European High Performance Computing Joint Undertaking

REF: EUROHPC-2022-CEI-QC-01

CALL FOR EXPRESSION OF INTEREST

for the hosting and operation of European quantum computers integrated in HPC supercomputers

Contents

1. INTRODUCTION – CONTEXT AND BACKGROUND

The European High Performance Computing Joint Undertaking (hereinafter "EuroHPC JU") was established by Council Regulation (EU) 2021/1173 of 13 July 2021 (hereinafter "Regulation") and entered into force on 8 August 2021[1].

According to Article 3 of the Regulation, the mission of the EuroHPC JU is to develop, deploy, extend and maintain in the Union a federated, secure hyperconnected supercomputing, quantum computing, service and data infrastructure ecosystem; to support the development and uptake of demand-oriented and user-driven innovative and competitive quantum computing systems based on a supply chain that will ensure the availability of components, technologies and knowledge, therefore limiting the risk of disruptions while ensuring the development of a wide range of applications optimised for these systems; and, to widen the use of that quantum computing infrastructure to a large number of public and private users, and to support the transition and the development of key skills for European science and industry.

One of the targets of the EuroHPC JU is to develop and support a highly competitive and innovative quantum computing ecosystem broadly distributed in Europe contributing to the scientific, industrial, and digital leadership of the Union, capable of autonomously producing quantum computing technologies and architectures and their integration on leading HPC computing systems, and advanced applications optimised for these systems. The primary objective of this action is to make available to users European quantum computers integrated with EuroHPC Participating States HPC computers, in a hybrid configuration, in order to address a growing demand from European industry and academia for applications with industrial, scientific and societal relevance for Europe. The activities should leverage European technology, in particular quantum computing technologies developed within the Quantum Flagship, other European initiatives and national Quantum research programmes of the EuroHPC Participating States. The action should foster the emergence of real use case applications, and mature quantum computing in Europe. This will contribute to the development of an ecosystem of quantum programming facilities, application libraries and skilled workforce.

The action will cover the acquisition of the quantum computers, their integration with the HPC infrastructure including the development of a quantum software stack, and their operations. The aim is to support multiple proposals with diverse qubit technologies to give users access to as many different quantum technologies as possible. The action should seek synergies and cooperation with the relevant projects at European or national level developing or testing the different layers of the software stack, quantum applications, or use cases, notably the projects resulting from the Quantum Flagship call HORIZON-CL4-2021-DIGITAL-EMERGING-02-10: Strengthening the quantum software ecosystem for quantum computing platforms.

In accordance with Article 12 of the Regulation, the EuroHPC JU shall proceed to the acquisition of quantum computers, funded by the Union's budget stemming from the Digital Europe Programme by contributions from the relevant Participating States to the EuroHPC JU. In accordance with Article 12 of the Regulation, the Union's contribution from Digital Europe Programme should cover up to 50 % of the acquisition costs, up to 50% of the costs for the integration of the quantum computer with the existing supercomputer of the hosting entity and up to 50 % of the operating costs of these quantum computers. The EuroHPC JU will be the owner of the quantum computers it has acquired.

Pursuant to Article 9 of the Regulation, the EuroHPC JU shall entrust to a hosting entity the operation of each individual quantum computer it owns in accordance with Article 10 of the Regulation.

The hosting entity shall be selected by the Governing Board of the EuroHPC JU (‘Governing Board’) following a Call for Expression of Interest evaluated by independent experts.

[1] OJ L 256, 19.07.2021, p. 3-51

The present Call for Expressions of Interest is launched for the selection of a hosting entity of a quantum computer the EuroHPC JU will acquire as mandated, on the basis and in accordance with the Council Regulation (EU) 2021/1173, taking into account the EU Financial Regulation[2] where relevant, on the basis of Financial Rules of the EuroHPC JU[3].

This action is an EU Synergy call. Grants and procurements can be linked with another grant funded from any other EU funding programme. The grants under both calls will be managed as linked actions.

2. OBJECTIVES

The overall objective of this call is to select hosting entities for quantum computers, which will be acquired by the EuroHPC JU.

The specific objectives of this call are the following:

- Selection of hosting entities and conclusion of a hosting agreement: The EuroHPC JU will select hosting entities for quantum computers and will conclude a hosting agreement, which will permit to establish a stable and structured partnership between the EuroHPC and the hosting entity for the acquisition, integration and operation of the quantum computer.
- Integration of the quantum computer to EuroHPC Participating State supercomputer infrastructure systems.
- Operation of the quantum computers for the EuroHPC Joint Undertaking

By submitting the application, applicant hosting entities provide their prior acceptance with the terms and conditions set in the model hosting agreement. The hosting agreement to be signed will follow the model used in the Call for expression of interest for the selection of a Hosting Entity for a high-end Supercomputer (EUROHPC-2021-CEI-EXA-01)which can be found in EuroHPC Joint Undertaking website[4].

The hosting agreement will be adapted to the particular application awarded and will be approved by the Governing Board before signature.

The EuroHPC JU will evaluate, with the help of external experts, the received applications to the call for expression of interest and will set up a ranking list of potential hosting entities (and their hosting consortia) for the quantum computers. From this ranking list, the EuroHPC JU, by decision of its Governing Board, will make a selection of the hosting entities. Inclusion in the list entails no obligation on the part of the EuroHPC JU for the conclusion of any contract.

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[2] Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012, *OJ L 193, 30.7.2018, p. 1–222; ("FR")*

(https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32018R1046)

[3] Decision of the Governing Board of the EuroHPC JU No 3/2020 Approving the Financial Rules of the EuroHPC Joint Undertaking readopted by Decision of the Governing Board of the EuroHPC JU No 17/2021 approving the re-adoption of Governing Board Decisions adopted under the framework of Regulation (EU) 2018/1488 and its updated Rules of Procedure in the view of Regulation (EU) 2021/1173.

