



$\langle \otimes \rangle$ Quantathon
BY OPEN QUANTUM INSTITUTE

Implementation guide

Launch

Guide on how to launch
a Quantum Hackathon.

OQI Hackathon in a Box

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Introduction

Hackathon in a Box

What is it?

This guide provides an introduction to the "Hackathon in a Box" curated by the Open Quantum Institute (OQI) education consortium. Building on the experience of leading quantum education providers, this service provides universities, companies, non-profits and other organizations with a toolkit to produce their own hackathons, focusing on quantum computing (QC) for the benefit of humanity.

Quantum computing could revolutionize industries by solving complex problems that classical computers can't tackle efficiently. By integrating quantum computing into the hackathon's collaborative and hands-on learning framework, participants can explore one of today's most disruptive technologies, contribute to society and prepare for career opportunities in the digital age.

Hackathons support OQI's aim to promote global, equitable and inclusive quantum computing education and develop applications for the benefit of humanity. Providing opportunities so that more people, including those from underserved locations, can learn about quantum computing and develop innovative applications is part of a broader effort to advance the United Nations' 17 [Sustainable Development Goals](#) (SDGs) for 2030, a blueprint for humanity unanimously adopted by 193 nations in 2015.

What follows is a preview of the hackathon planning process, a timeline for planning, and other key resources that the OQI offers on its website. By providing essential tools and resources to individuals and organizations, OQI aims to foster collaborative hackathons around the world that focus on quantum computing applications in service of the SDGs, particularly for the benefit of less developed regions.

Hackathons combine cutting-edge theoretical knowledge with technical skills in computer science-related fields, delivered through interactive workshops, certification courses, and mentorship. Leveraging quantum computing, participants work to build innovative solutions for health care, climate change and other global challenges.

We view hackathons as a vital learning experience that combine cutting-edge theoretical knowledge and technical skills in computer science and other related fields, delivered through interactive workshops, certification courses, and mentorship.

Hackathon in a Box

About OQI

OQI is a multilateral governance initiative that promotes global and inclusive access to quantum computing and the development of applications for the benefit of humanity. As a novel science diplomacy instrument, it brings together research, diplomacy, private sector and philanthropy stakeholders. OQI was initiated at GESDA, now hosted at CERN for its pilot phase (2024-2026), with the support of UBS.

Advantages and impact of the OQI Hackathon in a Box

Hackathons have both a competitive and collaborative spirit and foster the exploration of quantum computing use cases, creating impactful solutions to problems that local communities face. This approach is crucial for several reasons:

1. Context:

- Localized solutions address specific issues in a community, making them more relevant, effective and sustainable.
- Cultural sensitivity makes a solution more likely to be accepted and implemented successfully.

2. Empowerment and Capacity Building:

- Skill development empowers people to address future challenges independently.
- Community involvement encourages a sense of ownership and responsibility that leads to more robust and sustained efforts.

3. Scalability and Adaptability:

- Creating a model for replication means it can be adapted and scaled to other regions with similar challenges.
- Flexibility makes local solutions easier to adapt based on real-time feedback and evolving conditions.

4. Addressing Specific SDGs:

- Targeted impact directs local use cases toward solutions that meet a community's unique needs. That also advances specific community-related SDGs in areas such as clean water and sanitation (SDG 6), quality education (SDG 4), and affordable, clean energy (SDG 7).
- Measurable outcomes indicate clear evidence of progress toward the SDGs.

5. Innovation and Sustainability:

- Innovation that leverages QC to create solutions can result in benefits to local communities that might not register on a larger scale.
- Sustainable development is more likely to be achieved when a community's long-term needs and resources are part of the equation.

6. Economic and Social Benefits:

- Economic growth stems from QC solutions that create jobs, support entrepreneurs, and attract investors.
- Social cohesion and community bonds are strengthened by collaborative efforts to solve local problems.

7. Global Learning and Exchange:

- Knowledge sharing globally about local use cases contributes to broader understanding of how QC could further the SDGs.
- Collaborative networks enable people to share best practices and resources across regions and countries.
- Participants can connect with a community of people from academia and industry - global mentors, speakers, judges, sponsors and hackers - who share the goal of fostering open access to QC for all. This networking opportunity also helps launch careers.

