of the communication plan	Yes	<p>During the first year of the project there has been a re-evaluation of the sensitivity of the content created during the quantum communication project which has led to a re-evaluation of the original communication and dissemination plan. The re-evaluation concerns mainly the activities towards the general public, which have been postponed and will take place in the second half of the project.</p> <p>In the first half of the project, we aimed our efforts towards the target groups identified in our Dissemination and Communication plan. Estonia is one of the smallest countries in EU and this has given us an advantage of being able to reach up to 85% of the main stakeholders already within the first 12 months of this project. In the second half of the project the communication towards the general public will take place with special emphasis on raising general knowledge of quantum technologies.</p> <p>In order to enhance the communication tools a project logo and visual identity was developed. Different templates for future presentations and documents were created and are in use.</p> <p>Four main dissemination activities were organized that showed very positive feedback from the participants and created a productive discussion around potential use-cases. During these discussions a very promising use case emerged for securing the Estonian Government Cloud with QKD. This use case has now been integrated into our project.</p> <p>Communication results in numbers:</p> <ul style="list-style-type: none"> • 85% of the identified target groups reached • more than 130 stakeholders identified and reached • 4 stakeholder events organized <p>Lecture and discussions with Ph.D. Johanna Sepulveda 4.05.2023, 24 participants Lecture and discussions with Dr. Helmut Griesser 24.05.2023, 37 participants</p>

			<p>EstQCI Information days, 5th and 6th of October 2023, 60 participants</p> <p>State Communication Day, 19.10.2023, 107 participants</p> <ul style="list-style-type: none"> • Over 80 stakeholders participated in our events • Participation in 39 external events (including online participations) • New use-case added to project scope • Estonian Quantum Initiative preparation kicked off • Connections to 7 other QCI projects established and EstQCI project activities shared • Close cooperation with Finland and Latvia QCI projects achieved
T6.2	Stakeholder events	Yes	<p>The first larger Stakeholder events were organized in Q3 2023 ahead of schedule with very positive outcomes.</p> <p>Two events have been organized:</p> <p>EstQCI Information days (5th and 6th of October 2023) with the purpose of gathering the main stakeholders to raise awareness of QCI, share the EstQCI project plans and activities and initiate the discussion around potential use-cases. The event was very successful with over 60 participants representing a wide range of public and private sector.</p> <p>State Communication Day, held on the 19.10.2023, what gathered the main stakeholders in the public sector. The one-day conference had 107 participants and the project presentation received high interest from the participants.</p>
T6.3	Planning of support measures for the industry	Yes	<p>The planning for support measures for the industry has just begun. The development of National Quantum Initiative has also been started by Metroseret who has gathered the relevant stakeholders and first directions of where to focus are starting to mature. The strategy is to identify if we can plan for support measures to the industry through the NQI.</p>
<p>Other issues</p> <p><i>Mention and explain unexpected events and adjustments that had to be made. Explain impact on other tasks, available resources and planning/timing.</i></p>			
<p>Milestones and deliverables (outputs/outcomes)</p>			
<p>See Technical Report (Part A).</p>			
<p>Budget implementation — Use of resources (deviations) <i>(n/a for Lump Sum Grants) (n/a for Additional Prefinancing Report)</i></p> <p><i>Explain <u>deviations</u> from the budget planning (i.e. differences between actual and planned use of resources, especially for personnel). Include explanations on transfers of cost categories in the estimated budget (if applicable)</i></p> <p><i>/If needed, add explanations linked to the report on the use of resources filled in online. Ensure consistency with that report.</i></p>			
<p>No significant deviations.</p>			

Other issues	No other issues detected
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Timetable

Timetable (projects of more than 2 years)												
Report on <u>deviations</u> from Annex 1 of the Grant Agreement.												
Fill in the planned implementation in beige and the deviations in red. Adapt and repeat lines/columns as necessary.												
Starting date:	01.01.2023 -31.12.2023											
ACTIVITY	YEAR 1				YEAR 2				YEAR 3			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
T1.1 - Project management												
T1.2 - Procurement coordination												
T1.3 - Alignment with the security baseline												
T2.1 – Preparation for the networks												
T2.2 – Testing of the devices												
Devices arrived in end of December 2023												
T2.3.1 – Deployment of the metropolitan network												
T2.3.2 – Deployment of the round network												
T3.1.1 – Evaluation of the metropolitan network												
T3.1.2 – Evaluation of the round network												
T3.2 – Identification of use cases												
Use case identification activities started already in Q3 2023												
T3.3.1 – First use cases in the metropolitan network												
T3.3.2 – First use cases in the round network												
T3.4 – Knowledge dissemination												
T4.1 – Evaluation of technologies												
Devices arrived in end of December 2023												
T4.2 – Test planning and execution of long-distance network												
T4.3 – Demonstration of the network												
T4.4 – Planning of the long-distance network in the field												

