Open Quantum Institute (OQI)

Philipp Kammerlander, Advisor at OQI

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An initiative hosted by CERN, born at GESDA, supported by UBS

Agenda

In the next weeks, OQI will be at the center of attention in this course.

- story
- goals
- activities
- deep dives

25th February	4th March	18th March
Introduction to GESDA and OQI	SDG-focused quantum computing use case development at OQI	Quantum Diplomacy Game
Philipp Kammerlander	Alex Bernasconi Philipp Kammerlander	Audrey Himmer Philippe Caroff

Which Future with Quantum Computing Do We Want?

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GESDA - FROM THINK TANK TO DO TANK

Developing a public-private instrument of **anticipation** and **action** that...

- **ANTICIPATES** future developments in science and technology
- **ACCELERATES** the dialogue between science, diplomacy, philanthropy, and society to create a common understanding and alignment on the coming disruptions and use them to develop solutions ideas and tackle global challenges
- **TRANSLATES** these opportunities into action by deploying initiatives and projects with global impact through innovative partnerships, impact funds & citizen's involvement

gesda

GESDA ANTICIPATORY SITUATION ROOM

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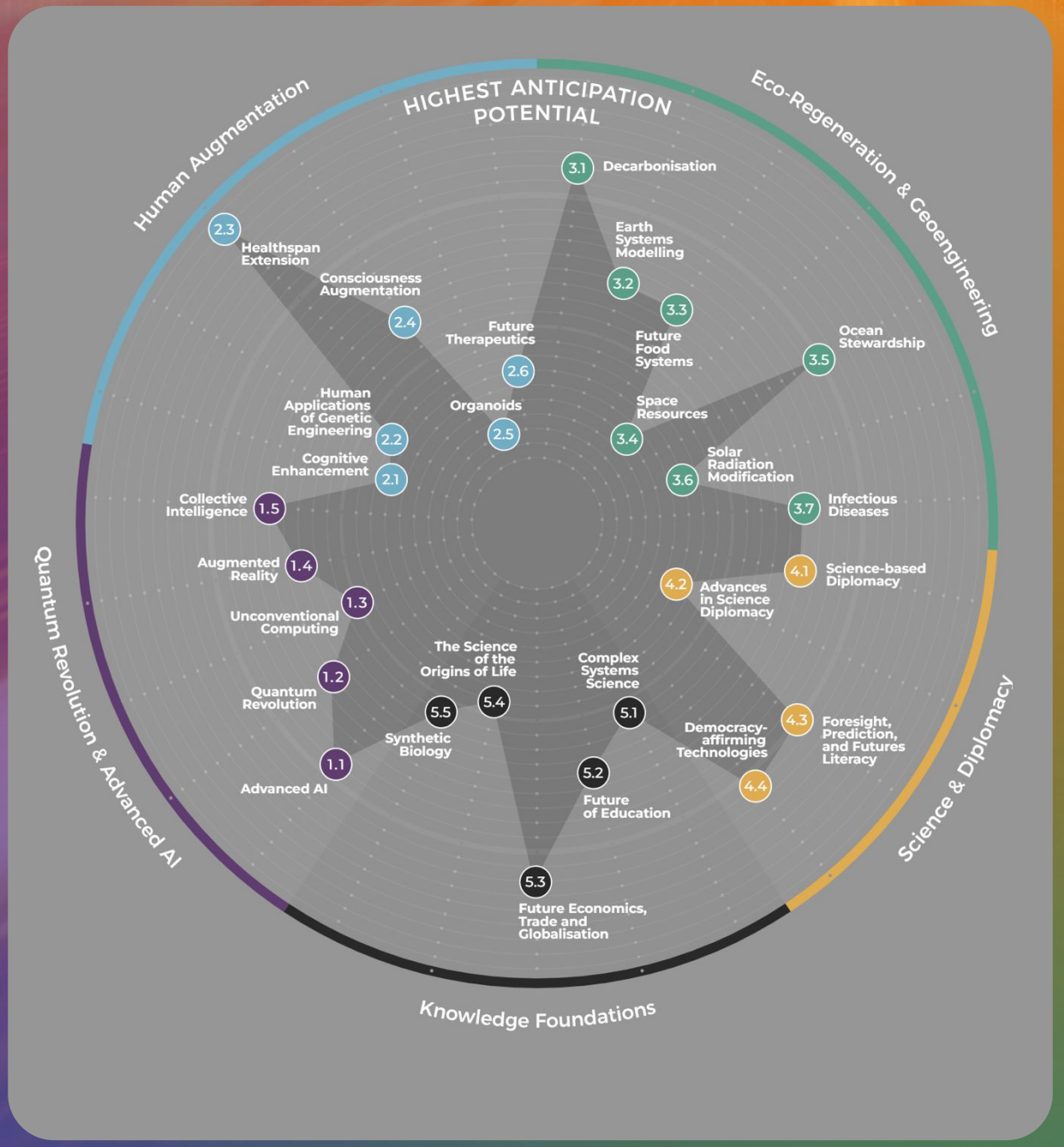
Taking the pulse of science

