XPRIZE QUANTUM APPLICATIONS | Google Quantum AI

Presenting Partner: gesda

Phase I
Rules and Regulations

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Version 4.0

These PHASE I RULES AND REGULATIONS ("Rules") govern the XPRIZE Quantum Applications competition. The Rules apply specifically to Phase I of the competition and complement and expand upon the Competition Guidelines posted here.

All participating Teams must adhere to these Rules to remain eligible to progress through competition milestones and qualify for selection as winners of the competition. Failure to comply with these Rules may result in consequences as detailed in the Competitor Agreement.

XPRIZE may update these Rules as necessary during the course of the competition to provide additional information or improve the competition's quality. There may also be unforeseen issues that require modifications to these Rules. XPRIZE reserves the right to revise these Rules as it, in its sole discretion, deems necessary. Any changes to dates, requirements, or other key details will be communicated directly to competing teams.

This Rules version supersedes version 1.0, 2.0, and 3.0. See Appendix C: Rules Revisions Change Log, for a record of notable changes to the Rules.

Note: Terms that appear in bold throughout this document are defined in the Glossary of Terms section in Appendix A.

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1. Introduction and Scope

Quantum computing has shown promise in tackling problems far beyond the reach of classical computation, offering opportunities to transform fields such as sustainability, healthcare, and resource optimization. The XPRIZE Quantum Applications competition launched on March 3, 2024, and is sponsored by title sponsor Google Quantum AI and presenting partner Geneva Science and Diplomacy Anticipator (GESDA). Competing teams develop and showcase innovative quantum algorithms that address complex, societally important problems that are outside the practical reach of classical computing. The competition aims to accelerate the field of quantum computing by advancing state-of-the-art quantum algorithms and demonstrating their potential to deliver a clear quantum advantage in real-world applications.

The winner(s) of this competition will demonstrate a novel quantum algorithm or application that combines scientific rigor with tangible societal benefit. Submissions will be evaluated based on their projected real-world impact, the feasibility of achieving quantum advantage, and the strength of evidence supporting their claims. The ultimate goal is to push the frontiers of quantum computation towards addressing urgent global challenges and creating a future where quantum technologies are harnessed for the greater good. The competition does not require or expect execution on quantum hardware to progress or win.

2. Team Roles and Responsibilities

Teams should refer to the Competition Guidelines for detailed eligibility requirements. Teams are responsible for the listed below. This is not a comprehensive list. Please contact XPRIZE at qc-apps@xprize.org if you have any questions.

1. Completing all required ACTIVITIES for Phase I of the Competition in the Prize Operations Platform (POP) system and a judging platform, if applicable, by the submission deadline, see Section 4.
2. Remaining in compliance with the Competitor Agreement.
3. Fulfilling insurance and eligibility requirements as detailed in the Competitor Agreement.
4. Development of the XPRIZE Quantum Application Solution.
5. Cooperating with the Judging Panel in any virtual verification activities if requested by the Judging Panel.
6. Teams may not contact Judges outside of XPRIZE-managed circumstances.
7. Adhere to conflict-of-interest protocols.

As defined in the Competitor Agreement, all Teams and Team Members must adhere to all applicable laws, including, but not limited to, local, regional, national, and international laws, orders, directives, ordinances, treaties, rules, and regulations for all aspects of the competition.

3. Judging Panel Roles and Responsibilities

For the most up-to-date list of Judging Panel members, please refer to the public competition website: https://www.xprize.org/prizes/qc-apps. These experts are tasked with Phase I judging responsibilities as listed below. This is not a comprehensive list. Please contact XPRIZE at qc-apps@xprize.org if you have any questions.

1. Evaluating Phase I Submissions: Conduct initial reviews of Phase I Submissions, scoring and providing limited feedback to determine up to 40 **Semifinalist Teams**.
2. Selecting up to 20 **Finalist Teams**: Participate in the Finalist Selection Process, which involves in-depth discussion and re-evaluation of Semifinalist Team submissions during a Judging Summit.
3. Offer feedback to Finalist Teams to guide their Phase II submissions.
4. Adhere to conflict-of-interest protocols.
5. Judges identify the need for subreviews, select trusted external experts for qualitative insights while maintaining confidentiality, and use subreviewer input to supplement their evaluation.
6. Judges are prohibited from providing feedback to Teams outside of XPRIZE-managed circumstances.
7. The Judging Panel's decisions are final, binding, and made with full discretion as outlined in the Competition Guidelines.

For other competition roles and responsibilities of the Judging Panel, as well as their selection process, refer to the Competition Guidelines.

4. Phase I Competition Timeline, Milestones, and Awards

Teams must accomplish the following milestones in order to be classified as a Finalist Team and progress into Phase II of the XPRIZE Quantum Applications competition.

