



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR COMMUNICATIONS NETWORKS, CONTENT AND TECHNOLOGY

CNECT.C – Digital Excellence and Science Infrastructure
C.2 – High Performance Computing and Quantum Technology

GENERAL PROJECT REVIEW CONSOLIDATED REPORT

Grant agreement (GA) number:	951821
Project¹ Acronym:	NEASQC
Project title:	NExt ApplicationS of Quantum Computing
Type of action:	RIA
Start date of the project:	01/09/2020
Duration of the project:	48
Name of primary coordinator contact and organisation:	5.1.2e (BULL)
Period covered by the report:	from 01/09/2020 to 28/02/2022
Periodic report/Reporting period number:	1
Date of first submission of the periodic report (if applicable):	30/04/2022
Amendments (latest AMD concerning description of the action)²	Not applicable
Date of meeting with consortium (if applicable):	30/03/2022
Name of project officer:	5.1.2e
Name(s) of monitors:	<ul style="list-style-type: none"> – 5.1.2e <ul style="list-style-type: none"> • University of Turku – 5.1.2e <ul style="list-style-type: none"> • Institute Ruder Bošković • Institute Ruder Bošković • Institut Ruder Boskovic – 5.1.2e <ul style="list-style-type: none"> • Institute Ruder Bošković • Institute Ruder Bošković • Institut Ruder Boskovic – 5.1.2e <ul style="list-style-type: none"> • Institute of Physics, Polish Academy of Sciences • Institute of Physics, Polish Academy of Sciences • Institute of Physics, Polish Academy of Sciences

¹ 'Project' means the same thing as 'action'.

² Only amendments to the description of the action (DoA; AT21) are relevant for general project reviews since they always have to be carried out against the latest version of the DoA

1. Overall assessment

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Project has achieved most of its objectives and milestones for the period with relatively minor deviations.
2. Significant results linked to dissemination, exploitation and impact potential
<p>Project will likely provide results with significant immediate or potential impact in the next reporting period (even if not all objectives mentioned in the Annex 1 to the GA were achieved).</p> <p>Project has achieved its objectives for this reporting period.</p> <p>At the moment, the results are too theoretical and preliminary to fully assess the potential impact. For example Task 5.3 has the potential for the financial market community.</p> <p>However, if the recommendations concerning the future work will be properly implemented, the project is likely to provide results of significant impact.</p>
3. General comments
<p>The project is progressing well.</p> <p>The communication and dissemination has been particularly strong and robust, despite Covid challenges. The online seminar series have seen large audiences, and the partners have made above average effort to inform the public about the project and its goals.</p> <p>It is important that the consortium reinforces the connection with the flagship quantum hardware and assesses issues such as scalability and efficiency in presence of noise.</p> <p>Moreover, it may be wise to consider development of more commercially exploitable results such as future commercially saleable software based on the algorithms worked out by the project.</p>
4. Recommendations concerning the period covered by the report
No recommendations.
5. Recommendations concerning future work, if applicable
<ol style="list-style-type: none">1) Increase collaborative efforts between partners.2) Exploitation potential, in particular concerning the potential patent applications should be taken into account.3) Assess scaling and effect of noise on the proposed algorithms.4) Identify the major limiting factors for the implementation of the proposed algorithms on near-term devices and research solution.5) Increase the focus and interaction with hardware providers of the QT flagship.

2. Objectives and workplan

1. Is the progress reported in line with objectives and work plan as specified in the DoA? If there are significant deviations, please comment.	Yes
There are no significant deviations.	
2. Are the objectives of the project still scientifically and /or technologically relevant?	Yes
<p>Of particular commendable note is the change undertaken regarding the specific use case in Task 5.1 where hydrocarbon well optimisation has been changed to inventory management. This is a very wise move, as the new use case has potentially extremely wide usage, far broader and more easily adaptable to different companies, than the original use case for this work package.</p> <p>The field of quantum algorithms and software for near term devices is certainly still very active, and the lack of demonstrated quantum advantage with near-term devices makes even more pressing the overall goals of this project.</p>	
3. Are the critical implementation risks and mitigation actions described in the DoA still relevant?	Yes
The risk management in the project is managed properly and consideration of new risks and updating are being carried out. A new risk was identified.	
4. Have the pilots/case studies started to showcase innovative results as described in the DoA?	Partially
This is an early report, and mostly preliminary work related to setting up the meat of the work has been carried out. Nevertheless some innovative results have begun to appear, such as the apparent better than classical scaling shown in Fig. 2 of the report - Preliminary results of a new algorithm for information extraction - in Task 5.3	
5. Have the ethics deliverables due for the current period been adequately addressed and approved?	Yes
No issues.	
6. Have the comments and recommendations from previous project reviews been taken into account?	Not applicable