[4] https://eurohpc-ju.europa.eu/sites/default/files/2021-12/03-%20Annex2_%20Hosting%20Agreement%20HighEnd%20.pdf

Following this selection:

- A hosting agreement between the EuroHPC JU and the selected hosting entities will be signed, laying down the terms and conditions for hosting and operating the quantum computers on behalf of the EuroHPC JU, including a service level agreement (Regulation Article 10).The hosting agreement shall specify the timing of the transfer to the EuroHPC JU of the selected hosting entity's financial contribution to the acquisition costs of the quantum computer. The EuroHPC JU will be the sole responsible for implementing the acquisition process. However, the hosting entity will be associated to the process, e.g. for verification of the technical specifications to be met by the suppliers. The hosting agreement is part of the outcome of the Call for Expression of Interest. It is the first contractual arrangement to be signed.
- A second contractual arrangement between the EuroHPC JU and the Hosting Entities shall be signed to cover the funding of the quantum computer's operating costs (specifying among others and if applicable any pre-financing of the hosting entity by the EuroHPC JU), which will be covered up to 50 % by the Union contribution. The operating costs should follow a well-defined, jointly agreed (with the hosting entity) and auditable model, which will be part of the contractual arrangement. There will be no transfer of funds from the hosting entity to the EuroHPC JU for the operating costs: the EuroHPC JU will cover its share of the eligible costs, while the hosting entity (or hosting consortium) will cover the remainder of the eligible costs.
- Following the selection of the hosting entities, the EuroHPC JU will initiate the procurement of the quantum computers. The specific conditions of the procurement will be defined in a Call for Tender. For security related reasons and as the action is directly related to the Union's strategic autonomy, the participation of suppliers in the acquisition of the quantum computers will be subject to conditions in accordance with Article 12(6) of Regulation (EU) 2021/694, and in accordance with Article 18(4) of that Regulation.
- The quantum computers should be hosted in national Supercomputer Centres already established in Member States that are Participating States of the Joint Undertaking. The selection will aim at ensuring a diversity in the technologies and architectures of the different quantum computers to be acquired.
- A third contractual arrangement between the EuroHPC JU and the Hosting Entities shall be signed to cover the costs of integrating the quantum computer with the hosting entity's supercomputer.

3. BUDGET AVAILABLE

The EuroHPC JU estimates that an EU contribution of between EUR 8 – 10 million matched by a MS contribution of EUR 8 – 10 million per quantum computer would allow for the acquisition and operation of at least three quantum computers covering different qubit technologies.

The total budget for the EU contributions to the topic is up to EUR 40 million.

The EuroHPC JU shall acquire at least 3 quantum computers in 2022 and shall own them. The Union financial contribution to the EuroHPC JU shall cover up to 50 % of the acquisition costs, up to 50 % of the operating costs of the quantum computer, and up to 50% of the integration costs. The remaining total cost of ownership of the quantum computer (including VAT if applicable) shall be covered by the

Participating State where the hosting entity is established or by the Participating States in the hosting consortium[5].

Grants will be established to cover the operating costs of the quantum computer[6]. The reimbursement from the EuroHPC JU will be calculated on the basis of the declared costs up to the maximum total contribution of the EuroHPC JU or up to a ceiling of 50 % of the declared eligible costs, whichever is lower.

Grants will be established to cover costs of integrating costs of the quantum computer with the hosting entity's supercomputer. The reimbursement from the EuroHPC JU will be calculated on the basis of the declared costs up to the maximum total contribution of the EuroHPC JU or up to a ceiling of 50 % of the declared eligible costs, whichever is lower.

The costs related to the adaptation of the hosting site per se (e.g. costs related to the building infrastructure that will host the quantum computer) shall not be covered by the EuroHPC JU. However, the costs of the preparation of the hosting site incurred by the hosting entity that can be directly accounted to the installation of the quantum computer may be considered as part of the Total Cost of Ownership (TCO) and may thus be considered as eligible costs that can be covered by the EuroHPC JU.

4. CONTENT OF THE EXPRESSIONS OF INTEREST

The expressions of interests should be submitted using the application form document *02 Annex 1* (EuroHPC HE Application Form). Appendix 1 of the present document provides information on how to fill the Application Form.

5. ADMISSIBILITY REQUIREMENTS

In order to be admissible, applications should

a) be sent no later than the 30 June 2022 at 17:00 CET Luxembourg time.
b) be submitted in writing (see section 11 "Procedure for the submission"), using the application form found in the Annex 1 (EuroHPC HE Application Form) and available at *https://eurohpc-ju.europa.eu/current-calls*.
c) be submitted in the English language.

Failure to comply with those admissibility requirements will lead to the rejection of the application.

6. ELIGIBILITY CRITERIA

The call is open to entities or consortia of entities fulfilling cumulatively the following conditions as defined in Article 9 of the Regulation:

a) The applicant hosting entity shall include the facilities to host and operate a quantum computer in a Participating State to the EuroHPC JU that is a Member State. The applicant hosting entity may represent one Participating State that is a Member State or a hosting consortium of Participating States that have agreed to contribute to the acquisition, integration and operation of the quantum computer. The applicant hosting entity and the competent authorities of the

[5] 'hosting consortium' means a group of Participating States or a consortium of private partners that have agreed to contribute to the acquisition and operation of a EuroHPC supercomputer, including any organisations representing these Participating States'

[6] The EuroHPC JU Model Grant Agreement can be found on the EuroHPC JU website: https://eurohpc-ju.europa.eu/

Participating State or Participating States in a hosting consortium shall enter into an agreement to this effect.

b) The coordinating applicant has to be registered as a legal entity in one of the Participating States that is a Member State.

c) The applicant(s) should have a legal personality on the date of the deadline for submission of applications and should be able to demonstrate its (their) existence as a legal person. In case the application is submitted by several Participant States working together (consortium), this criterion (c) applies to all entities.

d) Applications should include the provision of appropriate supporting documentation proving the commitment of the Member State where the hosting entity is established and, in the case of a hosting Consortium, of the competent authorities of the Participating States of the hosting consortium to cover the share of the total cost of ownership of the quantum computer that is not covered by the Union contribution as set out in Article 5 of the Regulation or any other Union contribution as set out in Article 6 of the Regulation, either until its ownership is transferred by the EuroHPC JU to that hosting entity or until the quantum computer is sold or decommissioned in case there is no transfer of ownership.

e) The JU will act as first user and acquire quantum computers or simulators that integrate technology primarily developed in the Union. In order to achieve the expected outcomes, and safeguard the Union's strategic assets, interests, autonomy, and security, it is important to avoid a situation of technological dependency on a non-EU source, in a global context that requires the EU to take action to build on its strengths, and to carefully assess and address any strategic weaknesses, vulnerabilities and high-risk dependencies which put at risk the attainment of its ambitions. Therefore, participation is limited to legal entities established in Member States that are members of the EuroHPC Joint Undertaking, and not controlled by third countries. Proposals including entities established in countries outside the scope specified in the call/topic/action will be ineligible.

In case of a hosting consortium, the hosting agreement shall take the form of a partnership in Participating States, of which the hosting entity will take the lead and act as coordinator of the hosting consortium. The co-ordinator will act as an intermediary for all communications between the EuroHPC JU and the partners of the hosting consortium. However, partners are jointly responsible for implementing the action resulting from the awarded hosting agreement. To implement the action properly, they should make appropriate internal arrangements.

The hosting entity shall assume full liability towards the EuroHPC JU for the performance of the agreement as a whole, including financial and operational liability

In accordance with Article 9 of the Regulation, after the selection of the hosting entity, the Participating State where the selected hosting entity is established (in the case of an application including only one Participating State) or the corresponding hosting consortium may decide to invite, subject to the prior agreement of the Commission, additional Participating States, or a consortium of private partners, to join the hosting consortium. The financial or in-kind contribution or any other commitment of the joining Participating States, or Private Members, shall not affect the Union financial contribution and the corresponding ownership rights and percentage of access time allocated to the Union with regard to that quantum computer as defined in Article 12 of the Regulation.