In summary, QC use cases that are applied to local SDGs-related challenges are vital for creating effective, sustainable, and relevant solutions that empower communities and help improve the world..

Resources offered by the Hackathon in a Box

This toolkit provides a comprehensive set of resources for leaders to organize hackathons in their local universities, organizations, or within their communities. It includes access to educational resources such as recorded workshops and courses on QC, access to the OQI global community (composed of academics and industry leaders), templates to organize and develop hackathons (such as the application form, judging scorecards, and links to top quality quantum computing hackathons focusing on the SDGs), and examples of application use cases for hackathons that leverage quantum computing for the SDGs.

This toolkit offers guidance on how to organize your hackathon, secure sponsorships, and recruit mentors, judges and speakers for your hackathon.



QC accounts with fee: Access to a real time quantum hardware and software environment (collaboration QC coding accounts): If you have sponsorships for your hackathon, you can offer your participants access to QC hardware and software environment supported by xxx

QC software environment



QC software with no fee: You can use IBM's QisKit for free. Participants can download it on their laptops and there are free tutorials available to use. You can use any other free QC software as well.

Please note that software and hardware is not offered by OQI's Hackathon in a Box, but we provide software recommendations as above.

Hackathon in a Box

Participants

Mentors

Mentors support your teams by managing its development of a project during the hackathon, regardless of whether it is held virtually or in person. Mentors also support your team through trouble shooting and ensuring your project is solvable. You can ask them to help come up with ideas, and they also will encourage active participation. Their role is to manage your team and its expectations, and to provide expertise. They are essential to the success of your hackathon.



Students

Talented, motivated students from diverse backgrounds are selected to participate in the hackathon. The organizer then creates balanced teams that brainstorm an idea and develop an application under the supervision of an experienced mentor. Applications focus on QC and the SDGs, integrating machine learning, data science, natural language processing, and digital security.



Organizers

Committed and engaged members of a local community can serve as organizers. These can be students or professional leaders from a university or organization who are dedicated to boosting expertise in quantum computing and sustainability among youth in their communities. They have multifaceted roles in planning and running a hackathon. They must recruit a strong team to organize it and delegate responsibilities. Beyond being able to help with logistics, organizers must possess a range of skills such as website building, securing sponsorships, and organizing students, mentors, judges and supporters. They also must be knowledgeable about data privacy issues.

Judges

Teams present their applications on the final day of the hackathon in front of a renowned panel of expert judges. Their knowledge in QC or the SDGs is used to evaluate your team's use case application based on five main criteria: sustainability, innovation and originality, technical quality, business sustainability, and the quality of the presentation.

Introduction

Formats

Possible formats of hackathons

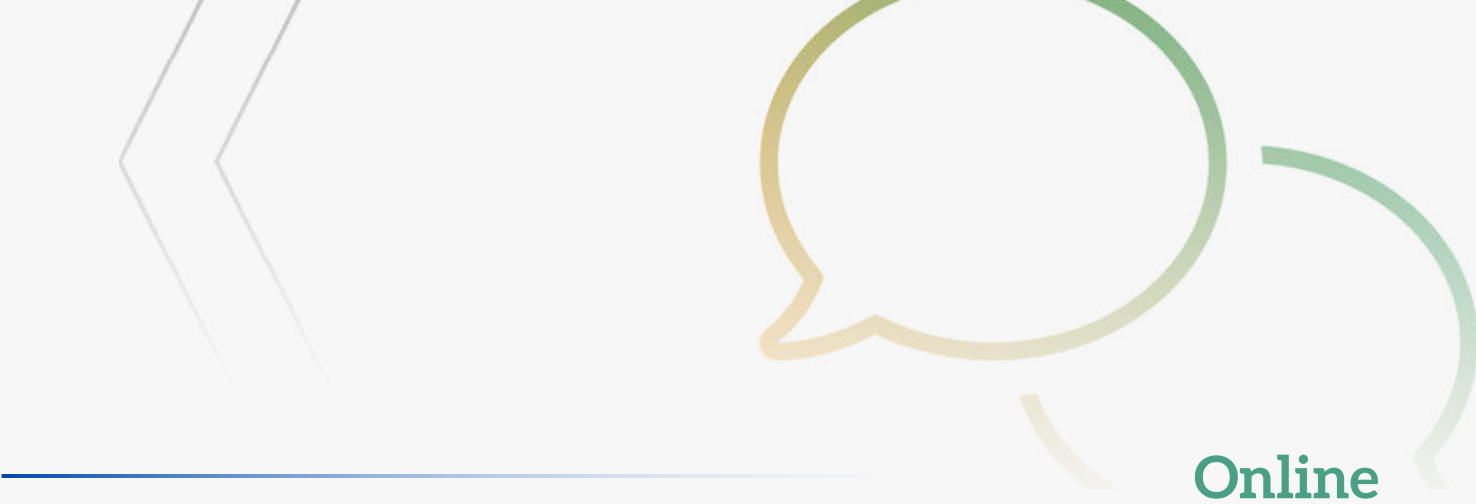
Your hackathon can take place online or in-person. This choice will depend on your level of experience, available facilities and budget.