The Science Breakthrough Radar

The GESDA Science Breakthrough Radar® aims to identify emerging research and map major science advances at 5, 10 and 25 years. Those advances will potentially have a significant impact on who we are as humans, how we are going to live together and how we can ensure the sustainability of our planet.



gesda Geneva Science and Diplomacy Anticipator Foundation

Use the future to build the present

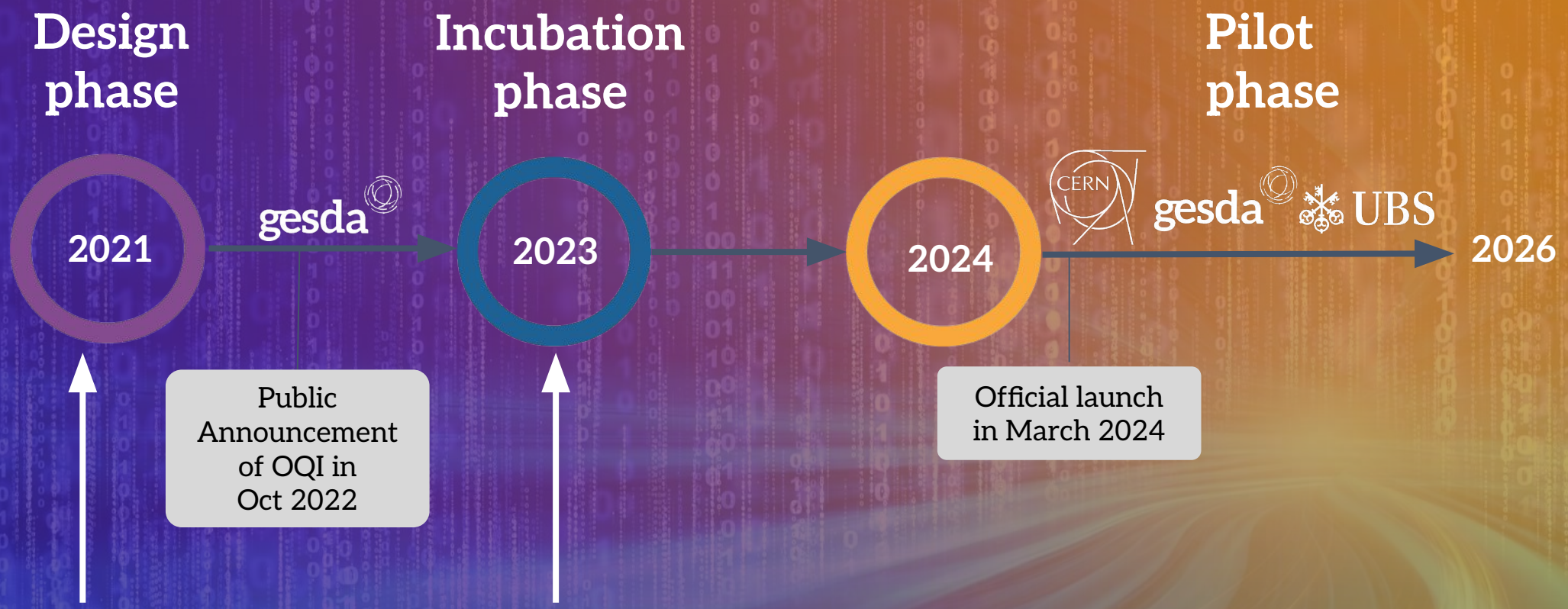
Quantum Computing, a technology with great transformative capability, requiring a science and diplomacy mobilization to ensure global access and benefits.

