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THE GENEVA SCIENCE AND DIPLOMACY ANTICIPATOR
USE THE FUTURE TO BUILD THE PRESENT

Marieke Hood | Executive Director Impact   Geneva Science and Diplomacy Anticipator

WHAT IS GESDA – A PRIVATE FOUNDATION TASKED

"

To develop an instrument of **anticipation** and **action**

➢ by favoring **public-private partnerships of international scope**

➢ and **projects**

- to provide solutions to current and future technological challenges
- turn them into **opportunities**
- and **widen the circle of beneficiaries of advances in science and technology**

"

GESDA STATUTORY MISSION GIVEN BY OUR FOUNDERS

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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

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THE HUMAN RIGHT TO SCIENCE

"

Universal Declaration of Human Rights (1948) - Art. 27(1) :

Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

International Covenant on Economic, Social and Cultural Rights (1966) - Art. 15.1 :

The States Parties to the present Covenant recognize the right of everyone:
(a) To take part in cultural life;
(b) To enjoy the benefits of scientific progress and its applications;
(c) To benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

"

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GESDA ANTICIPATORY SITUATION ROOM PROCESS
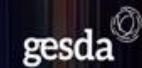
Anticipating scientific breakthroughs

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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.
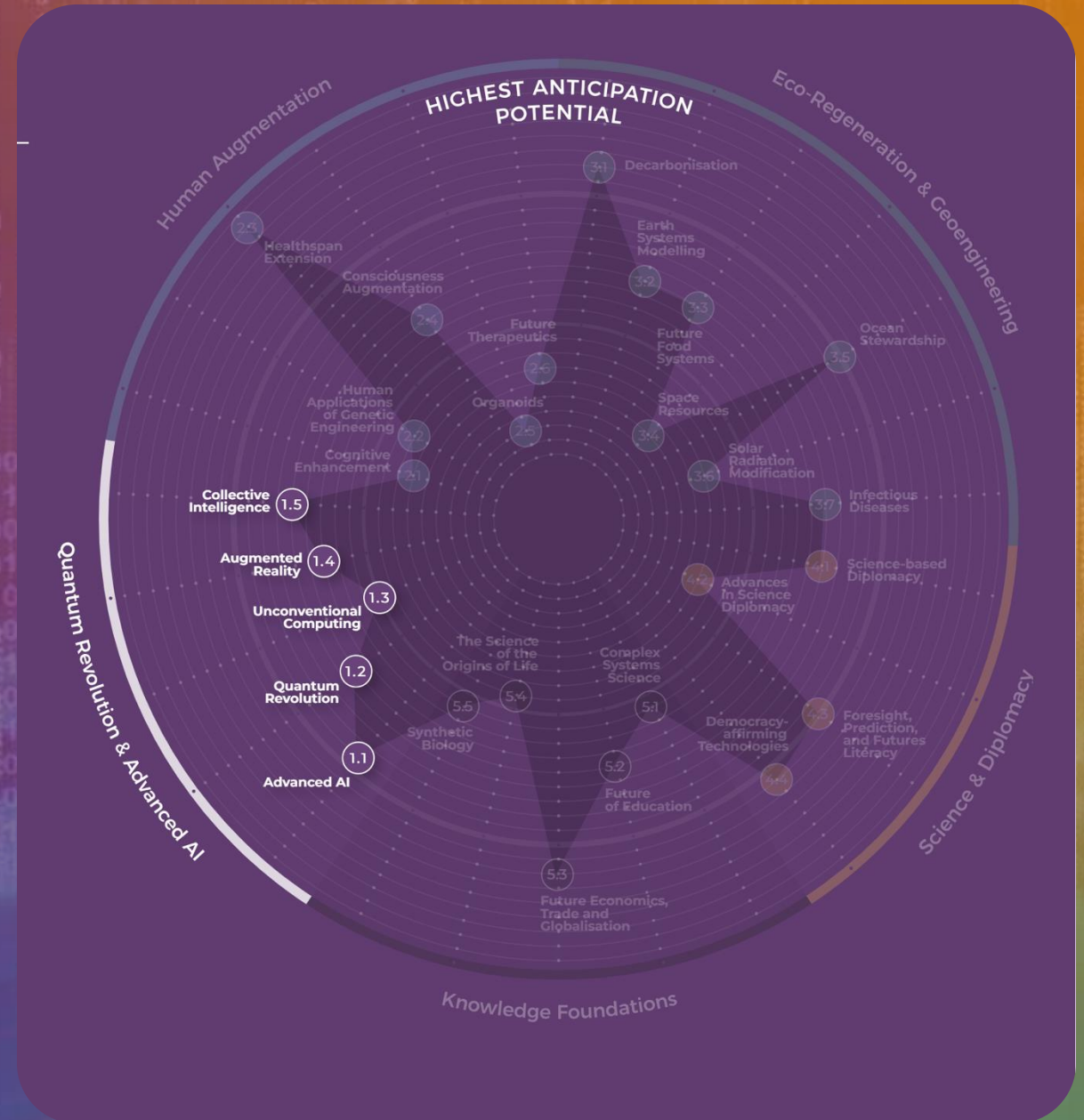
GESDA RADAR

