



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

Implementation guide

Planning

Guide on how to prepare to
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

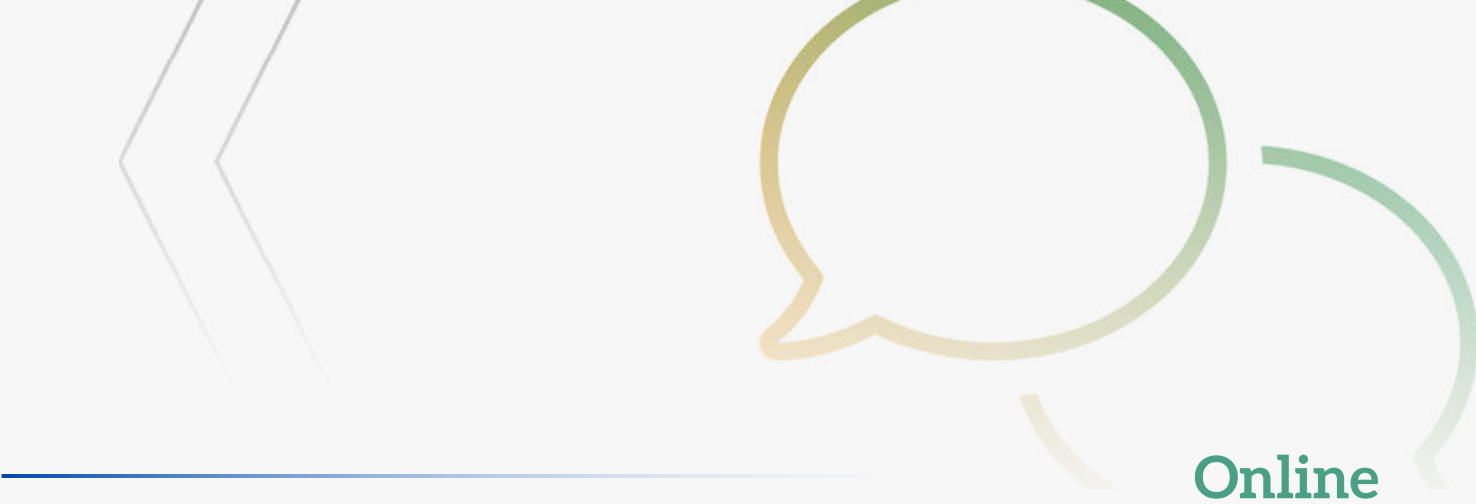
Your hackathon can take place online or in-person. This choice will depend on your level of experience, available facilities and budget.

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

Planning

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

2. Planning Timeline

Define the format, scope and location of your hackathon

1 Step

Determine the format of the hackathon (online or in-person) and decide on the location and infrastructure that will be needed, depending on the format.

2 Step

Estimate the budget and funding you will need, based on the scale of the hackathon. Plan the duration of the hackathon, such as 24 hours or 3 days.

3 Step

Set a target audience or level of expertise that you are seeking for your hackathon (for example, by educational levels, you could choose freshmen, sophomores, juniors, seniors, master's or or PhD candidates).

4 Step

Seek guidance and support from OQI's network of QC hackathon global experts on how to organize a hackathon for your community.



2. Planning

Timeline

Here are some committees you may need to set up to lead the hackathon:

Program committee

2 people

- Decides on the educational program and level (e.g. pre-hackathon virtual QC beginners' courses, during-the-hackathon lightening talks, technical and inspiring keynotes).
- Establishes a schedule for the program tasks, deadlines, and activities, and communicates them to the other committees.
- Invites speakers, mentors and judges for all levels of activities.

Sponsorship/Partnership Committee :

5 people

- Focuses on finding sponsors and partners from public and private organizations. The OQI global network can help you reach out to industry leaders for support and sponsorship.
- Sets up sponsorship packages and legal agreements.
- Establishes a timeline for finding sponsors, in consultation with the program committee.