Phase I Competition Milestone Reference Table

Competition Milestone	**Date**	**Requirements**	**Awards & Benefits**	**# Teams**
Interim Report	11:59 PM Pacific Time on March 31, 2025	Complete submission on POP (See Section 5)		All **Registered Teams**
Phase I Submission	4:59 AM Pacific Time on August 2, 2025	Complete submission on POP and the judging platform (See Section 6)		All **Official Competitors**
Semifinalist Team Classification	October 2025	Team must be selected by the Judging Panel on the basis of their Phase I Submission to be a Semifinalist Team	Qualified for XPRIZE Alumni Network	Up to 40 Semifinalist Teams
Finalist Team Classification	December 2025	Team must be selected by the Judging Panel on the basis of their Phase I Submission to be a Finalist Team	Split $1,000,000 (One Million USD) Phase I Milestone Award	Up to 20 Finalist Teams

5. Interim Report

5.1. Overview and Purpose

The Interim Report is a key submission in the XPRIZE Quantum Applications competition. The primary purpose of the Interim Report is to:

1. Provide a checkpoint for all registered teams to document early progress and challenges.
2. Gather information to identify gaps in judging expertise, allowing XPRIZE to adjust the panel as needed.
3. Enable XPRIZE to offer tailored resources, webinars, classifications, and impact measurement through impact questions included in the report.
4. Support XPRIZE communications by providing high-level statistics (e.g., participation numbers, geographic representation, team backgrounds,

contribution categories, and application types) to showcase team engagement and impact while ensuring confidentiality of technical details.

The submission is structured as a brief report of a team's progress during Phase I, highlighting initial development efforts and current status. The report provides a high-level overview of the contributions a team plans to make, while allowing team discretion to not disclose specific details to protect intellectual property or strategic insights prior to the Phase I Submission.

The Interim Report Instructions are available under the XPRIZE Quantum Applications RESOURCES table at https://pop.xprize.org/prizes/xpqa/resources.

Every Registered Team must submit an Interim Report as part of the competition requirements in order to be invited to submit a Phase I Submission.

5.2. Interim Report Submission Process

The Interim Report consists of a set of questions administered via an online form in the Prize Operations Platform (POP). Teams may also choose to submit a more detailed narrative document to supplement their Interim Report.

The Interim Report submission activity in POP will open no later than March 1, 2025. Registered teams can prepare for their report by consulting the Interim Report Instructions available under the XPRIZE Quantum Applications RESOURCES table at https://pop.xprize.org/prizes/xpqa/resources.

Please note:

1. The Interim Report must be submitted by a team member who is an administrator.
2. Teams should ensure the individual completing the submission has the necessary permissions to avoid delays or issues.
3. Upon successful submission of an Interim Report, teams will transition from a **Registered Team** to an **Official Competitor**, making them eligible to submit a Phase I Submission.

5.3. Interim Report Feedback

Neither the Interim Report nor the supplemental narrative document will be used to determine which teams advance to Phase II of the competition. Advancement decisions will be based solely on the Phase I Submission.

6. Phase I Judging Process

6.1. Overview

Phase I judging begins in August 2025 and concludes in December 2025. The judging panel will select up to 40 Semifinalist Teams from the Phase I Submissions and then narrow this to up to 20 Finalist Teams during a judging summit. Finalist Teams will split a $1 million USD prize purse (Phase I Milestone Award) and advance to Phase II.

The Phase I Submission includes a Questionnaire and a Narrative Document. If applicable competing teams must submit a Conflict of Interest (COI) Form. Teams must follow the Competition Guidelines and these Rules to ensure their Phase I Submission is complete and eligible for evaluation.

6.2. Phase I Submission Process

6.2.1. Phase I Questionnaire

This part of the Phase I Submission will be administered in POP as the Phase I Questionnaire ACTIVITY. This ACTIVITY will be divided in two sections. **Details not shared with judges*

6.2.1.1. Section 1: Shareable Team Summary

The information in this "Shareable Team Summary" will be used publicly in XPRIZE communications during the Semifinalist Teams and Finalist Teams Announcements. Please do not include any confidential information in this section that you would not like shared about your project.

- Team Name
- Team Logo (jpeg or png format)
- Photo of Team and/or Innovation (jpeg or png format)
- Legal Entity Name (if different than Team Name)
- Type of Entity (e.g. startup, subsidiary, university group, etc.)
- Name(s) of Team Leader/CEO
- Number of Team Members
- Please specify the country or countries your team members are based in if multiple locations apply
- Motivation - What inspired you to take part in this competition? Let us know what drew you to apply, whether it was the challenge, the opportunity to win a prize, the mission behind it, or something personal.

- Project Description - What is your project's elevator pitch? What sets it apart from other ideas? Please describe your project at a high-level in language that the general public would understand.
- Project Innovation - Which societal challenges or global issues does your project aim to address?
- What is the most closely related contribution type of your project? (select one)
    - Novel Algorithm
    - New Application
    - Enhanced Performance
- Abstract problem class solved by the quantum approach your project focuses on
- Which societal challenges or global issues does your project aim to address?
- Which, if any, UN Sustainable Development Goals (SDGs) does your project align with?
- Do you need any resources?
- Team Website (optional)
- University Affiliation (optional)

6.2.1.2. Section 2: Team Questionnaire

Information gathered in this "*Team Questionnaire*" will be kept confidential. Aggregated information may be used to illustrate the characteristics of the field of competitors and be used for prize impact work, but specific information about teams will not be shared without team permission.