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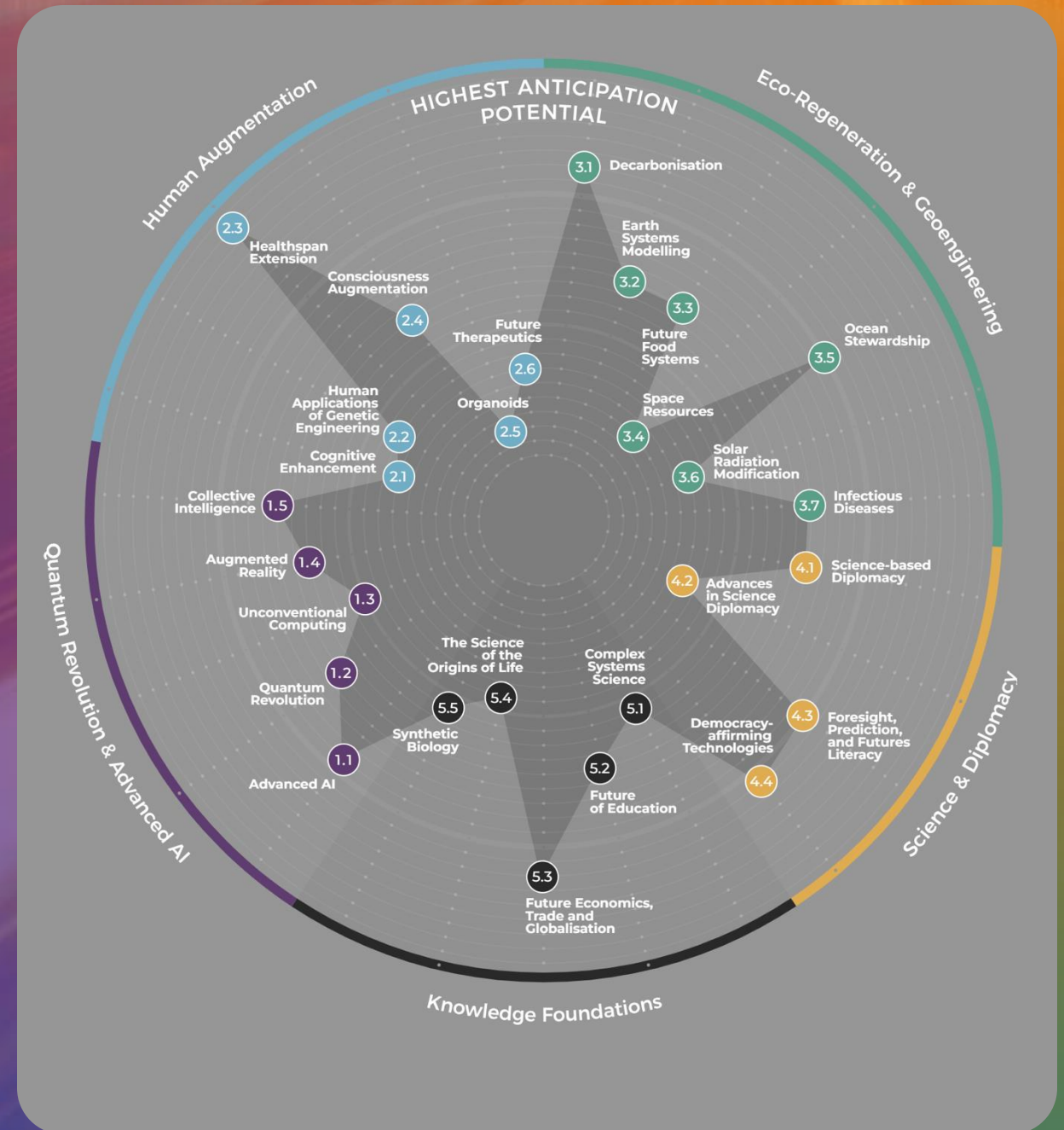
1 Quantum Revolution & Advanced AI