Communication Committee:

2 - 5 people

- Focuses on social media (publicity), writes articles (press) and communicates your messaging across multiformat platforms. It's key to publicize and deepen your impact.
- Develops the website, which is essential for communicating the agenda, timeline and logistics.
- Sets up a plan for the social media strategy

Administrative Committee (Logistics):

3 - 5 people

- Focuses on logistics (e.g. the location for the hackathon, ordering food if the hackathon is in person).
- Gets volunteers to help. Depending on the size of the hackathon, anywhere from 10 to 20 volunteers may be needed to help with administrative tasks such as managing and updating the website, and posting updates to social media.

Accounting Committee :

1 - 5 people

- Focuses on budget planning and compliance.

Define key milestones of the planning phase

After establishing these teams, you will need to pencil in some dates to anticipate milestones



2. Planning

Milestones

Decide on the technical infrastructure needed for training and hacking.

You will need to decide on a technical infrastructure to run the hackathon. Cloud access to a quantum coding environment is provided by several companies, with or without a fee. We highly recommend qBraid, which has supported high-quality hackathons such as the NYUAD Hackathon and MIT Hackathon.

You can seek funding from top QC companies such as IBM, Google, Microsoft, Xanadu, and Sandbox, and use this funding to provide a QC environment for your participants to use to simulate their application in real time. For example, qBraid can provide a QC environment and train participants to use the hardware and software for a minimal fee. If you don't have sponsors, you can use IBM's Qiskit for free. There are plenty of tutorials available as well.

For an online hackathon, you will need to provide a virtual environment such as Zoom where everyone can gather for talks and workshops, and the teams can work together in breakout sessions. You will need a plan with Zoom links, and a Discord channel to facilitate communication among participants and teams.

We also advise creating a community management platform on Discord or Slack to enable communication between the teams and organizers. This will be needed regardless of whether the format is virtual or in-person.

For an in-person hackathon, you will need a conference room for lectures; smaller rooms for teams to collaborate in privacy; access to Wi-Fi; and a stable power source that can accommodate multiple devices.

Hold an online, in-person or hybrid information session to smooth out logistics and prepare the participants before the hackathon is held.

2. Planning

Target Groups

Decide on target groups

Hackathons should convene people with complementary skills and experience in areas such as quantum computing, artificial intelligence, machine learning, data science, security, sustainability, and theSDGs. Students can have academic backgrounds in physics, chemistry, computer science or any other field that relates to quantum computing. You can also take a cross-cutting approach to the hackathon by focusing on gaming, art or another QC-related pursuit.

The theme of the hackathon can vary according to the organizer's interests and participants interested in these topics. To help you publicize your hackathon, recruit students and reach a variety of participants, the OQI global community of supporters and experts can provide help in several fields. You can also connect with your local university departments in physics, engineering, computer science, chemistry or other related fields.

Some of the key promotional factors will be the launch of your website and the start of a social media campaign to attract participants, speakers, sponsors, mentors and judges. You can also get help in finding an audience by reaching out to student associations and clubs that promote fields such as quantum computing, computer science, physics, chemistry, entrepreneurship, and sustainability.

If it's a local hackathon, with relatively simple logistical and financial needs, you can be flexible in your approach and admit university students who show commitment to taking part in the hackathon. They can, for example, fill out a form, submit their LinkedIn profile, and upload a video explaining why they want to participate.

Embrace the Candidates

Student candidates must maintain a 3.5 GPA (equivalent to a B+ or 90% or 5.5 in other international scales) or higher as a full-time, upper-class undergraduate or graduate student in any field, and show a strong interest in the use of technology for the SDGs, quantum computing, and entrepreneurship.

Participation will take into consideration the greater societal goals of diversity, equity and inclusion by encouraging, for example, nominations from traditionally under-represented or under-served populations such as women, minorities and people with disabilities. Ideally, candidates should have some proficiency in classical computing, including programming languages like Python or Java, plus some experience in mobile/web applications, quantum computing, and demonstrated leadership and achievements in relevant areas.