Ensure equitable access to the technology and progresses for the benefit of humanity

- Science to accelerate sustainable development
- Policymakers to think upstream about the impact of scientific and technological progress on society

Anticipation of future developments → **Acceleration of the dialogue between science, diplomacy, philanthropy and society** → **Translation of opportunities into action**

The OQI Journey



The OQI Incubation Partners

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Our incubation partners helped us grow OQI from a concept to reality, with many in the process of formalising their engagement to become partners during our pilot phase.

Academia

- Bibliotheca Alexandrina
- Quantum Delta the Netherlands
- University of Copenhagen
- ETH zürich
- RRI
- XPRIZE
- NYU Abu Dhabi
- EPFL
- Imperial College London
- NITheCS
- JÜLICH Forschungszentrum
- CERN
- Université de Genève
- University of Calgary
- University of KwaZulu-Natal / Inyuvesi YaKwaZulu-Natali

Industry

- AQT
- PASQAL
- IQM
- IBM Quantum
- NVIDIA
- aws
- Microsoft
- OQC

Diplomacy

20+ permanent representations in Geneva

- UN Habitat
- UNFCCC
- Periodic Table of Food Initiative
- SDG Lab
- WIPO
- gain
- Comité International Genève
- World Health Organization
- ICRC

Impact

- WHO Foundation
- Fondazione Compagnia di San Paolo
- XPRIZE

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The Open Quantum Institute

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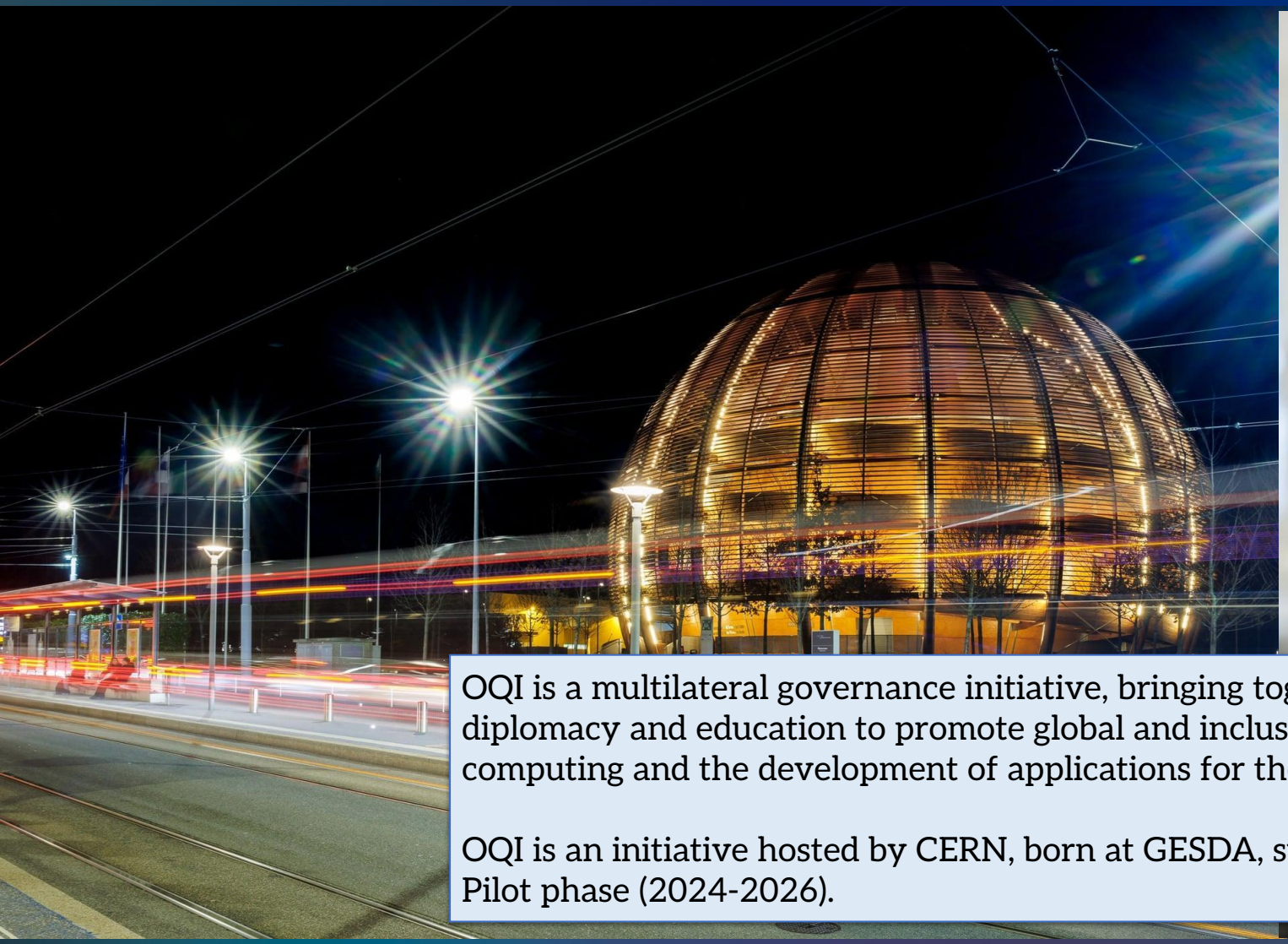