Our lives are intricately intertwined with the flow of data, and the information revolution has transformed the way we live and work, as well as our understanding of our environment. However, the impact of today's information technology could nonetheless be minor compared to the consequences of innovations coming over the horizon.

HIGHEST ANTICIPATION POTENTIAL

Human Augmentation
Eco-Regeneration & Geoengineering
Science & Diplomacy
Knowledge Foundations
Quantum Revolution & Advanced AI

Decarbonisation
Healthspan Extension
Earth Systems Modelling
Consciousness Augmentation
Future Therapeutics
Future Food Systems
Ocean Stewardship
Human Applications of Genetic Engineering
Organoids
Space Resources
Solar Radiation Modification
Cognitive Enhancement
Infectious Diseases
Collective Intelligence 1.5
Science-based Diplomacy
Augmented Reality 1.4
Advances in Science Diplomacy
Unconventional Computing 1.3
The Science of the Origins of Life
Complex Systems Science
Quantum Revolution 1.2
Synthetic Biology
Democracy-affirming Technologies
Foresight, Prediction, and Futures Literacy
Advanced AI 1.1
Future of Education
Future Economics, Trade and Globalisation

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Trend

1.2 Quantum Computing

EMERGING TOPIC

1.2

Quantum Computing

ANTICIPATION COMMITTEE CHAIR

Sabrina Maniscalco
Professor of Quantum Information and Logic
University of Helsinki

AI+ · Overview · Connections (2) · Resources (36) · Committee (9)

When information is stored in the physical states of objects whose behaviour is governed by the laws of quantum physics, new and powerful forms of information processing become possible. Suitably realised and managed, this creates novel computational capabilities that have the potential to significantly impact sectors as diverse as finance, ① materials science, ② cryptography ③ and drug discovery. ④

ASSOCIATED SUB-FIELDS:

SUB-FIELD
1.2.1
Quantum Hardware development

SUB-FIELD
1.2.2
Quantum Algorithms design

SUB-FIELD
1.2.3
Quantum error correction and noise mitigation

SUB-FIELD
1.2.4
Near-term applications of quantum computing

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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

