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The Quantum Moment

A Global Report

Outcomes of the International Year of Quantum Science and Technology

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INTERNATIONAL YEAR OF
Quantum Science
and Technology

SHORT SUMMARY

The quantum future cannot belong to the few

The quantum revolution has begun, but it cannot belong to only a few. During the **International Year of Quantum Science and Technology 2025 (IYQ 2025)**, proclaimed by the United Nations to mark the centenary of quantum mechanics, the world responded with extraordinary energy. Over 1300 events and activities from 83 countries and regions brought quantum science into classrooms, public squares, and policy forums on every continent. Of 1.2 million people mobilized during IYQ, average 42.5 per cent female participation across events was achieved.

Yet behind this momentum lies a reality that cannot be ignored. A deep and persistent **"quantum divide"** separates those at the frontier of this field from those who risk being left behind, a divide in infrastructure, in skills, and in the capacity to shape the rules that will govern these powerful technologies.

UNESCO's Global Survey on Quantum Research and Infrastructure, gathering responses from institutions across 72 countries, provides a clear empirical picture. 43 per cent of respondents identified a shortage of skilled researchers as the primary barrier to quantum development. Nearly one third of institutions reported no access to any quantum research facilities. When event density is measured per UNESCO Member State, Europe and North America recorded more than seven times the activity of Africa. This is not a gap that will close on its own.

IYQ 2025 demonstrated that a distributed, science-led model can rapidly mobilize global engagement and created concrete evidence base and network of partnerships. The **Global Quantum Initiative (2026–2028)** is UNESCO's response: a platform to translate this momentum into shared capacity, investing in education, enabling access to infrastructure, and advancing responsible governance so that the quantum future is built on inclusion and trust.

43%
cite shortage of skilled researchers as the primary barrier to quantum development

The Quantum Moment

A Global Report

Outcomes of the International Year of Quantum Science and Technology

Khaled El-Enany
Director-General of UNESCO

Foreword

One hundred years ago, quantum mechanics transformed our understanding of the physical world, revealing a reality that is both complex and full of possibility. Over time, these discoveries have led to major technological breakthroughs, such as transistors and lasers that underpin our modern world.

Today, as we advance in the Second Quantum Revolution, we are not just observing the quantum world, we are learning to engineer it. Controlling individual atoms and particles is unlocking new capabilities in computing, sensing, communication and medicine, with growing potential for water security, environmental monitoring and sustainable development. The people who stand to gain the most are not only scientists and technology developers – they are farmers, patients, learners, policy makers and communities in every part of the world.

The International Year of Quantum Science and Technology 2025, proclaimed by the United Nations, was a global call to bring quantum science into the broader conversation about education, development and the future. With over 1,300 activities and events in 83 countries, reaching over 1.2 million people, quantum science entered classrooms, public squares, science festivals and policy dialogues – from Paris to Nairobi, from São Paulo to Kuala Lumpur.