- Title of Project: Must match the title used in your Phase I Narrative Document.
- Project Abstract: Must match the abstract used in your Phase I Narrative Document.
- Areas of Expertise: Indicate any expertise areas you are looking to add to your team
- During this competition, has your team engaged in any co-development or knowledge exchange with competing teams?
- Since entering the XPRIZE competition, how many patents has your team been granted in relation to your solution/innovation?
- Since entering the XPRIZE competition, approximately how many hours of work has your entire team collectively invested in developing your solution/innovation?
- Please list and describe any industry collaborations your team has established since entering the XPRIZE competition. Examples:

Co-designed a virtual course with the UN on the potential impact of quantum algorithms.

- How many distinct classes of algorithms has your team proposed or developed to address Sustainable Development Goal (SDG)-focused use cases? Please list and briefly describe them.
- Since entering the XPRIZE competition, has your team engaged any students or youth through competitions, internships, or similar programs? If yes, how many, and in what capacity?
- Since entering the XPRIZE competition, approximately how much funding (e.g., venture capital, private equity, grants, etc.) has your team received?
- If applicable, what is your team's approximate current annual revenue?
- To date, has your team commercially deployed or academically applied your solution/innovation for this competition? If yes, please provide details, including when, where, and how.
- What additional partnerships, resources, skills, or expertise do you need to advance your solution?
- What significant technical, financial, or organizational challenges have you faced so far?
- What challenges do you foresee in the next phase?

6.2.2. Phase I Narrative Document

Teams will submit their Phase I Narrative Document as a PDF directly through the HotCRP judging platform. A link to the submission site will be provided in early July 2025. XPRIZE will provide teams with an MS Word template and an Overleaf LaTeX template to assist those who may need support in setting up their own formatting. The Phase I Narrative Document should be written using 12-point Times New Roman font or a similar, easily readable font. The document should have 1-inch margins on all sides and use 8.5-inch by 11-inch page size. Additionally, each narrative document must include a cover page. References should also be included at the end of the narrative document. Please ensure the document is uploaded as a PDF.

1. Cover Page (1 page) for all contribution types:

    - Title of Project
    - Authors and Affiliations (Team member names)
    - Contribution Type(s)
    - Project Abstract

Your title and abstract are critical elements of your Phase I Narrative Document as they influence which judges are assigned to review your submission. The abstract should be a concise paragraph summarizing your project.

Judges will "bid" on titles and abstracts during the review assignment process, meaning these components are the first impression of your proposal. While the bids do not impact whether your team advances to the next competition phase, a clear and tightly written title and abstract are essential to ensure your submission is reviewed by judges with the most relevant expertise.

2. Main Body of Phase I Narrative Document:

For each section, provide as much detail as possible about your work, following the Phase I requirements found in Table 2 of the Competition Guidelines document and Guiding Questions found in Appendix B of these Rules. Note that the specific sections expected in your Narrative Document may vary depending on the type of submission.

A. Problem Statement & Scope
B. Impact on the Problem Area
C. Quantum Advantage
D. Classical Benchmarking
E. Viability (e.g., what resources are required for advantage?)
F. Novelty
G. Scientific evidence that supports claims made in Section C. ("Quantum Advantage")
H. Scientific evidence that supports claims made in Section D. ("Classical Benchmarking")
I. References

When preparing your Phase I Narrative Document, ensure it is written in the style of a scientific paper:

- Use clear, concise, and formal language.
- Substantiate all claims with robust scientific evidence, avoiding unsupported or unsupportable claims, as well as marketing language.
- Include properly cited references for all sources, following standard citation formats used in scientific literature.
- Use numbered and labeled figures, tables, and equations, with sequential numbering maintained throughout the document.

You have the flexibility to reorder the above sections in your Phase I Narrative Document to improve the flow of your submission, but do so carefully to maintain clarity and coherence. Keep in mind that the default section order is designed to work well for most submissions and should only be adjusted if it significantly enhances readability and impact.

Submission of the Phase I Narrative Document to both HotCRP and POP is required. A guide for using HotCRP is available here.

6.2.3. Conflict of Interest Form

If at any point before or during the competition your team has received any amount of funding or plans to receive any funding from any Sponsors under the XPRIZE Quantum Applications Competition, teams must complete the Conflict of Interest (COI) Form for competing teams to identify any potential conflicts. Please refer to Section 7.1: Disclosure of COIs in the Competition Guidelines for further details.

6.3. Semifinalist Team Selection Process

This process aims to narrow down Phase I Submissions to a maximum of 40 Semifinalist Teams.