In the case of a joint application, the hosting entity should be given power of attorney to represent the other parties to sign and administrate the hosting agreement (consortium leader).

In order to assess the applicants' eligibility, the following supporting documents are requested:

- The legal entity identification form (http://ec.europa.eu/budget/contracts_grants/info_contracts/legal_entities/legal_entities_en.cfm) duly completed and signed by the person authorised to enter into legally binding commitments on behalf of the applicant organisation(s) to be submitted in original;
- Hosting consortium: in addition to the supporting documents referring to their legal status, the hosting consortium members will submit a signed declaration based on the model Consortium Agreement/Power of Attorney, appointing a consortium leader and giving a mandate to him (included as annex b).
- Each applicant and Participating State in a hosting consortium should fill-in and provide the duly signed Declaration of Honour (included as annex a).

The following entities will be considered as non-eligible:

a) natural persons;
b) entities without legal personality.

7. EXCLUSION CRITERIA

7.1. Exclusion[7]

The Executive Director of the EuroHPC JU shall exclude an applicant from participating in this call for expression of interest where:

(a) the applicant is bankrupt, subject to insolvency or winding-up procedures, its assets are being administered by a liquidator or by a court, it is in an arrangement with creditors, its business activities are suspended, or it is in any analogous situation arising from a similar procedure provided for under EU or national laws or regulations;

(b) it has been established by a final judgment or a final administrative decision that the applicant is in breach of its obligations relating to the payment of taxes or social security contributions in accordance with the applicable law;

(c) it has been established by a final judgment or a final administrative decision that the applicant is guilty of grave professional misconduct by having violated applicable laws or regulations or ethical standards of the profession to which the applicant belongs, or by having engaged in any wrongful intent or gross negligence, including, in particular, any of the following:

(i) fraudulently or negligently misrepresenting information required for the verification of the absence of grounds for exclusion or the fulfilment of eligibility or selection criteria or in the performance of a contract, a grant agreement or a grant decision;

(ii) entering into agreement with other applicants with the aim of distorting competition;

(iii) violating intellectual property rights;

(iv) attempting to influence the decision-making process of the EuroHPC JU during the award procedure;

(v) attempting to obtain confidential information that may confer upon it undue advantages in the award procedure;

[7] Article 136 FR

(d) it has been established by a final judgment that the applicant is guilty of any of the following:

(i) fraud, within the meaning of Article 3 of Directive (EU) 2017/1371 of the European Parliament and of the Council and Article 1 of the Convention on the protection of the European Communities' financial interests, drawn up by the Council Act of 26 July 1995;

(ii) corruption, as defined in Article 4(2) of Directive (EU) 2017/1371 or Article 3 of the Convention on the fight against corruption involving officials of the European Communities or officials of Member States of the European Union, drawn up by the Council Act of 26 May 1997, or conduct referred to in Article 2(1) of Council Framework Decision 2003/568/JHA, or corruption as defined in the applicable law;

(iii) conduct related to a criminal organisation, as referred to in Article 2 of Council Framework Decision 2008/841/JHA;

(iv) money laundering or terrorist financing within the meaning of Article 1(3), (4) and (5) of Directive (EU) 2015/849 of the European Parliament and of the Council;

(v) terrorist offences or offences linked to terrorist activities, as defined in Articles 1 and 3 of Council Framework Decision 2002/475/JHA, respectively, or inciting, aiding, abetting or attempting to commit such offences, as referred to in Article 4 of that Decision;

(vi) child labour or other offences concerning trafficking in human beings as referred to in Article 2 of Directive 2011/36/EU of the European Parliament and of the Council;

(e) the applicant has shown significant deficiencies in complying with main obligations in the performance of a contract, a grant agreement or a grant decision financed by the Union's budget, which has led to its early termination or to the application of liquidated damages or other contractual penalties, or which has been discovered following checks, audits or investigations by an authorising officer, OLAF or the Court of Auditors;

(f) it has been established by a final judgment or final administrative decision that the applicant has committed an irregularity within the meaning of Article 1(2) of Council Regulation (EC, Euratom) No 2988/95;

(g) it has been established by a final judgement or final administrative decision that the applicant has created an entity in a different jurisdiction with the intent to circumvent fiscal, social or any other legal obligations of mandatory application in the jurisdiction of its registered office, central administration or principal place of business;

(h) it has been established by a final judgement or final administrative decision that an entity has been created with the intent referred to in point (g);

(i) for the situations referred to in points (c) to (h) above, the applicant is subject to:

(i) facts established in the context of audits or investigations carried out by European Public Prosecutor's Office after its establishment, the Court of Auditors, the European Anti-Fraud Office or the internal auditor, or any other check, audit or control performed under the responsibility of an authorising officer of an EU institution, of a European office or of an EU agency or body;

(ii) non-final judgments or non-final administrative decisions which may include disciplinary measures taken by the competent supervisory body responsible for the verification of the application of standards of professional ethics;

(iii) facts referred to in decisions of persons or entities being entrusted with EU budget implementation tasks;

(iv) information transmitted by Member States implementing Union funds;

(v) decisions of the Commission relating to the infringement of Union competition law or of a national competent authority relating to the infringement of Union or national competition law; or

(vi) decisions of exclusion by an authorising officer of an EU institution, of a European office or of an EU agency or body.

7.2. Remedial measures[8]

If an applicant declares one of the situations of exclusion listed above, it should indicate the measures it has taken to remedy the exclusion situation, thus demonstrating its reliability. This may include e.g. technical, organisational and personnel measures to prevent further occurrence, compensation of damage or payment of fines. The relevant documentary evidence which illustrates the remedial measures taken should be provided in annex to the declaration. This does not apply for situations referred in point (d) of section 7.1.

7.3. Rejection from the call

The Executive Director of the EuroHPC JU shall not conclude a hosting agreement with an applicant who:

a. is in an exclusion situation established in accordance with section 7.1;
b. has misrepresented the information required as a condition for participating in the procedure or has failed to supply that information.

The same exclusion criteria apply to affiliated entities.

Administrative sanctions (exclusion) may be imposed on applicants, or affiliated entities where applicable, if any of the declarations or information provided as a condition for participating in this procedure prove to be false.