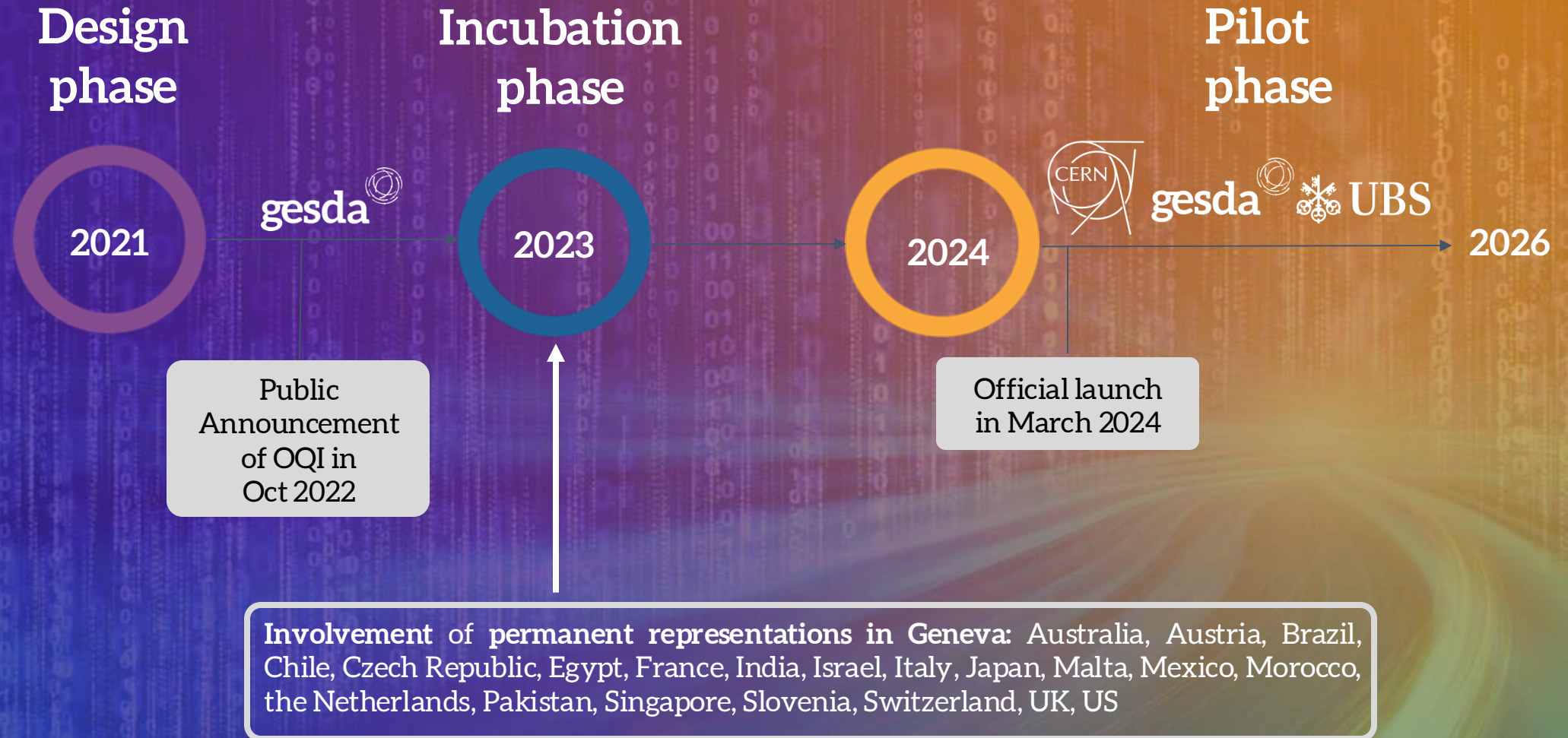**Anticipation of future developments**

Acceleration of the dialogue between science, diplomacy, philanthropy and society

Translation of opportunities into action

The OQI Journey

Design phase

Incubation phase

Pilot phase

2021

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2023

2024

CERN gesda UBS

2026

Public Announcement of OQI in Oct 2022

Official launch in March 2024

Involvement of **permanent representations in Geneva:** Australia, Austria, Brazil, Chile, Czech Republic, Egypt, France, India, Israel, Italy, Japan, Malta, Mexico, Morocco, the Netherlands, Pakistan, Singapore, Slovenia, Switzerland, UK, US

gesda Geneva Science and Diplomacy Anticipator Foundation

The OQI Incubation Partners

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

Industry

Diplomacy
20+ permanent representations in Geneva

Impact

Geneva Science and Diplomacy Anticipator Foundation

The Open Quantum Institute

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
Open Quantum
Institute

YOUTUBE VIDEO

Strategic Pillars of the Open Quantum Institute

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.