If it's a larger-scale hackathon with high ambition, you can seek sponsors and offer to pay for participants' travel while insisting that they meet a higher level of criteria for their participation. We recommend using the following criteria for a high-level hackathon with sponsorship:



Students' previous experience is highly valued if, for example, they have won a hackathon, received relevant awards, or participated in programming contests, or if they have conducted related research, attended conferences, or completed internships or held jobs related to QC, apps, web development, or any related start-up.

They should show interest in quantum computing applications, web development, mobile applications and startups.

They should be team players.

Students should demonstrate some leadership achievements, strong problem-solving skills, and communication skills.

2. Planning Approach

Decide on your approach

Prior to the hackathon, depending on your participants' profiles and their degree of knowledge about quantum computing, it may be useful to provide them with courses and workshops to ensure they are well-prepared for the event.

Key topics to be covered include:

- **Basics of quantum computing systems**
- **Quantum operations on a qubits**
- **Entanglement, superposition and basics quantum principles**
- **Quantum algorithms.**

The resource section of this guide provides some free educational resources on these themes. For a modest fee, some of those that are listed can provide certification courses. If you have the budget for it, the latter is a better option because students will be able to interact with the professors and get live help with their projects during the online QC courses prior to the hackathon.

During

During the hackathon, inspirational talks can be useful to support the ideation phase. Technical keynotes also can facilitate the hacking phase. Speakers can be leaders from quantum computing companies, lead researchers from academia, former students or hackathon participants with inspiring lives and career paths. The speakers can also serve as judges.

Examples of topics for talks and keynotes include:

- **Quantum computing ethics and responsible computing**
- **Quantum tools and software**
- **QC applications**
- **Quantum algorithms (e.g. for machine learning, optimization, chemistry, etc.)**
- **Gaming**
- **Quantum navigation systems**
- **Physical quantum circuits**
- **The SDGs**

2. Planning

Prepare outreach

Outreach and communication are fundamental parts of the planning phase, during which you must create your strategy to keep your audience informed and engaged.



A functioning website for the hackathon



Social media profiles dedicated to the hackathon



The confirmed date of the hackathon to announce



A communication plan for the following months



Application forms accessible on the website

Prepare outreach and communication material

Once the applications are open, publicize them on social media and within your local universities and, most importantly, set firm deadlines.

The structure of the website should include sections on:



Final agenda / program for the hackathon



Sponsors and partners



Judges (list all that will be involved plus their evaluation criteria)



Mentors (roles and list of names)



Hackers (list of all students selected to participate)



Teams (list of all teams and their students)



Application forms for mentors and judges

2. Planning Team

Confirm mentors, judges and speakers

The team's success will greatly depend on how dedicated the mentors are to their teams. When selecting mentors, you must be sure they have QC experience and a proven ability to lead teams, especially during a hackathon, which requires a specific set of skills that also include innovative thinking and problem solving.

Mentors should also be leaders who excel at innovative thinking, communication and problem solving.

Each team should be led and managed by one or two mentors (QC experts). Select judges who bring a diversity of experience and expertise from industries, academia and organizations. They should be QC experts involved in fields such as sustainability, public speaking, business and innovation. Make sure to inform them beforehand of their roles and duties, especially if they have never taken part in a hackathon before.

Excellent speakers also broaden students' chances to create a network. They could also serve as judges, particularly if one of the objectives of the hackathon is to stay small.

Before the application deadline, you will need to select mentors and judges and inform them about the entire process.

Finalize selection of participants and compose teams

Make sure to communicate the process and deadlines to each of the participants. Make sure they are aware of the program, the process and rules of the hackathon. Decide on the team formation:

Decide on the number of teams for the hackathon. We recommend having no more than 10 teams if the hackathon will be held in-person.

You can select the teams based on the diversity of their experiences, where they come from, or other demographic factors.

Research points to these elements as key factors in building successful teams and innovative products.

You can have participants come with their own team already formed.

Having teams formed based on their diversity and inclusion provides a great opportunity for people to learn from each other, forge new connections, and produce innovative solutions.

We recommend team sizes of around 5-7 members, and that each team have at least one or, preferably, two experienced mentors

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.



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BY OPEN QUANTUM INSTITUTE

It's time
to unleash your
ideas.

2025