If you have a limited budget or experience in organizing a hackathon, OQI’s advice is to start small, with a hackathon of 20-25 participants (4-5 teams) with a good level of computer science expertise and some basic knowledge of quantum computing. Depending on their level of complexity, small hackathons with limited resources can have anywhere from 20 to 50 participants.

The amount of effort and resources that will be needed for your hackathon will depend on the number of activities you plan as part of the hackathon. Depending on the participants’ experience, it may be useful to organize preparatory courses and lectures to ensure that everyone knows the basics of quantum computing coding and applications, including some training on how to frame a business model and/or assess the impact on the SDGs.

At least one workshop on how to use the technical infrastructure provided is essential. Our experience shows that such additional activities mentioned above, are a critical part of a hackathon’s value for each of the participants.

At-scale quantum computing hackathons can bring together several hundred participants over three to four days, but to pull them off successfully you will need a dedicated team, organizers, and sponsorship.



Online

Pros:

- Bigger pool of participants
- Access to non-local mentors, students, speakers and judges
- Lower costs
- Less organizational needs

Cons:

- Communication for the event can be more challenging
- Higher participant dropout rates before and during the event.
- Possible licensing cost for better and more secure communication
- Possible Wi-Fi or other technical issues

We generally recommend keeping in-person hackathons relatively small to allow for networking and close cooperation.

Here are the costs you will need to consider for an in-person event:

- Facilities to rent for the hackathon. We suggest university spaces, which are often free
- Catering and accommodation for the teams, mentors, judges, speakers and organizers
- Travel costs and visas
- Paid-for educational resources (optional)

Technical infrastructure, accounts and overhead

If you are not able to cover these costs, consider holding an online event. You could also approach local or regional philanthropic organizations and companies for sponsorship (template here). Some quantum companies may also provide financial support for specific hackathons.

You could also approach local or regional companies for sponsorship (template here). Some quantum companies are happy to provide financial support for well-run QC hackathons.

OQI’s Hackathon-in-Box provides an overview of free and more relatively inexpensive resources to organize your hackathon. You can reach out to our community for more practical guidance on how to organize them, and individuals who could provide assistance.



Offline

Pros:

- Easier to control communication about deadlines
- More active participant engagement during all phases of the event
- Better opportunities for community-building and networking
- Teamwork is easier and technical issues are minimized

Cons:

- Rental costs, limited availability of facilities, and other logistical issues
- Travel-related costs and complications
- Potential need for some participants to obtain visas or overcome other bureaucratic hurdles

QC Educational Courses

Depending on the experience of the participants, you can organize online interactive courses, interactive lectures and workshops prior to the hackathon to train participants with little to no experience or knowledge of quantum computing on the uses of QC and its applications for the SDGs.

Based on our experience, offering at least one workshop about the QC environment and its potential applications will be essential to the success of your hackathon. Your participants can find free tutorials online, such as IBM’s Qiskit and QWorld courses

Introduction

Timeline

Planning

Organizing the hackathon can take six months to a year depending on its scale, and can be split into three main phases.

Download Guide

Overview of the timeline

Organizing the hackathon can take six months to a year depending on its scale, and can be split into three main phases.

Launch

This section of the guide helps you know what to do during a successful quantathon. Understand what it takes to launch it, based on the QPEG mission.

Download Guide

Follow Up

This section has helpful suggestions on building impact within your hackathon community and explains how to contribute to the wider quantathon community.