3. OTHER

3.1 Ethics

Ethics				
<i>If your Application Form contains a section on ethics, report on the status of the ethics deliverables (if any).</i>				
See Technical Report (Part A).				
<i>Report on any <u>changes</u> to ethics issues identified in Annex 1 of the Grant Agreement (if any).</i>				
No ethics issues to report				
<i>Report on <u>new</u> ethics issues that have come up during the project implementation and the measures taken to solve/avoid them (if any).</i>				
Ethics Issue No	Description	Work Package No	Lead Beneficiary	Proposed Measures
-	-	-	-	-

3.2 Security

Security				
<i>Report on the status of the security deliverables (if any).</i>				
No security deliverables in 1-st period				
<i>Report on any <u>changes</u> to security issues identified in Annex 1 of the Grant Agreement (if any).</i>				
During the first year of the project there has been a re-evaluation of the sensitivity of the content created during the quantum communication project which has led to a re-evaluation of the original communication and dissemination plan. The re-evaluation concerns mainly the activities towards the general public, which have been postponed and will take place in the second half of the project.				
<i>Report on <u>new</u> security issues that have come up during the project implementation and the measures taken to solve/avoid them (if any).</i>				
Security Issue No	Description	Work Package No	Lead Beneficiary	Proposed Measures
1	Dissemination to general public	6	MKM	Re-evaluation of the communication and dissemination plan.

4. DECLARATIONS

Double funding

Information concerning other EU grants for this project ⚠ Please note that there is a strict prohibition of double funding from the EU budget (except under EU Synergies actions).	YES/NO
We confirm that to our best knowledge neither the project as a whole nor any parts of it benefit/have benefitted from any other EU grant (including EU funding managed by authorities in EU Member States or other funding bodies (e.g. EU Regional Funds, EU Agricultural Funds, etc). If NO, explain and provide details	Yes
We confirm that to our best knowledge neither the project as a whole nor any parts of it are (nor will be) submitted for any other EU grant (including EU funding managed by authorities in EU Member States or other funding bodies (e.g. EU Regional Funds, EU Agricultural Funds, etc). If NO, explain and provide details.	Yes

FINANCIAL REPORT

INDIVIDUAL FINANCIAL STATEMENT

The Financial Statement must be filled out directly on the Portal Financial Statements screen.

CONSOLIDATED FINANCIAL STATEMENT

The consolidated Financial Statement is generated automatically by the system.

ANNEXES

LIST OF ANNEXES

Standard

Use of Resources Report (annex 1 to Part B) *(to be filled out directly on the Financial Statements screen) — mandatory (n/a for Lump Sum Grants)*

Certificate on the financial statements (CFS) (annex 2 to Part B) *(template available on [Portal Reference Documents](#)) — mandatory if threshold reached (n/a for Lump Sum Grants)*

Special

n/a

Annex 1 REPORT ON THE USE OF RESOURCES — COST EXPLANATIONS

The report must be filled out directly on the Portal Financial Statements screen.

GRANT	
Project number:	101113143
Project name:	Estonian Quantum Communication Infrastructure
Project acronym:	EstQCI

REPORTING PERIOD	
⚠ Please note that you must report on the entire reporting period.	
RP number:	1
Duration:	from 1.01.2023 to 31.12.2023

PARTICIPANT	
Number:	1
Short name:	MAJANDUS JA KOMMUNIKATSIOONIMINISTEERIUM
No expenses to report for this period	

PARTICIPANT	
Number:	4
Short name:	Kaitseministeerium
No expenses to report for this period	

PARTICIPANT	
Number:	2
Short name:	AKTSIASELTS METROSERT

Personnel costs	
<i>Financial Statement screen — When you enter the costs, pop-ups will appear to ask you for more details.</i>	
Personnel costs declared as actual costs (if applicable)	
Person-months	Work Package

2.0	WP 1
8.2	WP 2
8.1	WP 4
1.0	WP 5
Personnel costs declared as unit costs (if applicable)	
Person months	Work Package
-	-
In-kind contributions provided by third parties (seconded personnel)	
Not applicable.	
<i>[OPTION for adjustment to previous financial statements]</i> Explanations on adjustments	
Not applicable.	