- Judging Platform: Judging will be administered via XPRIZE-hosted HotCRP, to manage submissions, bidding, and scoring.
- Blind Review Process: Judging will be conducted via a single-blind review process. In this method, the identities of the teams will be known to judges and subreviewers, but the identities of the judges and subreviewers will remain concealed from the teams. Judges and subreviewers will only have access to the assigned Phase I Narrative Document(s) and supporting materials. Teams will not be informed of which judges reviewed their submission. Judges will be instructed to evaluate each submission strictly on its merits, independent of the authors' reputation or institutional affiliation.
- Submission Review: Submissions are checked for completeness and adherence to Competition Guidelines and Rules and Regulations by the Judging Panel Chair and XPRIZE before being released for the bidding process, including:
  - The submission is written entirely in English
  - The Phase I Questionnaire is complete.
  - The submission is not out of scope for the prize (see Competition Guidelines)

    - The work was not published or submitted to a preprint repository before March 4, 2024
    - The submission is not based on pseudoscientific concepts
    - The Phase I Narrative Document includes all required sections for the selected contribution type(s).
    -
- Bidding: Judges bid on submissions based on expertise and interest, ensuring appropriate alignment while flagging any conflicts of interest (COIs).
- Assignment to Judges: The judging platform uses bidding results to assign a given submission to multiple judges. Preferences are prioritized, ensuring submissions are assigned to judges with relevant expertise and interest. For submissions where multiple judges show interest or where preferences are neutral, the system applies a degree of randomization to ensure balanced workloads and avoid bias.
- Scoring: Submissions are judged by multiple judges. Judges may solicit external subreviews for additional expertise when necessary. While subreviewers contribute detailed evaluations to inform the process, judges retain full responsibility for providing the final scoring. Subreviewers will be required to sign a confidentiality agreement before participating in the evaluation process. A set of Guiding Questions (see Appendix B), aligned with the evaluation criteria outlined in Table 2: Submission Requirements of the Competition Guidelines, is intended to help judges evaluate Phase I Submissions and assist teams in structuring their Phase I Narrative Documents.
- Filtering: Submissions are grouped into two categories:
    - Semifinalist Team
    - Removed from Contention: Teams not meeting evaluation thresholds.

By the end of the process, up to 40 Semifinalist Teams are selected. Semifinalist Teams will be announced by October 2025. All teams will receive feedback at a checklist level after Finalist Teams are announced.

6.4. Finalist Team Selection Process

The Finalist Team Selection Process narrows the Semifinalist Teams down to a maximum of 20 Finalist Teams, who will share the $1 million USD Phase I prize purse and advance to Phase II. Judges review all Semifinalist Team Phase I Submissions. During the Phase I Judging Summit in mid-November 2025, judges discuss each submission and determine the Finalist Teams.

Official decisions made by the Judging Panel will be approved by a majority of the judges who vote on each submission after careful and impartial consideration of the team's Phase I Submission. If any vote of the Judges results in a tie, the Judging

Panel shall determine, in its sole and absolute discretion, the mechanism to settle the tie.

By mid-December 2025, up to 20 Finalist Teams will be announced. All Finalist Teams will receive detailed feedback from the judging panel to help refine their projects and prepare their solutions for the Phase II Submission of the competition.

7. Conflict of Interest (COI) Management Procedures

This section outlines the process for identifying and managing conflicts of interests (COIs) among judges, teams, and advisors during Phase I judging. To ensure fairness and transparency throughout the evaluation process:

7.1. Disclosure of COIs

Advisors, judges, and teams are required to disclose any potential COIs before the start of the Phase I judging process. This includes factors such as close collaboration on projects, affiliations, financial stakes in a team's success, or any other relationships that could influence impartiality.

XPRIZE will provide COI disclosure forms ahead of Phase I Submissions for advisors and judges. If at any point before or during the competition a team has received any amount of funding or plans to receive any funding from any Sponsors under the XPRIZE Quantum Applications Competition, teams must complete the Conflict of Interest (COI) Form for competing teams to identify any potential conflicts.

These forms will capture relevant details to ensure transparency and integrity throughout the competition. Disclosing a COI does not necessarily result in exclusion; instead, it allows XPRIZE to assess and mitigate potential risks effectively, ensuring the fairness and credibility of the competition.

Judges, advisory board members, and competing teams must follow the outlined process in these COI disclosure forms for submitting, updating, and resolving COIs. Final decisions on managing COIs rest with XPRIZE, with input from relevant stakeholders.

7.2. Firewall Plans

In cases where an Advisor or Judge may have a significant potential conflict with a competing team—such as being employed by the same organization— XPRIZE may request a firewall plan. This operational plan, which is not a legal document, outlines the steps that will be taken to create separation between the judge and the team to mitigate any influence on the judging process. The firewall plan can be submitted to XPRIZE in a letter for review. Once the plan has been reviewed and approved, XPRIZE will ask the relevant parties to confirm via email that they will adhere to the plan. Each Phase I Submission will be reviewed by more than one judge and XPRIZE and the Judging Panel chair will carefully select judge matches to avoid conflicts of interest.

7.3. Assignment of Submissions

Judges with disclosed conflicts are not assigned to review Phase I Submissions from teams they have a conflict with. During the selection of Finalist Teams, judges with a conflict will be recused from the group discussion during the judging summit for submissions they have a conflict with.

7.4. Addressing Conflicts During the Judging Process

Should any conflicts arise during the evaluation process, they are addressed promptly. This may involve reassignment of submissions, the recusal of a judge from evaluating a particular team's submission, or a judge being fully recused from the judging panel.