OQI is a multilateral governance initiative, bringing together academia, industry, diplomacy and education to promote global and inclusive access to quantum computing and the development of applications for the benefit of humanity.

OQI is an initiative hosted by CERN, born at GESDA, supported by UBS.
Pilot phase (2024-2026).

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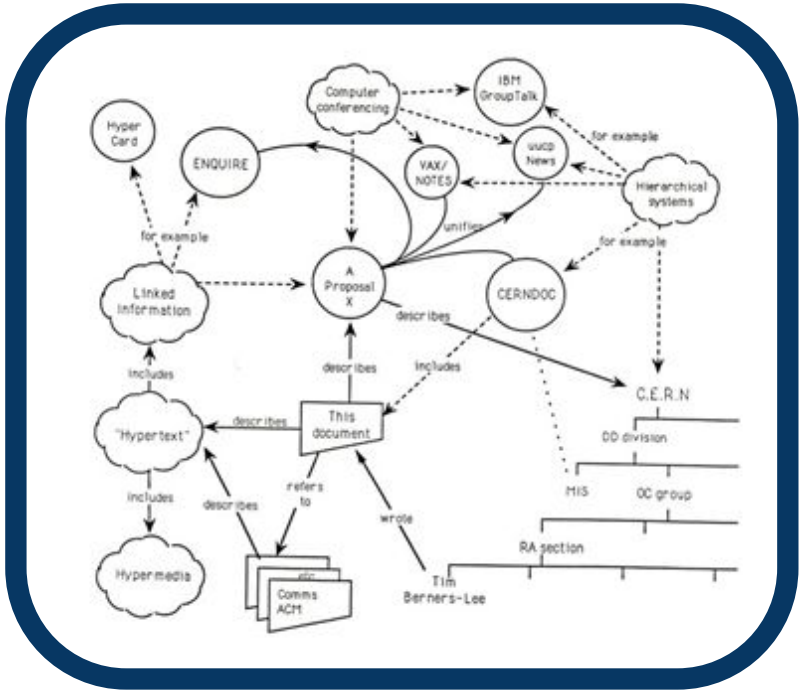
Why CERN?



- 70 years of exemplary track record in sharing technology with Society
- Non-profit, inclusive, open science in action
- Collaboration is at CERN's core: more than 700 partner universities worldwide and over 13,000 users

Strategic Pillars of the Open Quantum Institute

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A1 Accelerating applications for humanity

Realising the full potential of quantum computing by accelerating the use cases geared towards achieving the SDGs, thanks to the combined forces of researchers and developers, entrepreneurs, the United Nations, and large NGOs.

A2 Access for all

Providing global, inclusive and equitable access to a pool of public and private quantum computers and simulators available via the cloud

A3 Advancing capacity building

Developing educational tools to enable everyone around the world to contribute to the development of quantum computing and make the most of the technology.

A4 Activating multilateral governance for the SDGs

Providing a neutral forum to help shape multilateral governance of quantum computing for the SDGs

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A1: Use Cases

A1 - Accelerating Applications for Humanity

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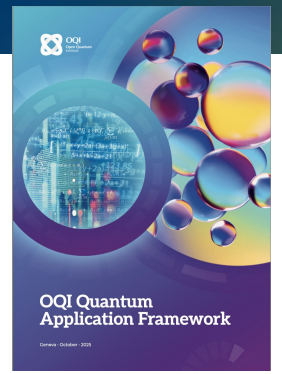
From ideation to proof of concept

[OQI Quantum Application Framework]



Quantum computing experts	Classical computing experts
Domain experts	Impact experts

Multidisciplinarity

Global Challenge
Mathematical Concept
Computational Approach
Quantum Computing Approach Quantum simulation Machine Learning Optimization Linear Syst. Of Eqns.