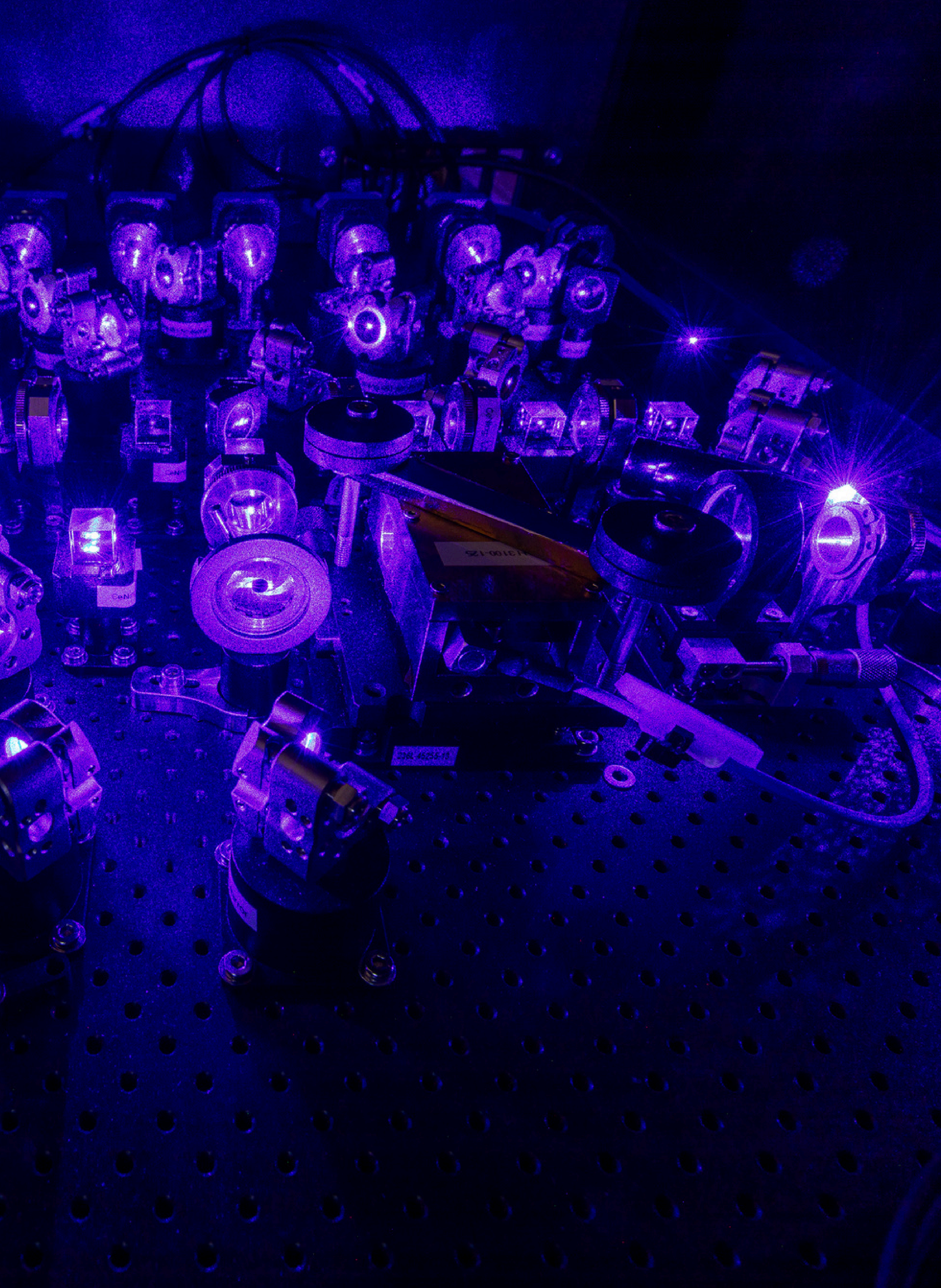
But this momentum also surfaced a harder truth. Enthusiasm for quantum science is genuinely global; the capacity to participate in it is not. Too many communities face real barriers: too few trained scientists and educators – with women significantly underrepresented, limited research infrastructure, and policy frameworks that have not kept pace with technological change.

At UNESCO, we believe this divide can be bridged. By building education systems to train the next generation of quantum scientists. By expanding access to knowledge and governing quantum technologies with the principles of open science and ethical frameworks that earn public trust. By promoting equitable scientific partnerships and deepening collaboration with the private sector. By ensuring that countries historically excluded from frontier science are not just beneficiaries but shapers of what comes next. This report shows both how far that work has come, and how much further it must go.

Building on this Year, UNESCO has launched the Global Quantum Initiative to carry the spirit of 2025 forward – supporting the partnerships and capacity building needed to ensure that the quantum future is developed responsibly and shared equitably. As a contribution to the International Decade of Sciences for Sustainable Development, it stands as a reminder of the human right to participate in and benefit from scientific progress.

I am deeply grateful to the thousands of scientists, educators, students, communicators and institutional partners who gave this International Year its energy and reach. The quantum future will be shaped by choices made in the coming years – about who is trained, who has access, whose questions are asked and whose knowledge is valued. Let us ensure that the quantum moment becomes a quantum leap for all of humanity.