8. Submission Deadline Policy

XPRIZE does not allow extensions for Interim Report and Phase I Submission deadlines to ensure fairness and integrity in the competition. While unforeseen circumstances may arise that prevent teams from meeting these deadlines, XPRIZE maintains a clear precedent of adhering to strict deadlines to ensure consistency across all teams and competitions. Granting extensions, even in exceptional cases, could create inconsistencies and potentially disadvantage teams that comply with the established Interim Report and Phase I Submission deadlines.

9. Phase I Wild Card Entry

XPRIZE and the Judging Panel will introduce a Phase I Wild Card period to ensure the competition remains inclusive of high-quality, innovative ideas and to address any identified gaps in the submission pool. The Wild Card Registration Period will be open from May 21 to July 9, 2025.

For full details on how to participate, including eligibility and submission guidelines, please refer to the Phase I Wild Card Process Document.

Appendix A: Glossary of Terms

Registered Team: A team that has paid the required Registration Fee, fully executed the Competitor Agreement, and is eligible to submit the Interim Report.

Official Competitor: A Registered Team that has completed the Interim Report or entered the competition via a Phase I wild card entry.

Semifinalist Team (up to 40 Teams): An Official Competitor that has provided a Phase I Submission and has been selected as a Semifinalist Team by the Judging Panel.

Finalist Team (up to 20 Teams): A team that has been approved by the Judging Panel to provide a Phase II Submission for Judging or entered the competition via a Phase II wild card entry.

Appendix B: Guiding Questions

These Yes/No questions help teams understand what judges look for when evaluating Phase I Submissions. They reflect key criteria: Problem Statement & Scope, Impact on the Problem Area, Quantum Advantage, Evidence, Viability, and Novelty. Grouped by contribution type, the questions are split into “Must-Haves” (baseline expectations) and “Nice-to-Haves” (strengthening factors). For more on how Phase I Submissions are evaluated, see Competition Guidelines and Section 6.3 of this document.

B1.New Quantum Algorithm

"Must Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and societally beneficial application with plausible significant real-world impact.		
Does the submission provide a clear, concise computational problem that plausibly encompasses at least one specific real-world societally beneficial use case?		
Impact on the Problem Area: The team has made the case that the solution they are proposing would create a positive impact in the real world.		
Does the submission provide plausible arguments that the specific computational problem being posed is, in fact, a bottleneck or a particular challenge that is obstructing progress towards a socially beneficial application.		
Does the submission make a thoughtfully reasoned case that the proposed improvement over the current state of the art is plausibly achievable?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
Does the proposed quantum solution demonstrate more than a quadratic speedup over classical methods? If not, did the team provide an exceptionally compelling case for practical quantum advantage supported by strong scientific evidence?		
Did the team explicitly state the asymptotic scaling of their quantum approach (i.e., how the execution time of the algorithm scales with problem size) in terms of resource requirements, and clearly describe the quantum architecture or model they intend their algorithm to be implemented in? In particular, did they describe (as applicable): ● Gate complexity and/or circuit depth (for Digital NISQ or FTQC models) ● Space complexity (number of logical qubits and logical ancilla required) ● Annealing time and scaling behavior (for Adiabatic/Quantum Annealing) ● Hamiltonian evolution time and control precision (for Analog Simulators & Continuous Variable QC) ● Quantum-classical iteration complexity (for Hybrid Quantum-Classical approaches) ● Number of times the quantum circuit or analog evolution must be repeated ● Other relevant asymptotic runtime and complexity metrics based on the specific quantum model used, if not covered above Asymptotic scaling should attempt to quantify total end-to-end resources required (including data loading) as opposed to only looking at query complexity (e.g. QRAM executions). Generally speaking, the tighter the bounds on the scaling, the better. If scaling depends on multiple parameters (e.g., system size and basis size), the team should justify which parameter regimes are plausible for the application.		
Did the team support their asymptotic scaling claim (i.e., how computational resource requirements grow with problem size) with rigorous proofs, numerical evidence, or heuristic arguments? If they relied on numerical evidence or heuristic arguments, does it scale to problem-relevant sizes?		
Did the team make an earnest attempt to quantify the computational resources of the best classical algorithms for solving the problem and relate that to the expected quantum speedup? ● If strong classical results exist, did the team reference well-established classical algorithms and provide a meaningful comparison to their quantum approach? ● If strong classical results do not exist, did the team attempt to propose a serious classical attack on the problem?		

"Must Haves" Guiding Questions	Yes	No
Quantum Advantage (continued):		
Did the team provide information about all relevant system parameters impacting performance, including any required approximations, and a clear breakdown of how runtime scales with those parameters—such as basis size, system size, error tolerance, or evolution time—as relevant to their quantum approach? If approximations are required (or an approximation ratio is the goal), did the team quantify quantum advantage in terms of both problem size and approximation parameters?		
Novelty: Submissions will be assessed for overall novelty and the relative "thought delta" introduced by this work.		
Does the submission demonstrate clear innovation and meaningful improvement over known methods, introducing a fundamentally new quantum algorithm that creates a significant "thought delta"?		