Potential impact of a quantum solution
- Societal
- Environmental
- Economical

Pathway to Impact

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A1 - Accelerating Applications for Humanity

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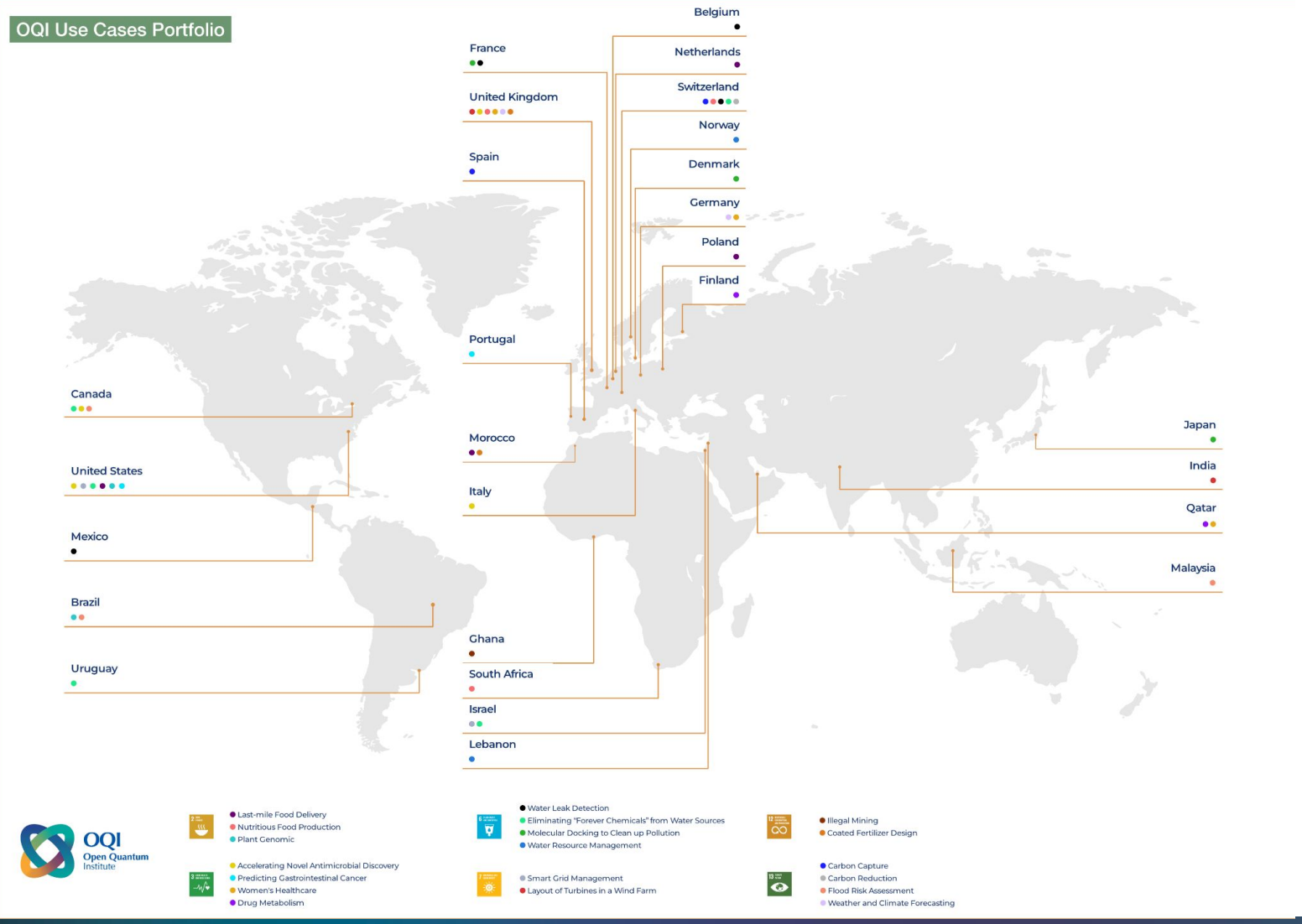

2 ZERO HUNGER
- Nutritious Food Production
- Food Security – Last-Mile Food Delivery
- Plant Genomics

3 GOOD HEALTH AND WELL-BEING
- Accelerating Novel Antibacterial Discovery
- Predicting Gastro- intestinal Cancer
- Women's Health
- Drug Metabolism