Khaled El-Enany
Director-General of UNESCO



Planqc quantum computer, Garching, Munich, Germany

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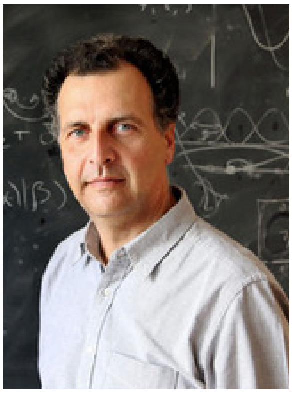
Sir Peter Knight
Co-Chair, Steering Commitee of the International Year of Quantum Science and Technology



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Prof. Rosario Fazio
Co-Chair, Steering Commitee of the International Year of Quantum Science and Technology

Foreword

The International Year of Quantum Science and Technology (IYQ 2025) began as a vision shared by a small group of scientists. This transformation was made possible through an unprecedented collaboration between international scientific unions, Member States, educators, and civil society. Today, we celebrate not only the centenary of the birth of quantum mechanics but also the launch of a future-oriented platform designed to inspire the next generations.

The achievements of IYQ 2025 have exceeded our most ambitious expectations. We have witnessed a surge in global participation which has been central to the year's success. Through a decentralized delivery model, united by a shared global identity, thousands of diverse events took place, bringing quantum science into the public and policy arenas. This approach ensured that every region, regardless of its established infrastructure, could engage in depth with the quantum revolution.

Throughout this journey, the Steering Committee has served the initiative's mission providing strategic direction and safeguarding scientific integrity while facilitating essential cross-sector collaboration. By bridging the gap between academia, industry, and government, the Committee have helped to lay the necessary groundwork for a framework of global quantum governance.

Even with these, the quantum divide remains a challenge. This gap is characterized by significant disparities in resources, and research capacity, between different parts of the globe. We recognize that progress in quantum technology cannot be truly global if it remains concentrated in a few regions. Addressing this divide requires more than a single year of celebration; it demands global dialogue, active participation from emerging economies, and an inclusive approach to governance.

Looking beyond 2025, it is a must to prioritize resource allocation and capacity building for the Global South, ensuring that the seeds planted this year can grow into robust local ecosystems. The goal is to deepen cross-border collaboration and establish permanent global coordination mechanisms.

The success of the IYQ 2025 would not have been possible without the crucial contributions of our stakeholders. We extend our deepest gratitude to the international scientific unions, the national and regional committees, academia, and the private sector. We specifically thank the Secretariat for their organizational leadership and, most importantly, all the participants to the IYQ whose energy and commitment provided the true heartbeat of this movement.

As we conclude this inaugural year, we call upon the global community to sustain the spirit of IYQ. We must continue to advance global dialogue and build an inclusive governance system that is both balanced and responsible. Let us ensure that the legacy of IYQ 2025 is not just a commemoration of the past, but a call-to-action for the world to ensure a fair and inclusive quantum future for everyone.

Star Trails, 1st place photo from the IUPAP–IYQ2025 Photo Contest

A juxtaposition of our perceived "fixed" reality, represented by the stationary bicycle, with the streaks of star light in this long exposure, representing our movement in space and time, in the context of a wider, evolving universe,' all connected fundamentally by the quantum nature of matter.

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Ms. Jing Zhao (UNESCO), Mr. Lassi Kotamaki (UNESCO), Ms. Genya Crossman (IBM), Ms. Veena Vijayakumar and Mr. Ben Castanon (Unitary Foundation), and Dr. Amal Kasry (UNESCO).

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Editorial note

This Report has been prepared under UNESCO's coordination, based on information, data, case materials, photographs, and contributions gathered throughout the International Year of Quantum Science and Technology (IYQ 2025), including inputs from partners, sponsors, event organizers, and contributors across regions. It combines documentation of activities and achievements with analysis and forward-looking reflections developed during its preparation.