"Nice-to-Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and socially beneficial application with significant global impact to tackle.		
Does the submission propose a quantum method that demonstrates broad applicability across multiple problem domains, rather than being limited to solving a single specific problem?		
If the method is general, does the submission include multiple specific, practical examples of how it can be applied to real-world challenges to clearly illustrate its utility and impact?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
If the asymptotic scaling relies on a mathematical conjecture, is it a widely accepted conjecture rather than speculative or weakly justified?		
Did the team provide strong theoretical evidence, such as showing that the problem is BQP-complete or using information-theoretic techniques to lower bound classical runtime in a blackbox version of the problem?		
Classical Benchmarking		
Has the team made an initial effort to identify and describe the constant factors associated with the best known classical algorithms for the problem they are targeting? Or alternatively, have they identified the point at which the problem becomes classically intractable in practice?		
Viability:		
Has the team begun defining the constant factor quantum resources necessary for their approach, including early estimations of relevant resource requirements (e.g., where applicable, gate count, circuit depth, qubit count, annealing time, Hamiltonian parameters) to assess how quantum solution might perform on realistic quantum architectures? This is in addition to the required asymptotic scaling analysis.		

B2. New Application

"Must Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and societally beneficial application with plausible significant real-world impact.		
Does the submission provide a clear, concise description of a precise computational problem that plausibly encompasses at least one specific real-world societally beneficial use case?		
Impact on the Problem Area: The team has made the case that the solution they are proposing would create a positive impact in the real world.		
Does the submission provide plausible arguments that the specific computational problem being posed is, in fact, a bottleneck or a particular challenge that is obstructing progress towards a socially beneficial application.		
Does the submission make a plausible and well-reasoned case that the proposed improvement over the current state of the art is plausibly achievable?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
Does the proposed quantum solution demonstrate more than a quadratic speedup over classical methods? If not, did the team provide an exceptionally compelling case for practical quantum advantage supported by strong scientific evidence?		
Did the team explicitly state the asymptotic scaling of their quantum approach (i.e., how the execution time of the algorithm scales with problem size) in terms of resource requirements, and clearly describe the quantum architecture or model they intend their algorithm to be implemented in? In particular, did they describe (as applicable): ● Gate complexity and/or circuit depth (for Digital NISQ or FTQC models) ● Space complexity (number of logical qubits and logical ancilla required) ● Annealing time and scaling behavior (for Adiabatic/Quantum Annealing) ● Hamiltonian evolution time and control precision (for Analog Simulators & Continuous Variable QC) ● Quantum-classical iteration complexity (for Hybrid Quantum-Classical approaches) ● Number of times the quantum circuit or analog evolution must be repeated ● Other relevant asymptotic runtime and complexity metrics based on the specific quantum model used, if not covered above Asymptotic scaling should attempt to quantify total end-to-end resources required (including data loading) as opposed to only looking at query complexity (e.g. QRAM executions). Generally speaking, the tighter the bounds on the scaling, the better. If scaling depends on multiple parameters (e.g., system size and basis size), the team should justify which parameter regimes are plausible for the application.		
Did the team support their asymptotic scaling claim (i.e., how computational resource requirements grow with problem size) with rigorous proofs, numerical evidence, or heuristic arguments? If they relied on numerical evidence or heuristic arguments, does it scale to problem-relevant sizes?		
Did the team make an earnest attempt to quantify the computational resources of the best classical algorithms for solving the problem and relate that to the expected quantum speedup? ● If strong classical results exist, did the team reference well-established classical algorithms and provide a meaningful comparison to their quantum approach? ● If strong classical results do not exist, did the team attempt to propose a serious classical attack on the problem?		

"Must Haves" Guiding Questions	Yes	No
Quantum Advantage (continued):		
Did the team provide information about all relevant system parameters impacting performance, including any required approximations, and a clear breakdown of how runtime scales with those parameters—such as basis size, system size, error tolerance, or evolution time—as relevant to their quantum approach? If approximations are required (or an approximation ratio is the goal), did the team quantify quantum advantage in terms of both problem size and approximation parameters?		
Novelty: Submissions will be assessed for overall novelty and the relative "thought delta" introduced by this work.		
Does the submission demonstrate clear innovation and meaningful improvement over known methods by applying an existing quantum algorithm to a previously unexplored real-world application, creating a significant "thought delta"?		

"Nice-to-Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and socially beneficial application with significant global impact to tackle.		
Does the submission propose a quantum method that demonstrates broad applicability across multiple problem domains, rather than being limited to solving a single specific problem?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
If the asymptotic scaling relies on a mathematical conjecture, is it a widely accepted conjecture rather than speculative or weakly justified?		
Classical Benchmarking		
Has the team made an initial effort to identify and describe the constant factors associated with the best known classical algorithms for the problem they are targeting? Or alternatively, have they identified the point at which the problem becomes classically intractable in practice?		
Viability:		
Has the team begun defining the constant factor quantum resources necessary for their approach, including early estimations of relevant resource requirements (e.g., where applicable, gate count, circuit depth, qubit count, annealing time, Hamiltonian parameters) to assess how quantum solution might perform on realistic quantum architectures? This is in addition to the required asymptotic scaling analysis.		