6 CLEAN WATER AND SANITATION
- Water Leak Detection
- Eliminating Forever Chemicals from Water Source
- Molecular Docking to Clean Up Pollution
- Water Resource Management

7 AFFORDABLE AND CLEAN ENERGY
- Laying out turbines in a windfarm
- Smart grid management

12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- Illegal Mining
- Enclosed Fertilizers

13 CLIMATE ACTION
- Carbon Capture
- Flood Risk Assessment
- Weather and Climate Forecasting

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Accelerating Novel Antimicrobial Discovery

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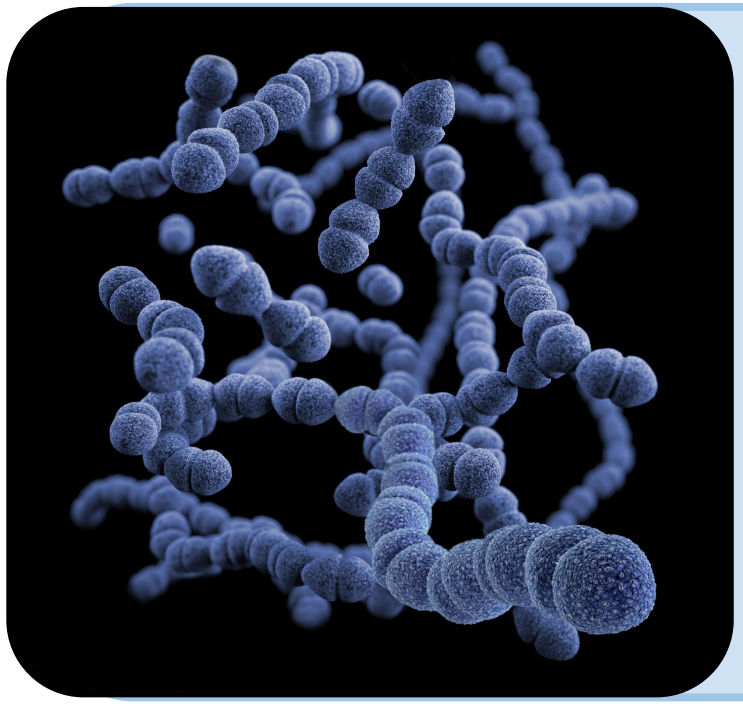

Use Case Team:

McMaster University

qBraid

GARDP
Global Antibiotic Research & Development Partnership

Team Origins:

Quantum Approach:
Machine Learning (QRC)

- Antimicrobial resistance is considered to be one of the largest threats to global public health by the WHO.
- Due to a lack or profitability, promising antibiotics failing to reach market due to lack of investment from pharmaceutical companies.
- Quantum computing to explore a larger number of chemical interactions more effectively, improving ability to produce affordable antibiotics.

More Efficient Drug Discovery Process → More Profitable Industry → Investment form Pharmaceutical Companies → More Available + Effective Antibiotics → 3 GOOD HEALTH AND WELL-BEING