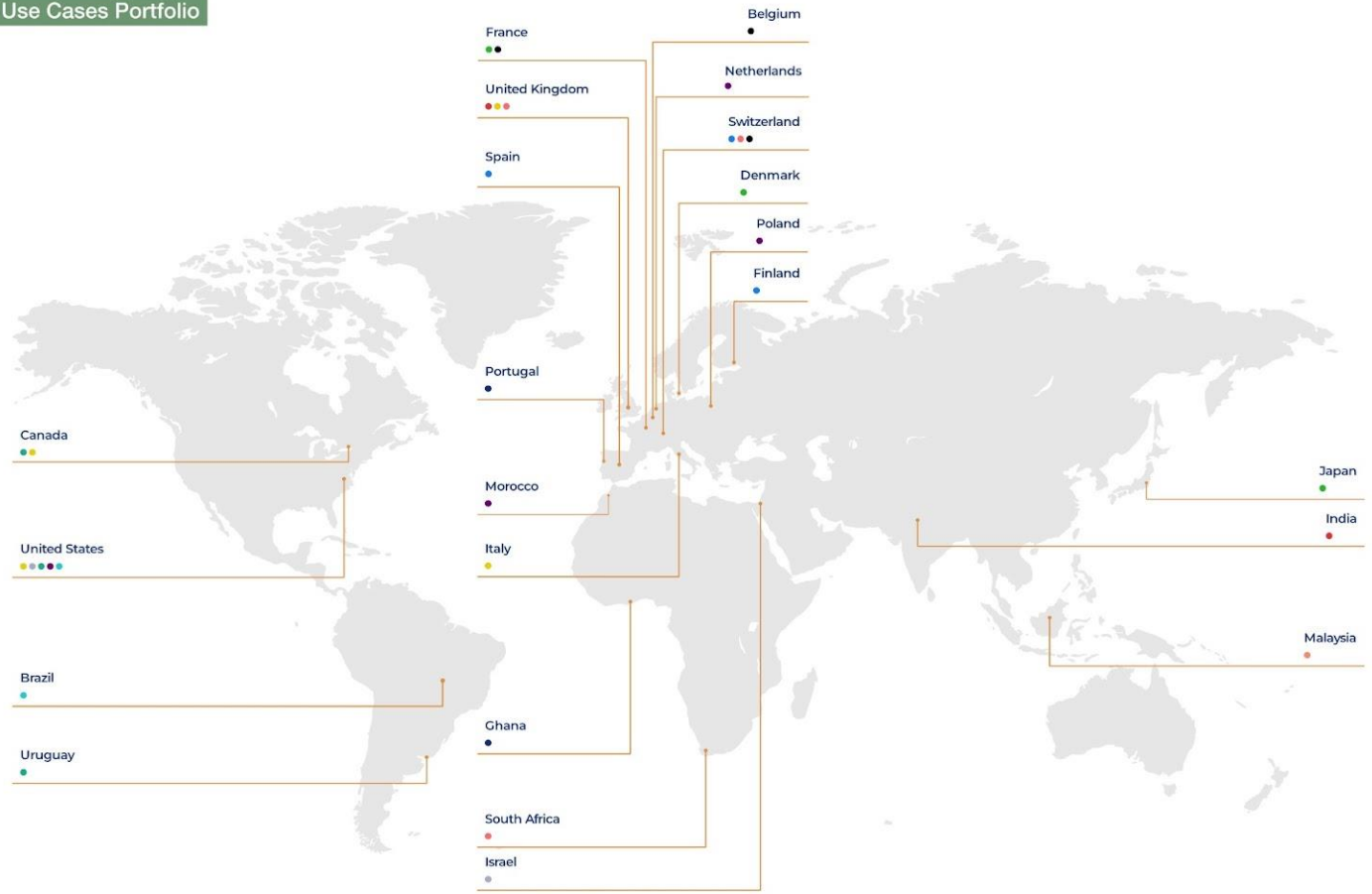## A4 Activating multilateral governance for the SDGs

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

Use case examples:

2 ZERO HUNGER
- Nutritious Food production
- Food Security – Last mile food delivery
- Plant Genomics

3 GOOD HEALTH AND WELL-BEING
- Accelerating Novel Antibacterial Discovery
- Molecular Docking
- Predicting Gastro- intestinal Cancer

6 CLEAN WATER AND SANITATION
- Water Leak Detection
- Eliminating forever chemicals from water sources

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

13 CLIMATE ACTION
- Carbon Capture
- Flood risk assessment

Use Case Team: QUANDELA QUNASYS

UN Agency: World Health Organization

Quantum Approach:
Machine Learning

This use case proposes the use of quantum computers to **model enzymes/catalysts** that could break down phenol into **less harmful substances**.