The analytical sections of the Report, including its framing, assessment, and recommendations, are under UNESCO's editorial responsibility. They aim to provide an informed synthesis of experiences, lessons learned, and emerging priorities related to IYQ 2025 and its possible follow-up. At the same time, the Report draws on a wide range of external and self-reported inputs. While every effort has been made to ensure accuracy and consistency, some minor inaccuracies or omissions may remain.

The annexes relating to partner and sponsor activities are based primarily on information provided by the respective organizations. Their inclusion is intended to acknowledge contributions and reflect the breadth of engagement during IYQ 2025. These entries should be understood as descriptive rather than evaluative. Inclusion of any organization, activity, product, service, or institution does not imply endorsement by UNESCO of any commercial claim, product, service, or institutional position.

UNESCO gratefully acknowledges all contributors whose inputs made this Report possible and helped reflect the global scope and impact of IYQ 2025.

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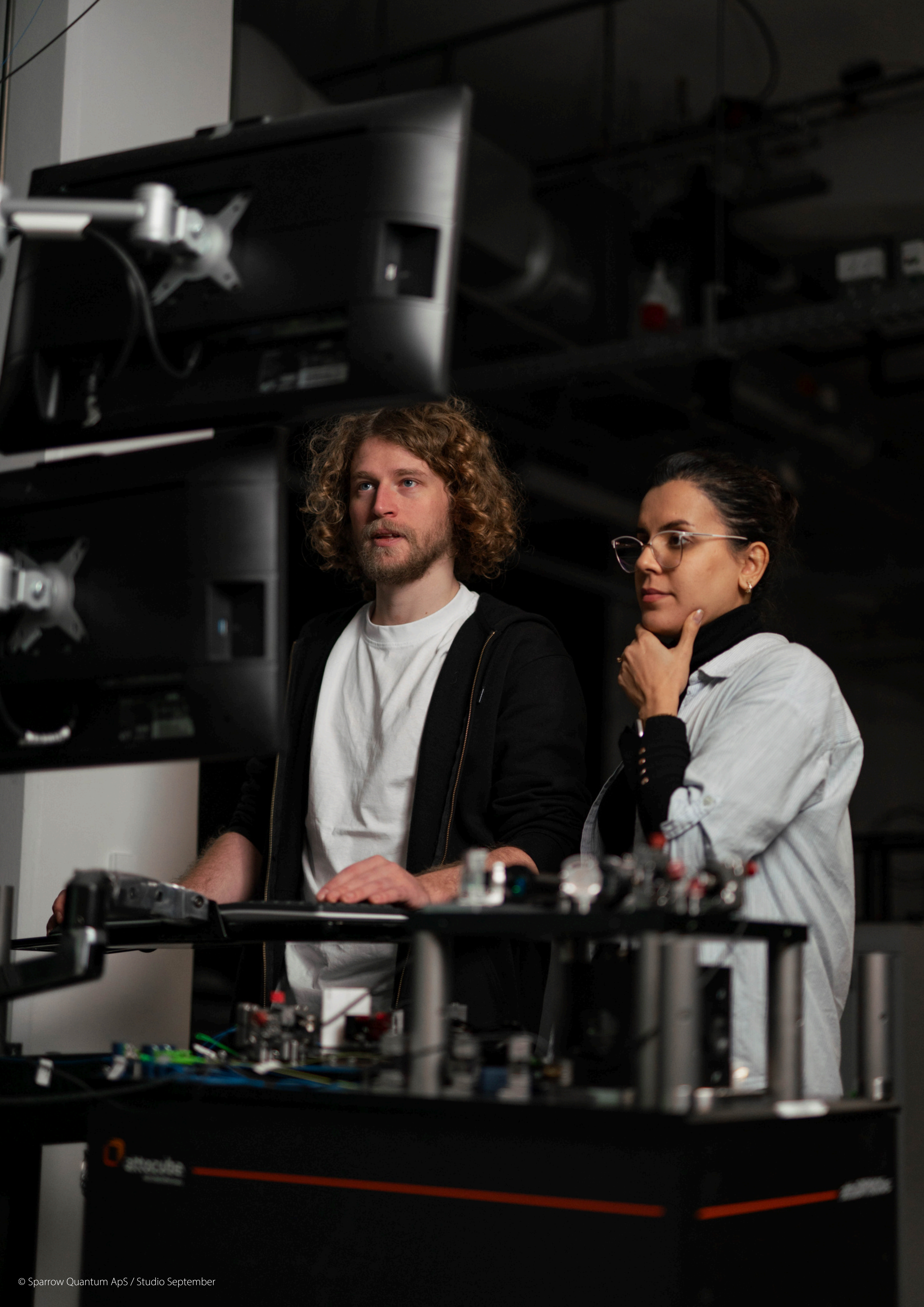