Download Guide

6 - 12 month

Launch

1 to 3 days

This section of the guide helps you know what to do during a successful quantathon. Understand what it takes to launch it, based on the QPEG mission.

2 Launch

Typical schedule

One-Day Schedule Example
(online or in-person)

Full day

8.00 – 9.00	Welcome and present the program keynotes and lightning talks
9.00 - 12.00	Creative process
12.00 - 12.30	Teams pitch their ideas (30 seconds per pitch per team)
12.30 – 13.30	Lunch and networking
13.30 – 8:00am	Teams work on their projects and prepare their presentation
9.00 – 10.00	Presentations in front of a panel of judges
10.00 – 10.30	Judging
10.30 – 11.00	Award ceremony
11.00- 12:00	Lunch and networking

Three-Day
Schedule Example:

Day 1

9.00 – 10.30	Welcome Keynotes and lightning talks
10.30 – 12.30	Creative session
12.30 – 13.00	Teams pitch their ideas (30 seconds per pitch per team)
13.00 – 14.00	Lunch and networking
13.30 – 16.30	Teams finish their ideas and start hacking (teams set their own schedule)
16.30 – 17.30	Dinner and networking

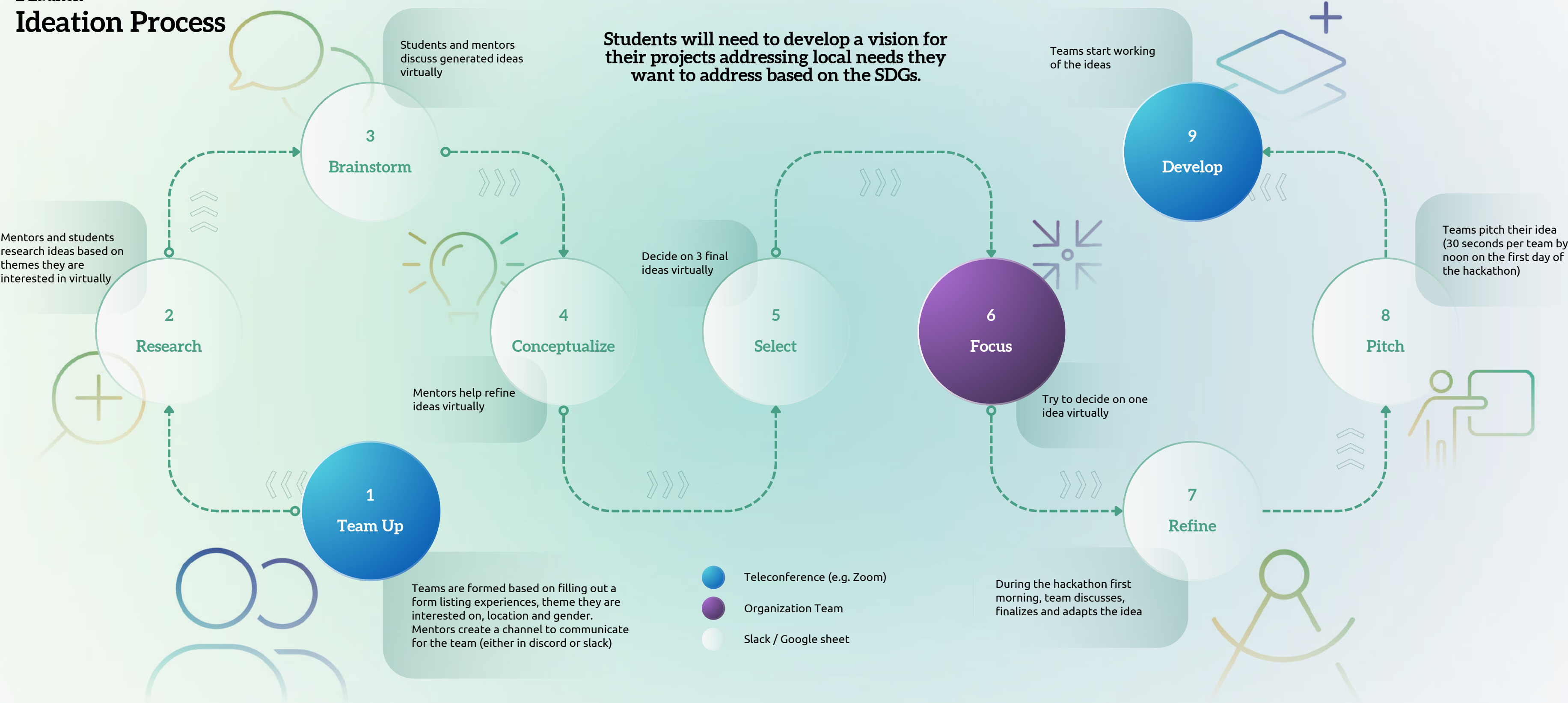
Day 2

9.00 – 17:30	Teams sets their own schedules and continue hacking
19.00 – 20.00	Dinner and networking

Day 3

9.00 - 9.30	Meet with mentors to handle any problems (you can have daily meetings with mentors to make sure things are going well)
9.00 - 12.00	Teams work and rehearse their presentation Applications must be completed
12.00– 13.00	Lunch and networking
13.00 – 15.00	Rehearsals of the presentations / teams work
17.30 – 18.30	Presentations in front of the panel of judges
18.30 – 19.00	Judging
19.00 – 20.00	Award ceremony
20.00	Dinner and networking

2 Launch
Ideation Process



2 Launch

Ideation timeline

Online ideation pre-hackathon

Mentors and students are encouraged to begin proposing ideas a week prior to the hackathon. Ideas can be shared virtually and should be focused on QC and the SDGs. Alternatively, people can begin to share their ideas at the start of the first day of the hackathon.

How to propose ideas

Everyone can propose an idea they are passionate about and capture it in a document or spreadsheet. Team members can discuss ideas within the team’s private Discord or Slack channel.

Provide a short description of your idea in one sentence. List the technology, skills needed and any helpful resources such as datasets.



Pre-hackathon: (one week prior to the hackathon)

- Mentors and students propose ideas virtually through [Slack](#)/ [Discord](#)/[Google docs](#)
- Announce teams
- Mentors create a channel for and invite their teams (on the chosen platform)

Each team will continue to propose, analyze and solidify their ideas. Make sure to do plenty of research and agree on a solid idea that is focused on QC and the SDGs. Teams can continue to discuss or work virtually on their ideas until the morning of the first day of the hackathon.

Day of the hackathon:

- Teams meet to refine and finish their ideas