7.4. Supporting documents

Applicants and affiliated entities should provide a declaration on their honour certifying that they are not in one of the situations referred to above under 7.3., by filling in the relevant form attached to the application form accompanying the Call for Expression of Interest and available at *https://eurohpc-ju.europa.eu/participate.html*

8. EVALUATION CRITERIA

Eligible applications will be evaluated according to the following evaluation criteria (based on the list of criteria in Article 8(5) of the Regulation):

1. Compliance with the general system specifications defined in the call for expression of interest (section 12.2); (0-20 points)

[8] Article 136 (7) FR

- *Quality and pertinence of the application to comply with the general system specifications defined in this call for both the quantum computer and the hosting site as well as the integration into the HPC supercomputer of the hosting site.*
- *Soundness of the concept, and credibility of the application.*

2. Estimation of Total Cost of Ownership (TCO) of the quantum computer and methodology to calculate it including an accurate estimate and a verification method of the operating cost of the quantum computer during its lifetime; (0-20 points)

   - *Clarity and effectiveness of the estimated TCO of the application.*
   - *Appropriateness of the methodology to calculate, report, validate and verify the operating costs.*

3. Experience of the hosting entity in working with quantum technologies or installing and operating integrated HPC systems/modules; (0-20 points)

   - *Capability and pertinence of expertise of the hosting entity in quantum technologies and in particular, quantum computing (development, utilization, user community ...).*
   - *Quality and pertinence of experience of the hosting entity in HPC technologies (in particular, development, utilization, user community ...)*
   - *Quality and pertinence of experience and know-how of the hosting to address the challenges of the future integrated HPC/quantum environment.*
   - *Sufficiency of the provided experience for supporting the system described in the general system specifications.*

4. Quality of the hosting facility's physical and IT infrastructure, its security and its connectivity with the rest of the Union; (0-20 points)

   - *Quality and pertinence of the current and proposed hosting facility's physical and IT infrastructure, its security and its connectivity with the rest of the Union.*
   - *Quality and effectiveness of the proposed plan for the readiness of the site to host the quantum computer including detailed risk assessment and effective mitigation measures.*

5. Quality of service to the users, namely capability to comply with the service level agreement provided among the documents accompanying the selection procedure; (0-20 points)

   - *Quality and pertinence of service to the users, namely capability to comply with the service level agreement provided in the Hosting application.*
   - *Quality of the proposed coordination and/or support measures to ensure requested service level towards EuroHPC JU users.*

Points will be allocated out of a total of 100 on the basis of the above-specified weighting. A minimum threshold of 10 points for each criterion and 60 points for the total will be applied. Applications below these thresholds will be rejected.

For each criterion, if appropriate, applicants should provide detailed information about the role and tasks to be carried out by each consortium member.

9. OVERVIEW OF THE EVALUATION AND SELECTION PROCEDURE

The EuroHPC JU is responsible for the implementation of the evaluation of the received expressions of interest. It shall organise the submission and evaluation procedures and communicates with the applicants.

9.1. Evaluation procedure

The submitted applications will be evaluated in a procedure by a panel of five independent experts. These experts will be appointed by the EuroHPC JU on the basis of the procedure followed under Digital Europe Programme. For the applications considered admissible according to the section 5, the EuroHPC JU will assess the eligibility and exclusion criteria according to the sections 6 and 7 above. Only eligible applications will be evaluated.

- **Individual evaluations**: In the first step, independent experts shall carry out individually the evaluation of expressions of interest on the basis of the evaluation criteria described in section 8 above. They give a score for each criterion, with explanatory comments. These individual reports form the basis of the further evaluation.

- **Consensus meetings**: After carrying out their individual assessment, all the panel members shall convene in a consensus meeting, to agree on a common position, including comments and scores and prepare a consensus report. The penal members might be assisted by the group of experts that carried out the individual evaluations. The consensus meetings shall be moderated by a Senior Officer of the EuroHPC JU who shall seek consensus, impartially, and ensure that all applications are evaluated fairly, in line with the relevant evaluation criteria.

- **Panel review:** The review panel shall be chaired by the Executive Director of the EuroHPC JU. The panel will review the scores and comments for all applications to check for consistency across the evaluations. If necessary, it will propose a new set of marks or revise comments, and resolve cases where evaluators were unable to agree. The panel will prepare a preliminary evaluation summary report, including questions to be clarified during the hearings.

    - **Hearings:** Applicants will be invited to hearings with the experts to clarify the questions of the panel. The applicants will receive the relevant questions two weeks in advance of the hearings. Hearings shall consist of oral presentations (approx. 60 minutes) by the applicants of their application and of their responses to the questions of the evaluation panel. The panel may ask further clarifications on the presentation and original questions. The presentation and responses shall not lead to an alteration of the application submitted but shall aim to ensure the proper understanding of the application. The hearing will last a maximum of 120 minutes. A maximum of five representatives from the applicant can participate in the hearing. Members of the EuroHPC JU Governing Board can participate as observers during the hearings. Hearings will be physically held in principle in Luxembourg (unless otherwise specified).

    - **Finalisation of Panel review:** After the hearings, the review panel will reconvene to establish its final ranking list and scores according to the evaluation criteria provided in section 8 above. Only applications above threshold will be ranked by the review panel according to the evaluation criteria total score. If necessary, a priority order for applications with the same score will be determined in the ranked list, according to the following approach:

    Applications with the same score: Applications with the same total score will be prioritised according to the scores they have received for the evaluation criterion "*Compliance with the general system specifications defined in the call for expression of interest*". When these scores are equal, priority will be based on scores for the evaluation criterion "*Experience of the hosting entity in installing and operating similar systems*", then "*Total cost of ownership of the quantum computer*" and then "*quality of the hosting's facility's physical and IT infrastructure*". These factors will be documented in the Panel Report.

9.2. Selection

The Executive Director of the EuroHPC JU will review the results of the evaluation panel and will elaborate a final ranking list based on the list proposed by the panel and aiming at ensuring diversity in the qubit technologies of the different quantum computers. The Executive Director may suggest to the Governing Board to deviate from the ranking proposed by the panel with a justification, for the consideration of the Governing Board.

This final ranking list shall consist of:

- a main list with the application to be selected as Hosting Entity as proposed by the experts complemented by any suggestion for deviation from this list as proposed by the Executive Director;
- a reserve list, with applications that have passed the evaluation thresholds. Applicants in the reserve list might be offered the possibility to become hosting entities and thus, conclude a hosting agreement, in case for whichever reason a hosting agreement cannot be established with a higher ranked application or additional funds become available.

In addition, the EuroHPC JU will prepare a list with applications that did not pass the evaluation thresholds or were found to be ineligible.

The Executive Director will submit the final ranking list, together with the Evaluation Summary Reports, to the Governing board of the EuroHPC JU with a proposal for selection of the Hosting Entities for their approval.

The Governing Board will make the final selection of the Hosting Entities, which will be invited to establish hosting agreement with the EuroHPC JU.

After the decision of the Governing Board, all applicants will be informed in written by the EuroHPC JU of the outcome of the evaluation in the form of an Evaluation Summary Report (ESR). The EuroHPC JU will also inform about the final selection or rejection of applications.