Subcontracting costs

One line per subcontract.

Double-check consistency with the information on subcontracting in the Technical Report (Part B) – Activities and work packages.

Subcontract name (subcontracted action tasks)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs for this RP (EUR)
-	-	-	-
Total			-

[OPTION for adjustment to previous financial statements] **Explanations on adjustments**

Nota applicable

Purchase costs (travel and subsistence, equipment and other goods works and services)

Details for major cost items (needed if costs declared under 'purchase costs' are higher than 15% of the claimed personnel costs).

Start with the most expensive cost items, down to the 15% threshold.

Travel and subsistence

Cost item name	Category	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)
First meeting with Finnish QCI team, Helsinki	Travel and Subsistence	5	Yes	3 persons	449,56
CEF Networks Conference, Prague	Travel and Subsistence	5	Yes	1 person	852,81
Visit to QTI in Florence Italy with the Finnish QCI team	Travel and Subsistence	1	Yes	1 person	1 205,19

Visit to ThinkQuantum in Padova, Italy with the Finnish QCI team	Travel and Subsistence	1	Yes	1 person	810,79
6th Annual ScyLight Conference, Workshop Quantum Internet, Athens, Greece	Travel and Subsistence	5	Yes	1 person	1 776,53
European Quantum Technologies conference, Hannover, Germany	Travel and Subsistence	5	Yes	1 person	837,7
Meeting for Finnish-Estonian-Latvian QCI teams, Riga, Latvia	Travel and Subsistence	5	Yes	1 person	280,22
Total					6 212,80
Equipment					
Cost item name	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)	
SPAD	2,3,4	YES		42 600,00	
Two White Rabbit low-jitter switches	2, 3, 4	YES		10 350,00	
Entangled photon pair source at telecom wavelengths	2, 3, 4	YES		56 000,00	
Pulsed laser	2, 3, 4	YES		12 955,00	
Two Optical Time Domain Reflectometers	3, 4	YES		21 245,86	
Optical Wavelength Meter	3, 4	YES		28 800,00	
Total					171 950,86
Other goods works and services					
Cost item name	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)	
Materials from FS.COM GmbH	2, 4	NO	Attenuators, optic patch cables, adapters for laboratory testing specially for this project	207,07	
Materials from Thorlabs	2, 4	NO	Optical fiber circulator, attenuator adapters, polarization controller needed specially for this project	3 731,78	
Construction services: fiber optical cable	2,3	YES	Fiber optical services for the metropolitan network connection	3 639,95	

Network management systems	2,3,4	YES	Management system solution for access and management of the QKD testbeds including support and installation equipment.	5 480,60
Laptop for the management of the networks	2,3,4	NO	Dell Latitude 5440, for managing the QKD devices	823,00
Standard	2,4	NO	EVS-EN IEC 61315:2019 to base the testing to previous standardization	28,50
Rack	2,3,4	NO	For EstQCI devices, specially for this project	941,5
Total				14 852,40
In-kind contributions provided by third parties				
Not applicable.				
<i>[OPTION for adjustment to previous financial statements Explanations on adjustments</i>				
Not applicable				

Internally invoiced goods and services (if applicable)				
<i>One line per cost item.</i>				
Item name	WP(s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)
-	-	-	-	-
Total				-
In-kind contributions provided by third parties				
Not applicable.				
<i>[OPTION for adjustment to previous financial statements Explanations on adjustments</i>				
-				

PARTICIPANT	
Number:	3
Short name:	STATE INFOCOMMUNICATION FOUNDATION

Personnel costs	
<i>Financial Statement screen — When you enter the costs, pop-ups will appear to ask you for more details.</i>	
Personnel costs declared as actual costs (if applicable)	
Person-months	Work Package
8,2	WP 1
13,4	WP 2
0,4	WP 3
0,3	WP 4
2,6	WP 5
5,3	WP 6
Personnel costs declared as unit costs (if applicable)	
Person months	Work Package
-	-
In-kind contributions provided by third parties (seconded personnel)	
Not applicable.	
[OPTION for adjustment to previous financial statements] Explanations on adjustments	
Not applicable	

Purchase costs (travel and subsistence, equipment and other goods works and services)					
<i>Details for major cost items (needed if costs declared under 'purchase costs' are higher than 15% of the claimed personnel costs).</i>					
<i>Start with the most expensive cost items, down to the 15% threshold.</i>					
Travel and subsistence					
Cost item name	Category	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)
Supplier visit – QTI, Firenze Italy 8-10.05.2023	Travel and Subsistence	1	Yes		3 041,41
Supplier visit – ThinkQuantum, Padova Italy 28-31.05.2023	Travel and Subsistence	1	Yes		2 984,90