- Judges check on all of the teams to make sure their ideas will have a strong impact.
- The teams must complete their presentations based on the template you provide at least one hour before the presentations start, so they can rehearse and continue working on the code.

A team’s success depends on the strength of its idea. Please ask for help if you need it - this is important for the success of your team.

Role of mentors during the idea-forming phase



Start with a discussion of the problem that the team wants to solve. The SDGs can provide inspiration. Since we are focusing on QC, mentors and students should prepare a list of ideas ahead of time.



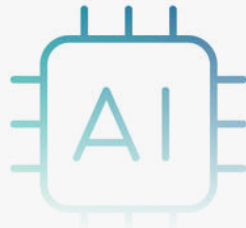
Encourage students to break down each of the problems into smaller pieces. The goal is to focus on the pieces that are small enough to be tackled during a hacking cycle.



Group similar ideas and problems together and begin to dissect each of them. Identify the scope of the problems, why they occur, and who they impact.



Once each problem has been broken down into smaller pieces, brainstorm technical solutions for each of the pieces. Encourage students to first think of the simplest possible solution.



Make sure the idea takes strong advantage of QC and is highly relevant to the achievement of the SDGs.



Students and mentors can all propose ideas that clearly answer:

How important is this problem, gap or need that we've identified?

Will our idea have a strong impact on our target audience or market?

How original is the solution that we propose or envision?

Does it take strong advantage of QC?

How relevant is our idea or solution to the achievement of the SDGs?

2 Launch

Examples



The 1st place entry in the 12th Annual NYUAD International Hackathon for Social Good in the Arab World 2024

Focused on solving the problem of gas leak anomaly detection and predictive avoidance through the use of quantum sensing and quantum machine learning (on quantum, not just classical computers). The implementation included an in-depth investigation of quantum hardware requirements for the sensors, demonstrated quantum advantage in variational quantum classifiers over the use of classical sensing data, execution on real quantum hardware, and a multi-stage business roadma



The 1st place entry in the 11th Annual NYUAD International Hackathon for Social Good in the Arab World 2023

Focused on mitigating blackouts in power grids through the use of quantum computing (QC) and machine learning, the project tackled a critical issue in the Middle East and North Africa. The implementation included optimizing power flows to reduce blackout risks by 60%, leveraging quantum-inspired models and real-time adjustments. This approach demonstrated significant potential in enhancing power grid stability, executed using QC hardware and software. The team’s solution, developed during the three-day hackathon, also included a strategic focus on scalability, with the first open-source implementation of two quantum circuits.