The EuroHPC JU will invite the selected applicant to the next stages for the signature of the hosting agreement, and the preparation of the acquisition of the quantum computer, but the invitation is not a commitment that the EuroHPC JU will launch the acquisition procedure. The hosting agreement shall be approved by the Governing Board before its signature by the respective parties.

9.3. Communication

The information contained in the present call document provides all the information required to submit an application. Please read it carefully before doing so, paying particular attention to the priorities and objectives of the present call.

All enquiries should be made by e-mail only to:

Contact point for any questions is[9] info@eurohpc-ju.europa.eu

Questions may be sent by to the above address no later than the **15 May 2022 – 12:00 CET** , defined as "Deadline to submit questions about the Call" in Section 10.

The EuroHPC JU has no obligation to provide clarifications to questions received after this date.

Replies will be given/published no later than the "Publication of the last answers to questions" defined in the Timeline in section 10.

[9] Questions on submission must be sent before the deadline indicated in section 10

To ensure equal treatment of applicants, the EuroHPC JU will not give a prior opinion on the eligibility of applicants, or affiliated entity(ies), an action or specific activities.

No individual replies to questions will be sent but all questions together with the answers and other important notices will be published (FAQ in EN) at regular intervals on the website under the relevant call: *https://eurohpc-ju.europa.eu/current-calls*

The EuroHPC JU may, on its own initiative, inform interested parties of any error, inaccuracy, omission or clerical error in the text of the Call for Expression of Interest on the mentioned website *https://eurohpc-ju.europa.eu/current-calls*. It is therefore advisable to consult this website regularly in order to be informed of any updates and of the questions and answers published.

No modification to the applications is allowed once the deadline for submission has elapsed. If there is a need to clarify certain aspects or to correct clerical mistakes, the EuroHPC JU may contact the applicant for this purpose during the evaluation process. This is generally done by e-mail. It is entirely the responsibility of applicants to ensure that all contact information provided is accurate and functioning.

In case of any change of contact details, please send an email with the application reference and the new contact details to info@eurohpc-ju.europa.eu

In the case of hosting consortia, all communication regarding an application will be done with the lead applicant only, unless there are specific reasons to do otherwise, where the consortium coordinator should be in copy.

Applicants will be informed in writing about the results of the selection process. Unsuccessful applicants will be informed of the reasons for rejection. No information regarding the award procedure will be disclosed to the public until the notification letters have been sent to the partners.

10. TIMETABLE

The steps and indicative times for the procedure from publication to expected start of the mandate for the selected Hosting Entities are in the table below:

Selection of HE milestones	Date and time or indicative period
Call for Expression of Interest Publication	
Publication of Call for Expressions of Interest	31-03-2022
Submission of applications	
Deadline to submit questions about the Call	15-05-2022 - 12:00 CET
Publication of the last answers to questions	
Call Deadline	30-06-2022 - 17:00 CET
Application Opening day (open of envelopes with expressions of interest)	
Evaluation	July 2022
Sending questions for the hearings	
Hearings	
Notification of results to applicants	

Signature of the hosting agreement	October 2022
Period for additional Participating States to join Consortium	
Signature of hosting agreement	

11. PROCEDURE FOR THE SUBMISSION OF APPLICATIONS

Applications **should be sent no later than the 30 June 2022 at 17:00 CET** .

- Application forms are available at *https://eurohpc-ju.europa.eu/current-calls*
- Applications must be submitted in the correct form, duly completed and dated. They must be submitted in electronic format, digitally signed by the person authorised to enter into legally binding commitments on behalf of the applicant organisation.
- Applications must be submitted by an electronically signed and encrypted email to calls@eurohpc-ju.europa.eu. The application files should be packaged in a password protected zip file.
- Contact point for any questions is[10] *info@eurohpc-ju.europa.eu*
- All applications will be treated confidentially, as well as any submitted related information, data, and documents. The EuroHPC JU will ensure that the process of handling and evaluating applications is carried out in a confidential manner.
- External experts are also bound by an obligation of confidentiality.
- Applicants should avoid taking any actions that could jeopardise confidentiality. They must not attempt to discuss their application with persons you believe may act as expert evaluator for the EuroHPC JU.
- Your application should not contain any information that is 'EU classified' under the rules on security of information in the Commission security rules for protecting EU classified information (see also Classification of Information in HE Projects).
- The EuroHPC JU will process personal data in accordance with Regulation (EU) 2018/1725 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC[11].
- Once the coordinator (or sole applicant) has submitted an expression of interest, an acknowledgement of receipt will be sent by the JU. No other interaction will take place with the EuroHPC JU until the application has been evaluated, unless:
- The EuroHPC JU needs to contact the applicant (usually through the coordinator) to clarify matters such as eligibility or to request additional information.

- The list of Annexes included as part of this call is:
- Annex 1: Application form (please fill in the application form, including its annexes, and provide the relevant supporting documents – all listed below). Includes the checklist for applicants included at the end of the application form and the following annexes:
    - Annex a Declaration of honour
    - Annex b Mandate letters (if applicable)

[10] Questions on submission must be sent before the deadline indicated in section 10

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018R1725

- Other supporting documents to be provided where applicable: see checklist for applicants

Regarding the compilation of the application file, it is recommended to follow the order of documents as listed in the checklist (and attach a ticked checklist as below to the application)

12. APPENDIX 1: CONTENT OF THE APPLICATION

12.1. Structure of the Application

Applicants should use the application form template for their applications (designed to highlight important aspects and facilitate the assessment against the evaluation criteria).

The application form is structured in two main sections. In the first section, "Information on the applicants", the application should provide administrative details about the applicants and consortium, including contact details and legal representatives.

The second section "Information on the Action" is divided in five subsections. In the first subsection, applicants should describe how the following general system specifications will be met, for both the quantum computer and the site. In the second subsection "Total Cost of Ownership", the applicant should include an estimation of the total cost of the acquisition and operations of the quantum computer that the applicant has in mind to host and that has been described in the previous section "general system specifications". In subsection 3, applicants should provide information on their know-how and expertise. In subsection 4, Applicants should provide information on the hosting physical and IT infrastructure, including security and connectivity that the site can provide for the quantum computer. In the last subsection, "Quality of service to the users, namely capability to comply with the service level agreement", the applicant should specify the benchmarks or deliverables which the applicant intends to employ to achieve the expected results and targets and how they will be used.

The application form includes a guide on how to fill it explanation for all sections.

Character and page limits:

- page limit: 90 pages
- minimum font size — Arial 8 points
- page size: A4
- margins (top, bottom, left and right): at least 15 mm (not including headers & footers).
- pagination instructions: each document from the application should be individually numbered in the bottom right corner.

As part of the application, applicants should provide a formal statement indicating whether the hosting consortium would be ready or not to include additional Participating States if selected. Such statement should also include the indicative amounts of the contribution of the additional Participating States.