Phenol is a chemical substance that is present in wastewater from petrochemical and pharmaceutical industries. It is classed as dangerous in **drinking water** by the World Health Organization and is related to health concerns such as tracheal ulcerations, corneal damage and blindness among other things.

Better Simulation of Enzymes and Catalysts

> Improved Ability to Break Down Phenol Molecules
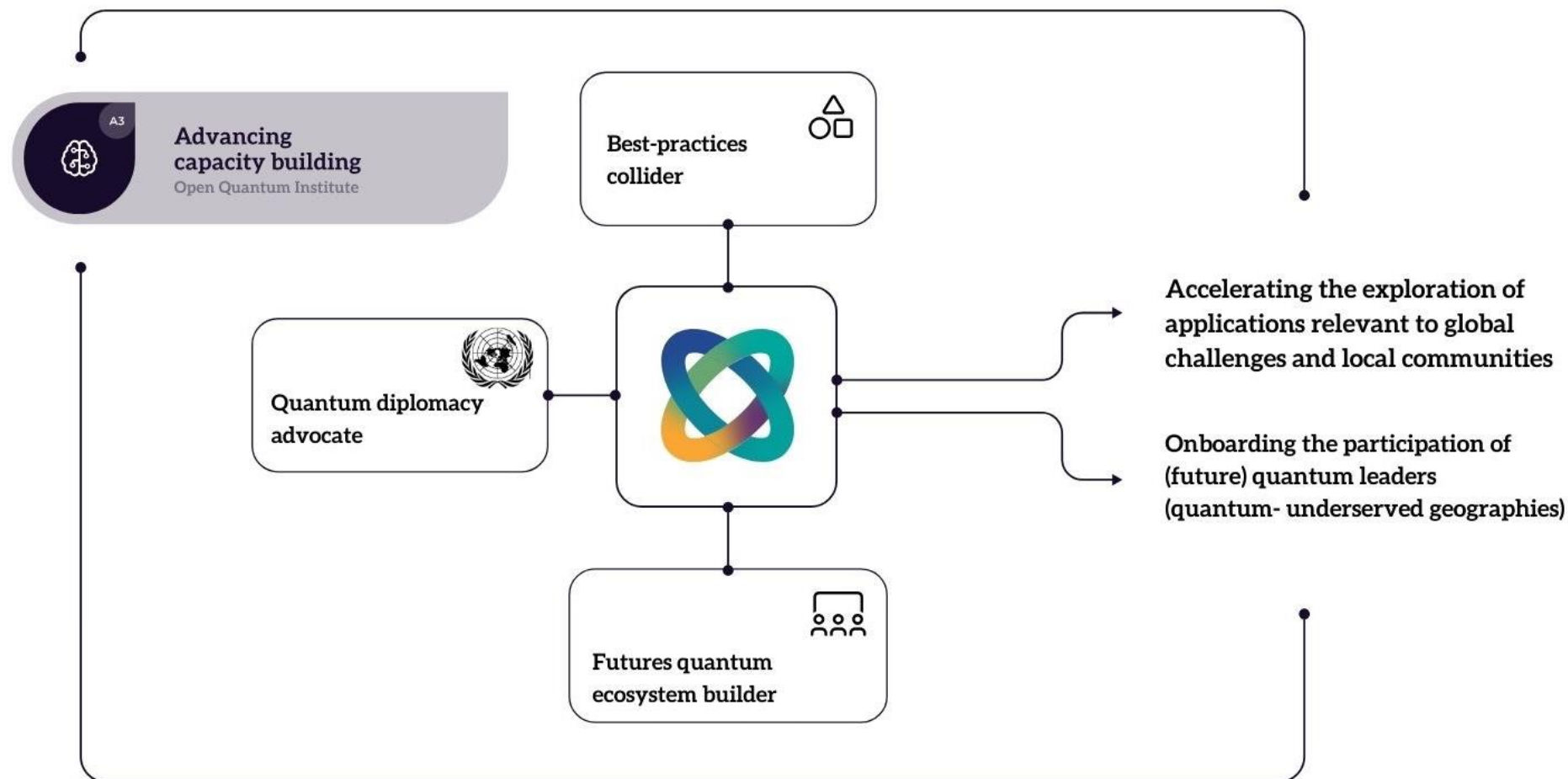
> Reduced Phenol in Soil and Wastewater