B3. Enhanced Performance for Existing Algorithm

"Must Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and societally beneficial application with plausible significant real-world impact.		
Does the submission provide a clear, concise description of a precise computational problem that plausibly encompasses at least one specific real-world societally beneficial use case?		
Impact on the Problem Area: The team has made the case that the solution they are proposing would create a positive impact in the real world.		
Does the submission provide plausible arguments that the specific computational problem being posed is, in fact, a bottleneck or a particular challenge that is obstructing progress towards a socially beneficial application.		
Does the submission make a compelling case that the proposed improvement over the current state of the art is plausibly achievable?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
Does the proposed quantum solution demonstrate more than a quadratic speedup over classical methods? If not, did the team provide an exceptionally compelling case for practical quantum advantage supported by strong scientific evidence?		
Did the team explicitly state the asymptotic scaling of their quantum approach (i.e., how the execution time of the algorithm scales with problem size) in terms of resource requirements, and clearly describe the quantum architecture or model they intend their algorithm to be implemented in? In particular, did they describe (as applicable): ● Gate complexity and/or circuit depth (for Digital NISQ or FTQC models) ● Space complexity (number of logical qubits and logical ancilla required) ● Annealing time and scaling behavior (for Adiabatic/Quantum Annealing) ● Hamiltonian evolution time and system parameters (for Analog Simulators & Continuous Variable QC) ● Quantum-classical iteration complexity (for Hybrid Quantum-Classical approaches) ● Number of times the quantum circuit or analog evolution must be repeated ● Other relevant asymptotic runtime and complexity metrics based on the specific quantum model used, if not covered above Asymptotic scaling should attempt to quantify total end-to-end resources required (including data loading) as opposed to only looking at query complexity (e.g. QRAM executions). Generally speaking, the tighter the bounds on the scaling, the better. If scaling depends on multiple parameters (e.g., system size and basis size), the team should justify which parameter regimes are plausible for the application.		
Did the team support their asymptotic scaling claim (i.e., how computational resource requirements grow with problem size) with rigorous proofs, numerical evidence, or heuristic arguments? If they relied on numerical evidence or heuristic arguments, does it scale to problem-relevant sizes?		
Did the team make an earnest attempt to quantify the computational resources of the best classical algorithms for solving the problem and relate that to the expected quantum speedup? ● If strong classical results exist, did the team reference well-established classical algorithms and provide a meaningful comparison to their quantum approach? ● If strong classical results do not exist, did the team attempt to propose a serious classical attack on the problem?		

"Must Haves" Guiding Questions	Yes	No
Quantum Advantage (continued):		
Did the team provide information about all relevant system parameters impacting performance, including any required approximations, and a clear breakdown of how runtime scales with those parameters—such as basis size, system size, error tolerance, or evolution time—as relevant to their quantum approach? If approximations are required (or an approximation ratio is the goal), did the team quantify quantum advantage in terms of both problem size and approximation parameters?		
Viability:		
Has the team begun defining the constant factor quantum resources necessary for their approach, including early estimations of relevant resource requirements (e.g., where applicable, gate count, circuit depth, qubit count, annealing time, Hamiltonian parameters) to assess how quantum solution might perform on realistic quantum architectures? This is in addition to the required asymptotic scaling analysis.		
Novelty: Submissions will be assessed for overall novelty and the relative "thought delta" introduced by this work.		
Is there clear innovation and meaningful improvement over known methods, either through a nontrivial development in methods that significantly improves the viability of quantum advantage, or through a significant breakthrough in the analysis of quantum algorithm performance that leads to new compelling evidence of quantum advantage—even in the absence of algorithm changes?		

"Nice-to-Haves" Guiding Questions	Yes	No
Problem Statement & Scope: The team has chosen a challenging and socially beneficial application with significant global impact to tackle.		
Does the submission propose a quantum method that demonstrates broad applicability across multiple problem domains, rather than being limited to solving a single specific problem?		
Quantum Advantage: Team makes a clear case as to what sort of quantum advantage the quantum computer is expected to have relative to classical computers.		
If the asymptotic scaling relies on a mathematical conjecture, is it a widely accepted conjecture rather than speculative or weakly justified?		
Classical Benchmarking		
Has the team made an initial effort to identify and describe the constant factors associated with the best known classical algorithms for the problem they are targeting? Or alternatively, have they identified the point at which the problem becomes classically intractable in practice?		

Appendix C: Rules Revisions Change Log

Record of notable changes to the Phase I Rules and Regulations Version 3.0 compared to this Version 4.0:

Page 1:

- Added "and 3.0" to "This Rules version supersedes version 1.0, 2.0, and 3.0."

Page 4, "Phase I Competition Milestone Reference Table":

- Changed "11:59 PM Pacific Time on August 1, 2025" to "4:59 AM Pacific Time on August 2, 2025"

Page 7, "Section 1: Shareable Team Summary":

- Added "Motivation - What inspired you to take part in this competition? Let us know what drew you to apply, whether it was the challenge, the opportunity to win a prize, the mission behind it, or something personal."