The 2nd place entry in the 12th Annual NYUAD International Hackathon for Social Good in the Arab World 2024

Focused on optimizing coral reef restoration strategies, the project combined classical computer vision (CV) techniques with quantum computing (QC) to address the urgent challenge of coral reef degradation, beginning with the UAE. By leveraging satellite imagery and quantum algorithms, the team identified ideal locations for coral restoration and designed optimal repopulation strategies. Their approach highlighted the critical role of coral reefs in marine ecosystems and economies, using QC to enhance decision-making processes. This innovative integration of CV and QC offers a scalable solution to combat the effects of climate change on coral reefs.

Mentors have a fundamental role in fostering collaboration and inclusion among the teams.

After the ideation phase, the hacking begins and students are ready to get to work with their teams, develop their code, and formulate a real strategy for their projects. This can last 24 hours or a few days, depending on the duration of the hackathon.

The goal is to make sure that everyone has a voice and is heard and feels safe. It is important to encourage hackers to focus on unsolved problems, but also to let them drive the process of refining ideas and addressing a localized need that is important to them.

The participants who are more involved in the coding than in the strategy or pitch preparation should also share their ideas and solutions as they face difficulties while developing the codes. They should be able to learn throughout the entire process, from the idea-forming phase to the presentations.

For mentors in this phase, it's helpful to bear in mind the importance of

- Openness to ideas at an early stage
- Being succinct with all guidance, questions and feedback
- Participation by the mentors in coding.
- Encouraging students to welcome new ideas and do some **quick research** before judging them.
- Curiosity, which begins with the questions, Why? What if? How might we do that?
- Focusing on asking questions, instead of stating opinions
- Staying silent to reflect on ideas before speaking, and not feeling a need to offer comments during every discussion.Helping students narrow the scope of a project by breaking it down into smaller steps and asking them how long they think each step will take, rather than being overly ambitious and proposing a scope that goes beyond theallotted time.Strict attitudes toward active participation, attendance, and punctuality.

The judging is based on the teams' presentations of their work.

The presentations can be made public by inviting local students, professors, company representatives and others to the event. Depending on their number, the teams can be allotted between 5 and 10 minutes for each of their presentations. We advise proposing a standard structure (template here) to help the teams pitch all the relevant aspects of their project, in line with the judging criteria.

At the end of each presentation, judges should provide short, constructive feedback. This is essential to encourage the participants and give them a sense of accomplishment. Feedback should also be an opportunity for judges to offer guidance on how to deepen the approaches and provide more potential professional contacts in business and academia who might be interested in the projects.

We advise providing judges with a scorecard (template here) listing the evaluation criteria. It provides an easy way to rate teams and their work and can be used to inform their discussions and decision-making processes. We advise keeping the list of criteria short and ensuring that each of the criteria is well-defined and understood by the judges. Examples of judging criteria include:



Relevance of the problem addressed by the quantum application for the SDGs and the local community



Innovation and originality



Quantum computing technical quality, complexity and completeness of the project



Business sustainability and scalability



Quality of the presentation and interaction with the audience

Not all judges will have the expertise to score all criteria. For instance, in the above example, judges with knowledge and experience of quantum computing or a technical background (computer science and engineering) will vote on all judging categories. Judges with no quantum computing skills will only vote on the “relevance for the SDGs,” “business sustainability and scalability,” and “presentation and interaction” criteria.

Once all the teams have presented, we advise organizing a 30- to 45-minute judges’ meeting to collate the scores, present the results, and allow for debate over the scoring or any outstanding cases. It is only after this judges’ meeting that the winner(s) should be announced publicly.