12.2. General system specifications

Applicants should describe how the following general system specifications will be met, for the quantum computer, the supercomputer of the hosting entity and the hosting site (the data centre).

The application should enable the development of real use cases supporting the adoption of applications with scientific, industrial and societal relevance for Europe. Although identified applications do not need to provide a definite quantum advantage, they should allow the development of libraries for quantum computers/simulators in a HPC environment.

Furthermore, the applications should support the implementation and testing of quantum software stacks, libraries etc., which facilitate the link from a high-level description of algorithms to a low-level implementation on the hardware, for solving concrete problems and applications expected to

demonstrate quantum advantage. The Quantum/HPC integration should follow a co-design approach together with the development of applications that will run on the quantum computers, thus contributing to the advance of new quantum software and applications. The applications, software and the high-level implementation should, to the extent possible, be independent of the underlying qubit platforms and they should be run/tested on as many integrated quantum computing platforms as possible within the EuroHPC infrastructure.

The quantum computers can range from pilots and experimental systems to prototypes and operational systems. The quantum computers should have at least 10 qubits, with a 2-qubit gate error rate of less than 1%, or equivalently with a 2-qubit gate fidelity at least above 99%, and allow for a maximum circuit depth and number of entangled qubits by the installation date. The quantum computer should integrate EU technologies and uptake research outputs emanating from Quantum Flagship/Eu-funded projects or from national research programmes of the EuroHPC Participating States. Applications to the Call for Expression of Interest should clearly identify the technical features of the targeted quantum computer, including the quantum processing unit (qubits, entanglement capability, control etc.) and the integration (type interface, interconnection, software stack, etc.) between the quantum computer and the rest of the EuroHPC infrastructure.

The application should also explain how access to the quantum computer integrated in the HPC system of the hosting entity will be implemented in agreement with the EuroHPC JU Access Policy. This is of particular importance for applications from entities where the ownership of the HPC system and the quantum computer will be different and the EuroHPC JU does not own HPC resources.

The selected hosting entities should ensure to the extent possible cooperation with complementary projects launched, notably in the area of the EuroHPC-2020-01-b: “Pilot on quantum simulator”. Successful applicants, should establish from the beginning of this cooperation appropriate IP exploitation agreements. They should also contribute to spreading excellence across Europe, notably through the involvement of participants from EuroHPC Participating States currently developing their HPC/quantum infrastructure, and incorporating results emanating from the Quantum Flagship/Eu funded projects or national research programmes of the EuroHPC Participating States.

The hosting entity will host at the time of delivery of the quantum computer a supercomputer with the following requirements:

- A capability computing system with an aggregated performance level capable of executing at least 4 Petaflop (sustained performance measured using linpack benchmark)
- Covering the needs of a wide range of applications, and in particular of key/grand challenge applications that demonstrably require the capability usage of the quantum computer, also in combination with the supercomputer at the hosting entity, i.e. using simultaneously the quantum computer and significant resources of the existing HPC system.

The hosting site of the quantum computer and interconnected supercomputer should comply with the following requirements:

- UPS power available to cover the critical systems including control electronics equipment of the quantum computing system.
- Adequate capacity for hosting the proposed quantum computing JU system
- Sufficient contiguous floor space available for hosting the proposed quantum computer which will be integrated with the existing supercomputer and auxiliary systems
- At least 100 Gbit/s connectivity towards the rest of the GEANT Network (link capacity).
- Hosting physical security

- Hosting fire mitigation equipment/procedures
- Hosting IT access security
- On call service support teams for IT issues
- Dedicated on-call service team for facilities issues
- Regularly measure the satisfaction of the users with the service via a user survey

Applications should include a description of the proposed quantum computer and hosting site, including features such as:

- Detailed description of the site hosting the system including information about physical constraints relevant for the quantum computer (room temperature, hygrometry, etc)
- Outline description of the hosting entity's HPC supercomputer where the quantum computer will be integrated including
    - System architecture
    - Type of nodes and their configuration (e.g. accelerated, CPU, High memory, etc.)
    - Memory and storage capacities and architecture
    - Ratio of different node types within the system (accelerator/CPU, memory size,...)
- Description of the main features of the targeted quantum computer system including e.g:
    - Technical features of the targeted quantum computer, including the quantum processing unit (qubits / individual quantum units, entanglement capability, control, error rate, gate fidelity etc.)
    - Physical requirements (room temperature, hygrometry, expected dimension etc.)
    - Information on expected maturity of the technology at the time of delivery
    - Information on the expected availability of the components, manufacturing timeline and time to delivery after signature of the contract with the vendor of the quantum computer.
- Description of the integration between the quantum computer, the existing supercomputer and the rest of the EuroHPC infrastructure (technical, legal and policy aspects)
    - Planned physical arrangement of the quantum computer and supercomputer in the data centre
    - Type of interface, interconnection, software stack etc.
    - Required hardware and software for the integration with the supercomputer and foreseen developments
    - User access and resource allocation including access models for hybrid quantum-classical algorithms and applications
    - Legal arrangements for the installation and operation of the quantum computer integrated in the supercomputer of the hosting entity
- Collaboration and cooperation with other initiatives such as the call EuroHPC-2020-01-b: "Pilot on quantum simulator" or national programmes
- What type of application domains (e.g. computational, HPDA, AI …) and specific applications (e.g. new materials, drugs design, astrophysics…) will the system be optimised for? What are the expected performance increases for the targeted applications?
- Acceptance tests and benchmarks to be used for the acceptance of the quantum computer

- Other related software/services (support of workflows, workflow management, user interface, quantum software stack, quantum computing libraries, supported programming languages …)

12.3. Total Cost of Ownership (TCO)

The applicant should include an estimation of the cost of the quantum computer that the applicant has in mind to host and that has been described in the previous section "general system specifications".

The estimation of the TCO will be based on an estimation of the acquisition costs of a potential system that complies with the general system specifications and on an estimation of its operating costs. The costs related to the construction of the hosting site per se (i.e., the costs related to the building infrastructure that will host the quantum computer, etc.) shall not be covered by the EuroHPC JU. The costs of the preparation and adaptation of the hosting site incurred by the hosting entity that can be directly accounted to the quantum computer may be considered as part of the TCO.

Applicants should provide their intention with regards to the duration of the operations of the quantum computer in the hosting entity. This should include not only their proposal for the duration of the operations, but their preference with the ownership of the quantum computer once the operations are finished (e.g. buy it, decommissioning it …).

12.3.1. *Site preparation*

The hosting entity should be able to meet the baseline requirements set out herein in time for the anticipated timeline for the delivery of the quantum computer. The applicant should provide a plan of how and in what timeline the preparation of the hosting site for the quantum computer will be realised, including costs of each action (indicating the ones that will be considered as in-kind contribution) and the definitive date at which the site will be ready for the installation of the EuroHPC quantum computer.