Page 8, "Section 1: Shareable Team Summary":

- Added "Abstract problem class solved by the quantum approach your project focuses on"
- Added "Which societal challenges or global issues does your project aim to address?"
- For "Which, if any, UN Sustainable Development Goals (SDGs) does your project align with? (optional)", removed "(optional)"
- Added "Do you need any resources?"

Page 8, "Section 2: Team Questionnaire":

- Added "Areas of Expertise: Indicate any expertise areas you are looking to add to your team"

Page 9, "Section 2: Team Questionnaire":

- For "If applicable, what is your team's approximate current annual revenue? If you are pre-revenue, please indicate that.", removed "If you are pre-revenue, please indicate that"

Page 9, "Phase I Narrative Document":

- For "Authors", added "and Affiliations"

Page 11, "Main Body of Phase I Narrative Document":

- Added "Submission of the Phase I Narrative Document to both HotCRP and POP is required. A guide for using HotCRP is available here."

Record of notable changes to the Phase I Rules and Regulations Version 2.0 compared to this Version 3.0:

Page 1:

- Added "and 2.0" to “This Rules version supersedes version 1.0 and 2.0.”

Page 9, Phase I Narrative Document:

- Added "HotCRP" in “Teams will submit their Phase I Narrative Document as a PDF directly through the HotCRP judging platform.”
- Removed "Important Note: When preparing your Phase I Narrative Document, do not include any information that could identify your team’s identity to preserve anonymity during the blind review process. For example, do not use phrases such as “as shown by the work of our team member [team member name]“ or specific references like “we have previously shown [reference #]“. Instead use something like “as previously shown [reference #]“. It is the team's responsibility to adhere to this requirement."
- Added "Authors (Team member names)" in “Cover Page (1 page) for all contribution types:” list.

Page 10, “Main Body of Phase I Narrative Document”:

- Added "and Guiding Questions found in Appendix B of these Rules." to the first paragraph.

Page 11, “Semifinalist Team Selection Process”:

- For “Blind Review Process:”, removed "Judging will be conducted via a blind review process, also known as a double-blind review. In this method, the identities of both the teams and judges, including subreviewers, are concealed. Judges and subreviewers will only have access to the assigned Phase I Narrative Document(s) to preserve the anonymity of teams during the review process."
- For “Blind Review Process:”, added "Judging will be conducted via a single-blind review process. In this method, the identities of the teams will be known to judges and subreviewers, but the identities of the judges and subreviewers will remain concealed from the teams. Judges and subreviewers will only have access to the assigned Phase I Narrative Document(s) and supporting materials. Teams will not be informed of which judges reviewed their submission. Judges will be instructed to evaluate each submission strictly on its merits, independent of the authors’ reputation or institutional affiliation."
- Removed “The Phase I Narrative Document does not identify the team’s identity to preserve anonymity during the blind review process.”

Page 12, “Semifinalist Team Selection Process”:

- Changed "Semifinalist Teams will be announced by mid November 2025." to "Semifinalist Teams will be announced by October 2025."

Record of notable changes to the Phase I Rules and Regulations Version 1.0 compared to Version 2.0:

Page 1:

- Added "This Rules version supersedes version 1.0. See Appendix C: Rules Revisions Change Log, for a record of notable changes to the Rules."

Page 5, "Phase I Competition Milestone Reference Table":

- Updated "Phase I Submission" row to reflect revised submission method: Changed “Complete submission on POP and the judging platform if applicable” to “Complete submission on POP and the judging platform (see Section 6).”
- Updated "Semifinalist Team Classification" date from “October 2025” to “October–November 2025.”

Page 9, "Phase I Narrative Document":

- Changed "Teams submit their Phase I Narrative Document as a PDF either on POP as an ACTIVITY or directly to a judging platform. If a judging platform will be used, a link to the submission site will be supplied early July 2025." to "Teams will submit their Phase I Narrative Document as a PDF directly through the judging platform. A link to the submission site will be provided in early July 2025."

Page 11 "Semifinalist Team Selection Process"

- Changed "Judging Platform: Judging will be administered via a judging platform, such as EasyChair or HotCRP, to manage submissions, bidding, and scoring” to "Judging Platform: Judging will be administered via XPRIZE-hosted HotCRP, to manage submissions, bidding, and scoring."

Page 12, "Semifinalist Team Selection Process"

- Revised second-to-last bullet: changed “A set of Guiding Questions, aligned with …” to “A set of Guiding Questions (see Appendix B), aligned with …” and removed the final sentence: “These questions will be included in Version 2.0 of these Rules and Regulations and added to Appendix B of this document, and posted after the Interim Report analysis has been completed.”

page 14 "Phase I Wild Card Entry"

- Updated the entire section to “ XPRIZE and the Judging Panel will introduce a Phase I Wild Card period to ensure the competition remains inclusive of high-quality, innovative ideas and to address any identified gaps in the submission pool. The Wild Card Registration Period will be open from May 21 to July 9, 2025. For full details on how to participate, including eligibility and submission guidelines, please refer to the Phase I Wild Card Process Document.”

page 16 "Appendix B"

- Added Guiding Questions for each submission type.