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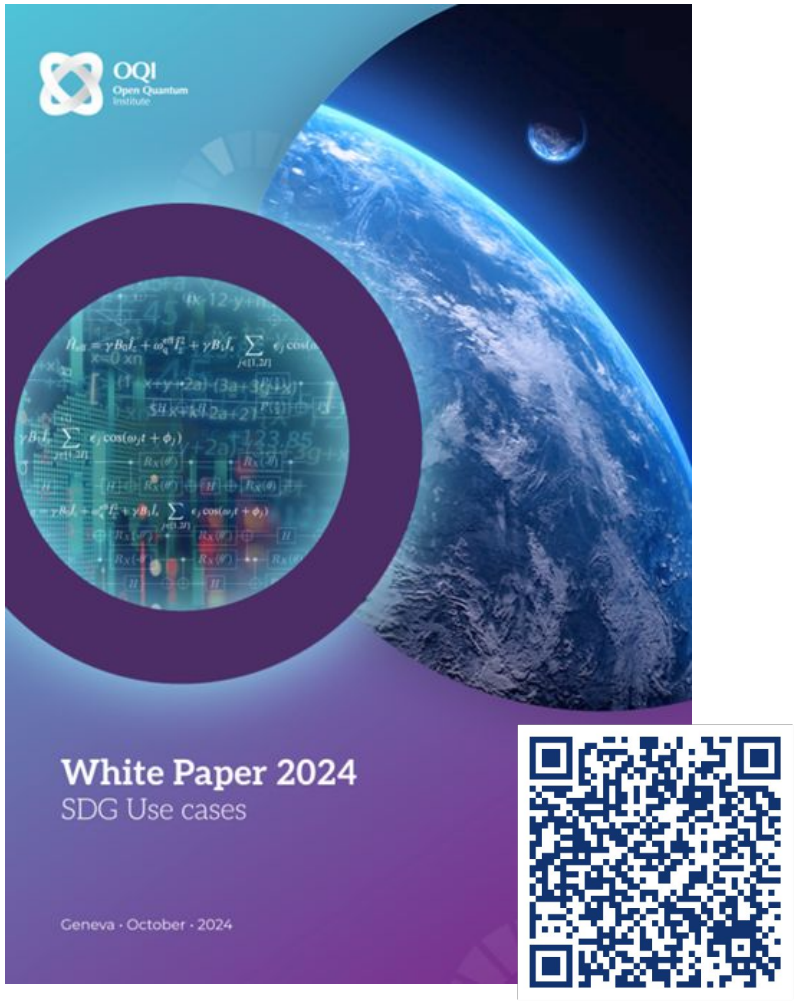
Read more about OQI use cases

All previous editions of the OQI Use Case White Paper can be found on our website.



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A2: Access

Global distribution of our community

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500+ individuals

50+ countries

42+ members

7+ partners

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OQI Community

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Join the OQI community as Friends!

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A3: Capacity building

Capacity building goals

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INDIVIDUALS

Educational consortium: made up of domain and quantum computing experts from academia and industry

ORGANISATIONS

National and international institutions (e.g. startups, industry)

TOOLS

Open access educational resources and access to QPUs

CAPACITY BUILDING ACTIVITIES

Hackathons

Quantum Diplomacy Game

Regional events

ECOSYSTEMS

Support the growth of independent local ecosystems and cultivate awareness and interest in quantum underserved geographies

INDIVIDUALS

Nurture pools of regional talent in QC, connecting them with international and local opportunities

APPLICATIONS

Support A1 : education on quantum computing applications for the SDGs

A1

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OQI Educational Consortium

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Bringing together expert from industry, academia, the public sector and NGOs to:

100+ experts

90+ global institutions

Co-shape and implement best practices.

Ensure that the quantum underserved geographies have a voice in co-shaping global quantum diplomacy.

Enable the development of future quantum ecosystems that are regionally and culturally relevant.

A3 - Advancing capacity building (2025 activities)

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A3 - Advancing capacity building (2026 activities)