Prague QCI conference, Czech Republic 17-20.04.2023	Travel and Subsistence	2	Yes		1 715,63
EQTC conference, Hannover, Germany 16-20.10.2023	Travel and Subsistence	5	Yes		1 655,70
EuroQCI Technical Working Groups meeting, Brussels Belgium 6-9.11.2023	Travel and Subsistence	5	Yes		1 576,61
FortiNet conference, Greece 7-10.11.2023	Travel and Subsistence	2	Yes		1 513,03
EuroQCI NQI's meeting Brussels, Belgium 8-9.06.2023	Travel and Subsistence	5	Yes		1 415,66
Lat-Est-FIN meeting in Riga, Latvia 18.12.2023	Travel and Subsistence	2	Yes		1 404,36
Meeting with Finnish QCI team, Helsinki Finland 17.03.2023	Travel and Subsistence	2	Yes		566,12
Total					15 873,42
Equipment					
Cost item name	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)	
QKD equipment 3 device pairs	2	Yes		639 360,00	
SNSPD detector	3	Yes		201 600,00	
Encryptors	2	Yes		783 719,46	
Total					1 624 679,46
Other goods works and services					
Cost item name	WP (s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)	
Legal support for tender process	1	No	More complicated procurement procedure than expected due to project extension. Legal counsel was needed to make sure we comply with Estonian Procurement Law	12 686,60	
Event - EstQCI information days 5-6.10.2023	6	Yes		11 627,43	
Event - State communication day 19.10.2023	6	Yes		4 245,39	
Communication - Visual identity and logo	6	Yes		2 754,00	

Event - EstQCI planning day 6.09.2023	2;6	Yes		2 055,69
Stakeholder events- Lectures with J. Stepulveda (4.05.2023) and H. Griesser (24.05.2023)	2;6	Yes		890,77
Total				34 259,88
In-kind contributions provided by third parties				
Not applicable.				
<i>[OPTION for adjustment to previous financial statements Explanations on adjustments</i>				
Not applicable				

Internally invoiced goods and services (if applicable)				
<i>One line per cost item.</i>				
Item name	WP(s)	Foreseen in Annex 1?	Explanations (if not in Annex 1)	Costs (EUR)
-	-	-	-	-
Total				-
In-kind contributions provided by third parties				
Not applicable.				
<i>[OPTION for adjustment to previous financial statements Explanations on adjustments</i>				

HISTORY OF CHANGES		
VERSION	PUBLICATION DATE	CHANGE
0.1	8.01.2022	Initial version
0.2	12.01.2022	RIKS data added
0.3	25.01.2022	RIKS financial data added
0.4	27.01.2022	Metrosert data and financial data added
1,0	10.02.2022	Final financial data submitted

Critical implementation risks and mitigation actions

Foreseen Risks

Foreseen risks			
<i>The table shows the risks already listed in Annex 1 of the Grant Agreement (read-only).</i>			
Risk No	Description	Work Package No(s)	Proposed Mitigation Measures
1	Costs of QQI systems rise due to high demand from EU countries	WP2,WP3,WP4	Procurements based on price. Eventual changes in the project plan to use less devices.
2	Equipment is not working as foreseen	WP2,WP3,WP4	Close collaboration with partners to exchange experiences and best practices. Availability of non-EU devices which might be more advanced.
3	Low interest of stakeholders to develop new products and services	WP3	Proactive engagement to bring together international stakeholders to exchange ideas and find potential services and customers.
4	Too few experts in Estonia to fulfil the tasks of the project.	WP2,WP3,WP4	Collaboration with other Member States to train experts.
5	Neighbouring countries (Latvia, Lithuania) are not interested in developing networks and cross-border connections.	WP5,WP4	Proactive close collaboration with other Baltic countries. Alternatively prepare EuroQCI connections through Finland, who is well advanced in the project.
6	Project amendment to incorporate the round network to the project is not approved or not approved in time to be able to purchase the needed equipment in 2023.	WP2,WP1,WP3	Careful and thorough preparation of the amendment justification and supporting documentation is crucial for a successful proposal. It ensures that all the necessary information is provided, and the rationale for the amendment is clear and well-documented.