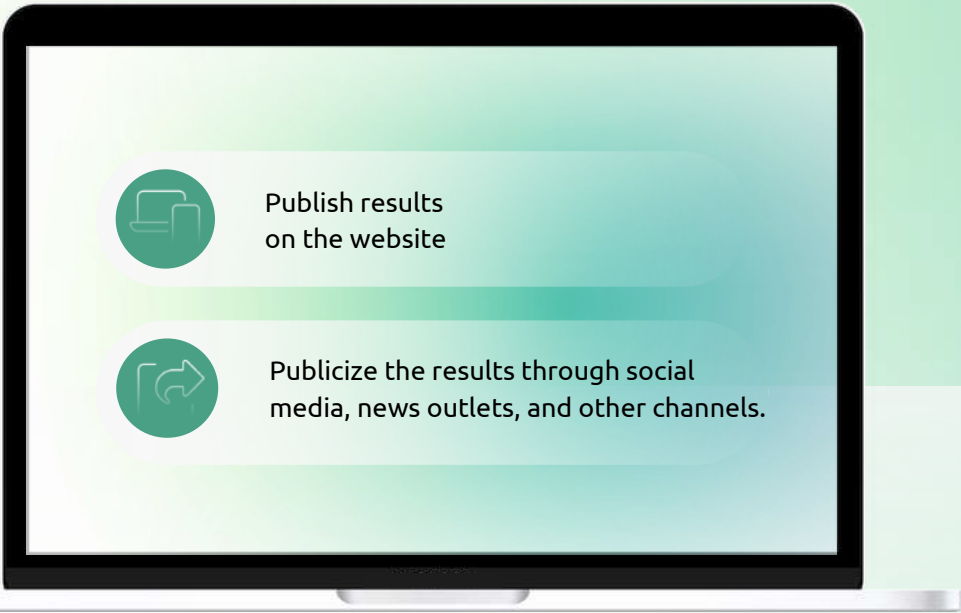
The judging phase can also include a moment to take a more in-depth look at the code produced by the teams to assess their technical achievement.

2 Launch

Award ceremony

Provide all the prizes during the award ceremony.

After the judges deliberate, they can distribute prizes to the winning teams. Make sure you have set realistic expectations about the awards prior to the hackathon.



Repository of resources



3 Repository

Example



New York University Abu Dhabi (NYUAD)
Hackathon for Social Good resources (free courses,
lectures, interviews and list of projects)

[Discover more](#)



Qiskit
Github

[Discover more](#)



Medium info
on Qiskit QC hacks

[Discover more](#)



MIT's iQuHACK (interdisciplinary
Quantum Hackathon)

[Discover more](#)



Xanadu's
Hackathon

[Discover more](#)



Sandbox
Hacks

[Discover more](#)

Examples of websites
for hackathons

- [NYUAD hackathon on QC for social good](#)

Examples of use cases leveraging
quantum computing for the SDGs

- [NYUAD 2024 winners of hackathon on QC and UN Sustainable development goals](#)
- [NYUAD 2024 past years winners of the hackathon on QC and UN Sustainable development goals](#)
- [OQI white paper 2022](#)
- [OQI white paper 2023](#)
- [Ideation process inspirational ideas](#)

Free workshops and
educational resources

- QBraid (Providing a QC account environment for participants): For QC accounts and access to the QC environments with all libraries and software needed: This can be set up with the excellent team from qBraid for a reasonable fee: <https://www.qbraid.com/>
- Qbraid is [A Preferred Notebook Environment for Former IBM Quantum Lab Users](#)
- [QWorld](#) offers live QC courses and certification: This is a non-profit organization that aims to offer excellent education and curated courses for a reasonable fee, with experienced instructors who can deliver, mentor and support the courses with office hours and hands-on activities and certificates.

Key Partners to help with the implementation especially in the case of funded hackathons:

- New York University Abu Dhabi (NYUAD) Hackathon for Social Good
- qBraid (Providing a QC account environment for Participants): For QC accounts and access to the QC environments with all libraries and software needed: This can be set up with the team from qBraid for a reasonable fee: <https://www.qbraid.com/>
- QWorld offers live QC courses and certification: This is a non-profit organization that aims to offer excellent education and curated courses for a reasonable fee with experienced instructors who can deliver, mentor and support the courses with office hours and hands-on activities and certificates.



Quantathon
BY OPEN QUANTUM INSTITUTE

It's time
to unleash your
ideas.

2025