> 6 CLEAN WATER AND SANITATION

CERN gesda UBS

Industry partners donate expertise, capacity on simulators and QPUs to OQI

Educational Consortium
55+ institutions contributing, with 17 official member institutions, and 80 experts involved in the Education Consortium

All activities aligned and relayed as part of the UN Year of Quantum Science and Technology

Best-practices
- Educational Consortium Workshops
- Extended Educational Repository
- Foundational Trainings

Futures quantum ecosystems
- Hackathons
- Training for host institutions of OQI supported hackathons
- Pre-hackathon training programme for participants
- OQI mentorship programme
- OQI internship programme
- Regional quantum community events
- OQI inspired activities

Quantum diplomacy
- Quantum Diplomacy Game
- Quantum Diplomacy Game facilitator programme

OQI educational consortium

➜ Share experience and best practices and co-develop tools

➜ Feed OQI Edu Repository which will feature e.g. an Arxiv Paper on Regime of Quantum Advantage

Quantum hackathons focusing on SDGs

➜ Support 6 hackathons in quantum-underserved geographies in all continents

➜ Deployment of OQI's Hackathon in a Box

Quantum Diplomacy Game

➜ 2025: Deployment of this role play on the geopolitical implications of quantum computing as an emerging technology around the globe

International Year of Quantum Technology and Science (IYQ)

➜ OQI representation on the IYQ Steering Committee

➜ Contribution to the IYQ global events calendar

Map of global OQI activities in 2025

Quantum Diplomacy engagement through informal discussions with 20+ permanent representations in Geneva and in country with input from community of practice (industry and science)

- Digital and economic inclusivity
- Technology for the SDGs
- Global Security
- Interoperability
- Trade
- Environment
- Talent
- Human Agency

OQI at the International Year of Quantum launch

"We have the unique opportunity to strengthen international collaboration and exchange knowledge between countries. By its nature, science is a collaborative effort that transcends borders. In Mexico, we believe the future of quantum science will be built thanks to the participation of all, and t**his is why OQ**I and other initiatives, as proposed by 60 different countries, represents a c**ollaborative effort of science diplomacy** to resolve fundamental problems with quantum mechanics and **lean towards new paradigms of technology development**."

-   *Dr. Ana Maria Cetto, Professor UNAM Institute of Physics, during the opening remarks of the IYQ launch in Paris*

OQI at the International Year of Quantum launch

"OQI is a platform where all sectors come together, including industry, politicians, civil servants, and anyone who is interested in promoting equitable development of quantum technology. **OQI is working to tackle the real-world challenges of our time**, and although it is not obvious to put politicians, scientists and policymakers into the same room – **if we do nothing, there will be a cost for all of society**."

Maricela Munoz, Director External Affairs, GESDA, moderating a roundtable discussion during the IYQ launch in Paris

OQI at the International Year of Quantum launch

"**OQI is doing something that no one else has done yet**. We are developing an initiative driving global access to quantum computing resources, fostering international collaborations and pragmatically working towards bridging the quantum divide."

- *Dr. Mira Wolf-Bauwens (Responsible Quantum Computing Lead, IBM and OQI Advisory Committee member during a panel discussion on responsible quantum innovation*

Alignment with UN principles for ethical use of AI

Principles for the Ethical Use of AI in the UN system

- Defined purpose, necessity proportionality
- Sustainability
- Safety and security
- Right to privacy, data protection and data governance
- Human autonomy and oversight
- Do no harm
- Responsibility and accountability
- Fairness and non discrimination
- Inclusion and participation
- Transparency and explainability

OQI's mission to advance quantum technologies and driving values of inclusivity, global scope, openness and collaboration align clearly with many of the UN ethics and human rights principles for AI