12.3.2. *Acquisition Costs*

Applicants should detail the estimation for the cost of the acquisition of the quantum computer. Applicants should indicate clearly what costs will be included in this category, how they will calculate them and who will pay for those.

12.3.3. *Operating Costs*

Applicants should provide an auditable methodology to calculate and to verify the operating costs of the quantum computer for the duration of the action. Applicants should describe the model that will be used for calculating the costs of the Operational expenditures (OPEX), detailing the cost elements included in the model and providing estimates for each cost.

The hosting entity should be in position to provide an accurate estimate and to verify the operating costs of the quantum computer, by ensuring, for example, the functional separation, and to the extent possible, the physical separation of the quantum computers and any national or regional computing systems it operates with the exception of the supercomputer where the quantum computer will be integrated.. The applicants should explain how the quantum computer shares its IT environment, storage, support services and other infrastructure in the data centre and how operating costs will be shared between the supercomputer of the hosting entity and the integrated EuroHPC quantum computer.

The method should be used to calculate the operating costs and the amount that will be covered by Union's contribution. Applicants can use the indicative list of cost elements provided in Appendix 2 to consider in the calculation of the operating costs.

Applications should include at least the following information and/ or estimations:

1. Average power usage effectiveness (PUE) for the current data centre over the last 12 months. And, in the case that the applicant would be upgrading the site to host the quantum computer, what is the planned (design specification) PUE for your upgraded data centre
2. Depreciation time for the building, technical building infrastructure and IT investments and method used for the depreciation of the assets (e.g. linear) associated with the quantum computer.
3. Average cost of IT on-call service (24/7) (internal or outsourced) over the last 12 months. If the existing IT service will not cover the quantum computer a description and cost model should be provided for the planned services.
4. Current electricity price in EUR/kWh (all taxes included) and if available, electricity price in EUR/kWh (all taxes included) at the expected installation time of the quantum computer.
5. Number of system administrators (FTE) expected to be dedicated to the operation of the quantum computing service (including critical auxiliary services such as storage, scheduling system, connection to the supercomputer etc.), including average Person Month cost.
6. Number of user support staff (FTE) expected to be dedicated to the support of the users of the quantum computing service and application support including average Person Month cost.
7. Number of technical support staff (FTE) expected to be dedicated for an Application Support Team including average Person Month cost.
8. IT environment including storage (disks, tapes ...) architecture, capacities and their ability to be extended to serve the user communities of the quantum computing service.
9. Other relevant costs e. g. for the cooling medium

12.3.4. *Integration Costs*

Applicants should detail the estimation for the cost of the integration of the quantum computer with the HPC supercomputer. Applicants should indicate clearly what type costs will be included in this category and how they are calculated.

The application to the call for expression of interest should include the request for a grant to cover the integration of the quantum computer with the existing supercomputer of the hosting entity, including the necessary developments of the quantum hardware and the software stack. Applications should provide sufficient details to understand and evaluate the concept, the feasibility within the proposed timeline (technology, partners etc) and to justify the indicative costs. The description should further explain how co-design will be used to support the development of applications, software and the high-level implementation. Applications and the application programming interface should, to the extent possible, be independent of the underlying qubit platform and they should be run/tested on as many quantum computing platforms as possible within the EuroHPC infrastructure

12.4. Experience of the hosting entity in installing and operating similar systems

Applicants should provide information on their expertise, experience and capabilities in working with quantum technologies as well as installing and operating quantum computers and supercomputers:

- Previous experience with installing and operating quantum and supercomputers. Provide information in case the applicant's site has experience in hosting very early releases of new systems. If relevant, applicants must provide documentation of their experience in having installed systems in the last 5 years (especially systems using quantum computing technologies and supercomputers that ranked in the Top500 at the time of their first listing).
- In the case of installing and operating a supercomputer for a 3rd party (supercomputer is legal title of 3rd party and operated for them at agreed SLA) or operating a supercomputing

service or equivalent major infrastructure for a 3rd party (3rd party pays for a service with agreed SLA, supercomputer is the legal title of the hosting site); applicants must provide a description of the service provided as well as at least one contact person from the 3rd party from whom the JU may request a reference for this service.

- Description of the current organizational structure and the teams of people responsible for the supercomputer operation and management (including user support and specialist support of the HPC systems). If available, include current procedures and tools for system management, help desk project management, configuration management, training and education put in place.
- Description of the current procedures adopted by the supercomputing operation and management team to monitor HPC systems. Please indicate which of these are these are in-house and which are 3rd party solutions; how they have been integrated and customized. List any current Quality Control certifications your organization has obtained for system management, help desk project management, configuration management, training and education.
- Description of the current procedures adopted by the supercomputing operation and management team to trace and resolve issues and communicate them to users and other stakeholders. Include description of current procedures adopted by the supercomputing operation and management team to ensure that service level agreements are met.
- Description of any current continuity procedures the operations team or the Network Operations Center (NOC) has in place and description of current workload management software and methodology (bonus/malus; backfill; etc.) in place.
- Description of previous experience in providing quantum computer and supercomputer access and other related services to users from other member states or pan European environments (e.g. PRACE)
- Information on other relevant experience in quantum computing such as collaborations with research institutions, universities, industry or the delivery of courses to user communities.

12.5. Quality of the hosting facility's physical and IT infrastructure, its security and its connectivity with the rest of the Union

Applicants should provide information of the hosting physical and IT infrastructure, including security and connectivity that the site can provide for both the supercomputer and the integrated quantum computer.

For the site preparation, the hosting entity should be able to meet the baseline requirements set out herein in time for the anticipated timeline for the delivery of the quantum. The applicants should provide a plan of how and in what timeline they intend to realise the preparation of the site, including the definitive date at which the site will be ready for the installation and integration of the quantum computer. This may include, but is not limited to Gantt charts, contractual timelines, construction permits and work contracts status.

Applicants should include (at least) the following information related to the current and proposed capacities of the hosting facility of the supercomputer and integrated quantum computer and how to achieve them:

1. Description of the intended hosting entity site and facility, including integration and interconnection with different platforms, cooling methods and experience on cooling systems, power measurement facilities, accessibility, possibility to accommodate visitors, courses, possible extendibility of the site (m^2 and KW) and description of physical security concept, including access control, CCTV, etc.

2. Power measurement facilities in place at infrastructure level (device type, location of measurement at rack, pdu, centre) and maximum levels of energy measurement according to the

EE HPC Power Measurement Methodology. If available, reference to any memberships of energy efficiency interest groups or codes of conduct (e.g. EE HPC WG , EU Code of Conduct, EMAS, or other); certifications for energy efficiency and sustainability (e.g. ISO / IEC 13273).