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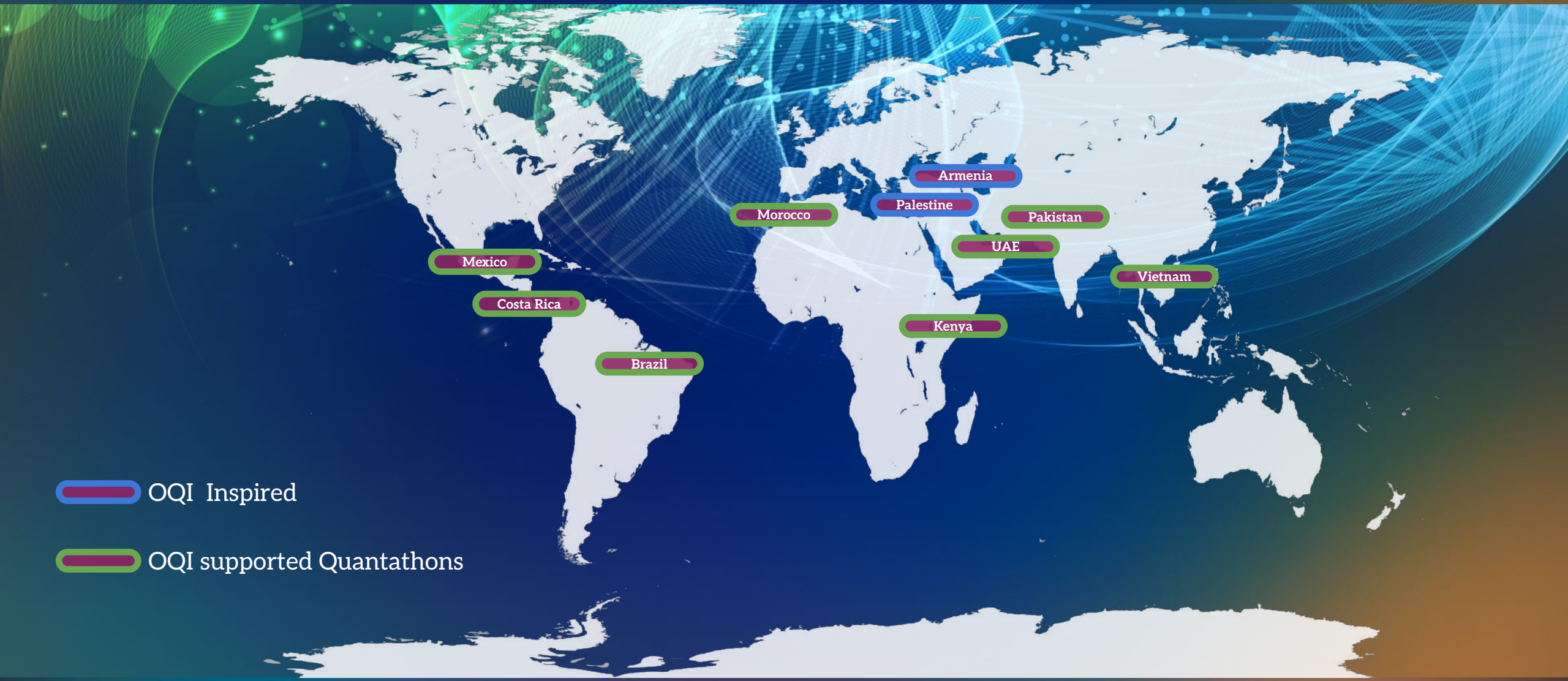

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Quantum Diplomacy Game

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An immersive role-play serious game designed to promote science diplomacy and raise awareness and anticipation of the geopolitical implications of quantum computing as an emerging technology.

20+ Quantum Diplomacy Games played in 2025

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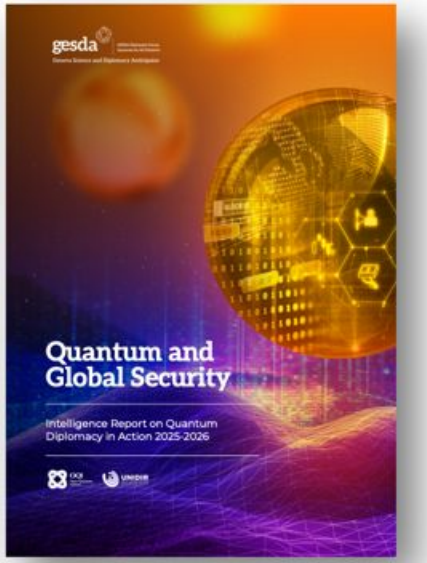
A4: Diplomacy

Intelligence Report



Governance: OQI Advisory Committee

Formed of 34 members from industry, academia, diplomacy and education, working together to provide strategic input to the OQI team to achieve the goals of OQI

- ➔ OQI's advisory committee includes diplomats from: Austria, the Netherlands, Chile, Mexico, Morocco, Italy, Pakistan and Brazil.
- ➔ Other members are from organisations such as IBM, ETH Zurich, XPRIZE, and other collaborating organisations.

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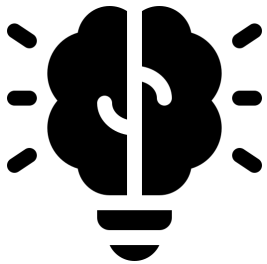
What can you do?

Learn actively

Stay curious and deepen your understanding of the societal impact of quantum technologies



Reflect critically

Question your (future) choices as a researcher, developer, or innovator, and familiarise yourself with RRI (responsible research and innovation) practices and integrate them into your work/processes.

Get involved

Join responsible quantum initiatives and be a voice for ethical, inclusive, and sustainable quantum tech!

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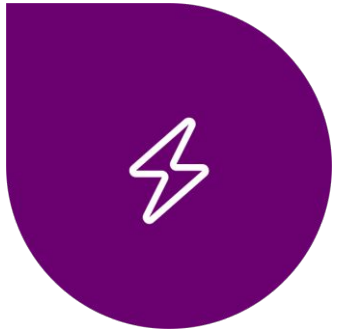


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