Multistakeholder governance: OQI Advisory Committee

➜ 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

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

Multistakeholder governance: OQI Advisory Committee

Joachim Mnich *(OQI Advisory Committee-Co-Chair, Director for Research and Computing, CERN)*

Marieke Hood *(Ad interim OQI Advisory Committee Co-Chair, Executive Director Impact Translator, GESDA)*

Alain Labrique *(Director of Digital Health and Innovation at WHO)*

Alberto Anfossi *(Secretary General, Compagnia di San Paolo Foundation)*

Anousheh Ansari *(CEO, XPRIZE Foundation)*

H.E. Mr. Arindam Bagchi (Ambassador, Permanent Mission of India to the United Nations Office)

Barry Sanders *(Professor Scientific Director, Quantum City, University of Calgary)*

H.E. Mr. Bilal Ahmad *(Ambassador, Permanent Mission of Pakistan to the United Nations Office)*

Christian Bluhm *(Group Chief Risk Officer, UBS)*

H.E. Ms. Claudia Fuentes Julio *(Ambassador, Permanent Mission of Chile to the United Nations Office)*

Cornelius Hempel *(Group Head, ETH Zürich – PSI Quantum Computing Hub)*

H.E. Ms. Désirée Schweitzer *(Ambassador, Permanent Mission of Austria to the United Nations Office)*

Diederick Croese *(Director Centre for Quantum & Society, QDNL)*

Dominik Heinrich *(Director, Innovation Division, World Food Programme (WFP))*

Elica Kyoseva *(Director of Quantum Algorithm Engineering, NVIDIA)*

Francesco Petruccione *(Professor, Stellenbosch University)*

H.E. Ms. Francisca Mendez *(Ambassador, Permanent Mission of Mexico to the United Nations Office)*

George Popescu *(Head of Quantum Computing Laboratory, University Politehnica of Bucharest)*

H.E. Mr. James Waweru *(Ambassador, Permanent Mission of Kenya to the United Nations Office)*

Massamba Thioye *(Project Executive UN Climate Change Global Innovation Hub, UN Framework Convention on Climate Change)*

Matthias Christandl *(Professor for Quantum Computing, University of Copenhagen)*

Matthias Troyer *(Technical Fellow and CVP, Microsoft Quantum)*

Mira Wolf-Bauwens *(Responsible Quantum Computing Lead, IBM Research Europe)*

H.E. Mr. Omar Zniber *(Ambassador, Permanent Mission of Morocco to the United Nations Office)*

Ozge Aydogan *(Director, SDG Lab)*

H.E. Mr. Paul Bekkers *(Ambassador, Permanent Mission of Kingdom of the Netherlands to the United Nations Office)*

Philippe Chomaz *(Executive Scientific Director, Commissariat à l'énergie atomique et aux énergies alternatives (CEA))*

Prince Osei *(Acting President, African Institute for Mathematical Sciences (AIMS))*

Rosario Fazio *(Director of the Trieste Institute for Quantum Technologies (TQT), Abdus Salam International Centre for Theoretical Physics (ICTP))*

Ryan Babbush *(Head of Quantum Algorithms, Google)*

Simon Plant *(Deputy Director for Innovation, National Quantum Computing Centre)*

H.E. Mr. Tovar Da Silva Nunes *(Ambassador, Permanent Mission of Brazil to the United Nations Office)*

Urbasi Sinha *(Professor, Raman Research Institute)*

H.E. Mr. Vincenzo Grassi *(Ambassador, Permanent Mission of Italy to the United Nations Office)*

Vladimír Bužek *(Professor, Institute of Physics, Slovak Academy of Sciences)*

Conclusion: How can we ensure equitable access ?

Anticipating

Accelerating of the dialogue between science, diplomacy, philanthropy and society

Translating opportunities into action

Identifying opportunities for SDG use cases on the global quantum landscape

Identifying access and implementation support needs

Using platforms such as the Quantum Diplomacy Symposium to debate across sectors about multilateral efforts required to harness the technology responsibly

Using quantum technologies as tools for equitable innovation rather than instruments of division

Offering support for implementation when providing access to technology

Advocating for capacity-sharing initiatives

Offering open-source educational resources

Implementing collectively best practices for advancing capacity building

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