Unforeseen Risks

No Unforeseen Risk has been identified for this action

State of play

State of play				
<i>Continuous Reporting (Critical Risks screen) - Give the state of play of the risks that were identified in Annex 1 of the Grant Agreement (and new risks that materialised during project implementation) and add new mitigation measures, if needed.</i>				
Risk No	Period	Did you apply risk mitigation measures?	Did your risk materialise?	Comments
1	1	Yes	No	The price level of the QKD devices was lower than expected and therefore the risk did not materialise.
2	1	Yes	No	The devices are just being installed and configured. No major issues so far but full extent will be evident during testing.
3	1	Yes	No	Most public stakeholders included in project activities, interest is high. Private sector is interested to be kept informed but not willing to start activities.
4	1	Yes	No	Currently all project activities are covered with personell.
5	1	Yes	No	Good cooperation achieved with Finland and Latvia. Further actions are being planned. No confirmed agreements made so far.
6	1	Yes	No	With thurow preparation and cooperation with suppliers the project amendment was approved and the devices reached us in time.

3. DELIVERABLES

Deliverable No	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date	New Due Date (if delay)	Delivery Date (actual)	Status	Comments
D1.1	Technical documents for the 1st review meeting	WP1	MKM	R	SEN	31 December 2023		14 February 2024	SUBMITTED	
D1.4	Procurement overview	WP1	MKM	R	SEN	31 December 2023		29 December 2023	SUBMITTED	
D2.3	Deployment plan	WP2	RIKS	R	SEN	31 December 2023		29 December 2023	SUBMITTED	
D5.2	Report on participation to the EuroQCI initiative and on the collaboration with other DIGITAL projects, part 1	WP5	MKM	R	PU	31 December 2023		29 December 2023	SUBMITTED	
D6.1	Communication report, 1st period	WP6	MKM	R	PU	31 December 2023		29 December 2023	SUBMITTED	
D6.3	Report on dissemination and exploitation	WP6	MKM	R	PU	30 June 2023		31 May 2023	SUBMITTED	

LIST OF MILESTONES

Milestones								
<i>Continuous Reporting (Milestones screen) — Update the status (and add new due date for late milestones, together with an explanation for the delay). In the Comments, please indicate if the milestone was achieved as planned or not.</i>								
MS No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Delivery Date	Delivery Date (actual)	Achieved	Comments
1	Management setup	WP1	MKM	Feedback from partners	31/3/2023	31/3/2023	Yes	
2	Technical specifications	WP1	MKM	All specification tables filled	30/6/2023	22/6/2023	Yes	
3	Procurements	WP1	MKM	All tenders available in the public procurement portal	30/9/2023	22/12/2023	Yes	
4	Deployment plan for metropolitan network	WP2	RIKS	Document is available	31/12/2023	29/12/2023	Yes	
5	Equipment tested	WP2	Metrosert	Test report and data available	30/6/2024		No	
6	Metropolitan network deployed	WP2	RIKS	Network is available for use cases and testing	30/6/2025		No	
7	Evaluation report of the metropolitan network	WP3	Metrosert	Evaluation report available for all participants	30/6/2025		No	
8	First use cases of the metropolitan network	WP3	MKM	At least two use cases in the network, description of use cases available.	30/6/2025		No	
9	Long-distance network technologies evaluated	WP4	Metrosert	Evaluation report	30/6/2024		No	
10	First demonstration of the long-distance network	WP4	Metrosert	Test report, data	30/6/2025		No	

Milestones

Continuous Reporting (Milestones screen) — Update the status (and add new due date for late milestones, together with an explanation for the delay). In the Comments, please indicate if the milestone was achieved as planned or not.

MS No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Delivery Date	Delivery Date (actual)	Achieved	Comments
11	Plan for a long-distance network	WP4	RIKS	The deployment plan is available	30/6/2025		No	
12	Identification of cross border partners	WP5	MKM	At least two cooperation agreements with neighbouring countries.	31/12/2024		No	
13	Design of the cross-border network	WP5	MKM	Document is available as a part of cooperation agreements	31/12/2024		No	
14	Feasibility analysis for the satellite link	WP5	RIKS	Study report	30/6/2025		No	
15	International stakeholder cooperation	WP5	MKM	At least two international events held.	30/6/2025		No	
16	Communication plan	WP6	MKM	All relevant target groups reached (industry, academia, regulatory, general public)	30/6/2025		No	
17	Stakeholder involvement	WP6	MKM	Event reports indicate involvement of at least 25 different stakeholders	30/6/2025		No	
18	Interim review	WP1	MKM	Interim review report	29/2/2024		No	