3. Information about the connection to the power grid, including maximum capacity of connection to the power grid and other characteristics such as redundant connection to the power grid. Information about power grid quality (number of outages from supplier in last 48 months, starting January 1st 2018) and energy procurement method (e.g., long-term contracts, annual market based purchases, other).

4. Information about availability of the data centre: expressed as a minimum percentage of uptime or in maximum number of hour's downtime that the hosting entity deem are acceptable per year. Average availability of data centre infrastructure (cooling, power, etc.) (over the last 24 months for current)[12].

5. Information about connectivity towards the rest of the GEANT Network (link capacity) and the Network Operating Centre (NOC) and its reachability (e.g. 24/7).

6. Facility managers (in-house or outsourced) involved in ensuring the operation of the data centre, and their specialization.

7. Total memory and storage capacities of the centre, defining what part would be dedicated to the quantum computing service.

12.6. Quality of service to the users, namely capability to comply with the service level agreement

The applicant should specify the benchmarks or deliverables which the applicant intends to employ to achieve the expected results and targets and how they will be used. These should include at least the SLAs in the Hosting Agreement and information related to:

1. Access time accounting model that will be used to control the allocation time of the quantum computer integrated with the hosting entity's supercomputer. Description of access time policy proposed and how the total number of jobs in waiting queue ready to run will be measured. Provide historic system uptake and usage for the existing supercomputers or recent HPC systems of the hosting entity.

2. Availability of help-desk; number of active projects currently supported. Description of services provided by user support (e.g. 1st level, 2nd level, application support) and of policy regarding response times for level 1, 2 and 3 tickets[13].

3. Overview of training course curriculum related to HPC including quantum computing and links towards user documentation pages, user tutorials and webinars[14].

4. Description of how the on-call service (24/7) for the supercomputing service and infrastructure facilities are set up and work. Include, if available, results from the user satisfaction surveys for your site for the last 5 years.

[12] Facility is deemed available when no facility issues are affecting the running of the supercomputing service. Availability = total hours – (scheduled + unscheduled downtime)

[13] Level 1 => simple request, can be solved in 1 day; Level 2 => more complex request, requires some research, can take up to 5 working days to resolve, Level 3 => request that requires vendor response to resolve, may take longer than 5 working days

[14] or provide electronic copies if these are not reachable online or without a user account

5. Fraction of time for which the current supercomputing service (supercomputer + all necessary auxiliary services like storage, network, login nodes, etc. + main software services like scheduler, access to file systems, etc.) has been available over the last 12 months[15]

6. Results of regular regression tests to assess the stability of performance of your current supercomputer service. If applicable, please provide a description of the regression test used and the frequency at which it is run.

7. Description of any additional services that may not be critical to running the computing service but may provide an additional benefit to the end user. If applicable, please provide a description of these services.

Applicants should provide details on how they propose to achieve these tasks for the hosting of the quantum computer integrated with the supercomputer. Applicants should indicate subcontracted action tasks (if any) and explain the reasons why (as opposed to direct implementation).

[15] Available = fully up and running and reachable by the users and at least 98% of compute nodes available

13. APPENDIX 2: INDICATIVE LIST OF COST ELEMENTS TO CONSIDER IN THE CALCULATION OF THE OPERATING COSTS

In-kind contributions are marked with coloured fields.

Quantum computer and maintenance

Cost item	Verification	Method	Provider
Quantum computing system	N/A procured by EuroHPC JU	N/A	
Quantum computing control electronics and interconnection	N/A procured by EuroHPC JU	N/A	

Equipment and commercial software

Cost item	Verification	Method	Provider	
Site preparation	Invoice /Balance sheet	Fraction committed to the EuroHPC JU (JU)	Hosting site only	
Network at data centre level	Invoice /Balance sheet	Fraction committed to JU	Hosting site only	Related equipment
disks/Home Storage	Invoice /Balance sheet	Fraction committed to JU	Hosting site / others	
Backup storage	Invoice /Balance sheet	Fraction committed to JU	Hosting site / others	
Level 2 storage/Long term Storage	Invoice /Balance sheet	Fraction committed to JU	Hosting site / others	
Other IT equipment	Invoice /Balance sheet	Fraction committed to JU	Hosting site only	
Quantum computers (SC) room	Invoice /Balance sheet	Fraction of the room occupied by the JU systems		
Building	Invoice /Balance sheet	Fraction of the building occupied by the SC room		
Power supply to the facility	Invoice /Balance sheet	Fraction of MW used by JU	Hosting site only	
Power backup	Invoice /Balance sheet	Fraction of MW used by JU	Hosting site only	

Power distribution	Invoice /Balance sheet	Fraction of MW used by JU	Hosting site only	
Cooling	Invoice /Balance sheet	Fraction of MW used by JU	Hosting site only	
Fire detection and extinction	Invoice /Balance sheet	Fraction of the surface of the SC room occupied by the JU systems	Hosting site only	Other infrastructure services
CCTV, security, access control	Invoice /Balance sheet	Fraction of the surface of the SC room occupied by the JU systems	Hosting site only	
Monitoring, building and facility	Invoice /Balance sheet	Fraction of MW used by JU	Hosting site only	
File system software	Invoice	Fraction of sw used by JU	Hosting site only	
Accounting software	Invoice	Fraction of sw used by JU	Hosting site only	
Compilers	Invoice	Fraction of sw used by JU	Hosting site only	
Debuggers	Invoice	Fraction of sw used by JU	Hosting site only	
Scientific software	Invoice	Fraction of sw used by JU	Hosting site only	

Personnel

Cost item	Verification	Method	Provider
System administration, user support and training	Payroll, and/or invoice when part of the service is subcontracted	Timesheets to show dedication to the JU	Hosting site only
Application enablement	Payroll, and/or invoice when part of the service is subcontracted	Timesheets to show dedication to the JU	Hosting site / others
Facility	Payroll, and/or invoice when part of the service is subcontracted	Timesheets to show dedication to the JU	Hosting site only
Installation	Payroll, and/or invoice when part of the service is subcontracted	Timesheets to show dedication to the JU	Hosting site only
Security	Payroll, or invoice when the service is subcontracted	Fraction according to max. dedication	Hosting site only

Cleaning	Payroll, or invoice when the service is subcontracted	Fraction according to max. dedication	

Operations and maintenance

Cost item	Verification	Method	Provider
Electricity	Invoice/Meters	Fraction used by the JU	Hosting site only
Water	Invoice/Meters	Fraction used by the JU	
Gasoil	Invoice/Meters	Fraction used by the JU	
Network connection	Invoice /Balance sheet	Fraction committed to the JU	Hosting site only
Maintenance of HPC system and the high-performance disks/scratch storage	N/A procured by EuroHPC	N/A	
Maintenance of items under "Equipment and commercial software"	Invoice	According to method in "Equipment and commercial software"	Hosting site / others