3. Impact

1. Does the work carried out contribute to the expected impacts detailed in the DoA?	Yes
The work is in line with the impacts detailed in the DoA.	
2. Does the work carried out follow the plan detailed in the DoA to enhance innovation capacity, create new markets opportunities, strengthen competitiveness and growth of companies, address issues related to climate change or the environment, address industrial and/or societal needs at regional level or bring other important benefits for society? Give information on the relevant innovation activities carried out (prototypes, testing activities, standards, clinical trials) and/or new product, service, reference materials, process or method (to be) launched to the market, if any.	Yes
Yes. The work significantly contributes to the expected impacts (European competitiveness, quantum technologies, industry involvement)	
3. Does the work carried out contribute towards European policy objectives and strategies and have an impact on policy making?	Yes
The work carried out certainly contributes to European policy objectives and strategy in what it identifies use cases of a new emerging and potentially disruptive technology such as quantum.	
4. Does (or will) the work carried out have an impact on SMEs?	Yes
Partners in the project include SMEs such as Tilde SIA.	
5. Have the beneficiaries reached gender balance at all levels of personnel assigned to the action? If not, have the reasons been explained in the periodic report?	Not applicable

4. Implementation

1. Has the project been efficiently and effectively managed?	Yes
Management activity all performed well as per plan or exceeding the plan.	
2. Is the management of the project in line with the obligations of beneficiaries (including ethics and security requirements, risk and innovation management if applicable)?	Yes
Management of the project is in line with the obligations of beneficiaries, and has been carried out well to date.	
3. Is the contribution of each beneficiary in line with the work committed in the DoA? (applicable only to multibeneficiary projects)	Yes
Some Tasks/participants have had delays due to hiring problems, but this has been overcome and backlog will be made up during the remainder of the project.	
4. Have the beneficiaries disseminated project results (foreground) in scientific publications as planned in the DoA (including the deposition of publications in open access repositories)? Do they include a reference to EU funding?	Yes
Dissemination has significantly exceeded the plan so far. Admittedly, the target KPI for number of papers was low for such a large collaboration, but it is well that it is well on track to being strongly exceeded by the end of the project. However, some of the partners, have not been contributing to disseminating results via scientific publications, while others have contributed more than average. In this sense there has been an imbalance.	
5. Have the beneficiaries disseminated and communicated project activities and results by other means than scientific publications (social media, press-release, the project web site, video/film, etc) as planned in the DoA? Do they include a reference to EU funding?	Yes
Dissemination and Communication have been carried out very energetically, exceeding the plan in fact.	
6. Has the plan for the exploitation and dissemination of the results (if required) been updated and implemented as described in the DoA, in particular as regards intellectual property rights? Is it appropriate?	Yes
The plan is implemented.	
7. Has the data management plan (DMP) (if required) been updated and implemented? Is it appropriate?	Not applicable
8. Have the proposed institutional changes been appropriately promoted?	Not applicable

5. Resources

1. Were the resources used as described in the DoA and were they necessary to achieve its objectives? If there are deviations from planned budget, have they been satisfactorily explained? Have they been used in a manner consistent with the principle of sound financial management (in particular economy, efficiency and effectiveness)?	Yes
Some well explained deviations from the budget occurred due to Covid and hiring problems that were noted as one of the risks. Financial management has been sound and the mitigation measures are also sound. All indications are that the budget deviations will be evened out as the project progresses.	

Expert opinion on deliverables

Deliverable number	Deliverable name	Status	Comments
D1.1	Project Quality Management Handbook	Accepted	
D1.2	First Intermediate Progress Report	Accepted	
D2.1	Communication and Dissemination Plan	Accepted	The communication and dissemination plan is excellent.
D2.2	Public website	Accepted	The web site is regularly updated.
D2.3	Table of Exploitable Results & Exploitation Plan	Accepted	For each targeted TRL, initial value should be indicated.
D2.4	Communication Dissemination first intermediate report	Accepted	
D2.5	Exploitation first intermediate report	Accepted	Webinars are an excellent tool. Together with the targeted TRL's, assesment on the current state of TRL's are needed.
D3.1	myQLM (with support of HW platforms) Specification document	Accepted	
D3.2	Design document benchmark methodology	Accepted	
D4.1	VA Beta and BBO Beta (Open source software)	Accepted	
D4.2	QCCC Alpha (Open source software)	Accepted	
D5.1	Review of state-of-the-art for Pricing and Computation of VaR	Accepted	Very practical and interesting review.
D6.1	QNLP design and formal specification	Accepted	
D6.2	QRBS models, architecture and formal specification	Accepted	
D6.3	QNLP pre-alpha prototype	Accepted	Very nice examples.
D6.4	QPSA Divide and quantum mathematical foundation	Accepted	
D6.5	QRBS requirements analysis	Accepted	
D6.6	QPSA Divide and Quantum open source software	Accepted	

Expert opinion on milestones

Milestone number	Milestone name	Achieved	Comments
MS1	M3.1 - Readiness of Libraries integration process & tools	Yes	OK.
MS6	M4.1 - Progress point on deliverables D4.3 and D4.4	Yes	OK.
MS10	M5.1 - Progress point on deliverables D5.3.1, D5.3.2, and D4	Yes	OK.
MS16	M6.1 - QNLP and QRBS specifications	Yes	Very good progress.
MS17	M6.2 - QNLP, QPSA, QRBS foundations	Yes	Very good progress.