Executive summary

A critical moment

One hundred years after the birth of quantum mechanics, the world has entered a Second Quantum Revolution. New advances in quantum science and technologies are continuously enhancing technological capabilities and exerting an increasingly profound impact on sectors such as health, energy, and water security. Through United Nations General Assembly (UNGA) Resolution 78/287, Member States proclaimed 2025 the International Year of Quantum Science and Technology (IYQ 2025) and designated UNESCO as its lead agency. The Year marked both a scientific centenary and a deliberate choice: to treat quantum science as a shared global capability to be built with intention, for the benefit of all.

IYQ achieved a global mobilization of exceptional scale and diversity. From lecture halls in Accra and Manila to observatories, parliaments and public squares across five continents, the Year brought quantum science into conversations far beyond the research community, reaching students, educators, policymakers, industry leaders, cultural institutions and the wider public.

Yet this progress is unfolding in a period of geopolitical tension, constrained multilateral cooperation, and growing asymmetries between countries at the frontier of quantum science and those still building foundational capacity. In this context, questions of who participates in quantum development, who shapes its direction, and who benefits from its applications can no longer be deferred. Without deliberate action to sustain cooperation, broaden participation, and invest in capacity, the next phase of quantum development risks deepening existing divides in skills, infrastructure, and governance.

Prof. Anne L'Huillier, physicist and 2023 Nobel Laureate in Physics, delivered the keynote address at the Opening Ceremony of the International Year of Quantum Science and Technology at UNESCO Headquarters, Paris, France.

IYQ's global mobilization at scale

IYQ substantially raised the global profile of quantum science and technology, transforming scattered research enthusiasm, educational needs and policy interest into an international mobilization backed by practical organisational capacity and resources. Over 1,300 events were registered throughout the year, spanning 83 countries, with an estimated direct participation of more than 1.2 million people. This mobilization was supported by stakeholders from diverse fields and in various roles. IYQ's global partnership network comprises 71 partners and sponsors, raising over US$1 million to support 25 key global initiatives. UNESCO led the design of access-enabling mechanisms to lower entry barriers for researchers, students and innovators in resource-constrained regions, including remote-access modalities for quantum computing infrastructure, open educational resources, and targeted mentorship programmes; industry partners contributed cloud-based platforms, tools and expertise that made many of these initiatives possible. International participation was further supported through conferences, fellowships, scholarships and travel grants. A survey of event organizers indicated that approximately 34 per cent of activities focused on workshops, school events and public outreach, around 31 per cent engaged industry and private-sector audiences, and approximately 28 per cent included policy dialogue components.

IYQ also placed strong emphasis on inclusion and equitable participation. Among events reporting gender data, the average proportion of female participants was approximately 42.5 per cent, well above the long-term baseline of 20 to 25 per cent for senior-level research in physics globally. Accessible event formats and targeted collaborations with initiatives such as Girls in Quantum and The Quantum 100 contributed to broader participation of women and girls. Evidence from the Year also points to sustained engagement beyond 2025: approximately 92 per cent of organizers reported planning or considering follow-up activities beyond 2025, and 91 per cent indicated interest in receiving information on future global or regional quantum collaborations. These indicators suggest that IYQ has laid the foundation for sustained international cooperation on quantum science, supported by an established resource base and partner network.

Figure 1. IYQ by the numbers

1,300+ registered events worldwide

83 participating countries worldwide

1.2+ million participants directly engaged

$1M USD funding raised

71 sponsors

25 IYQ global events and initiatives supported by IYQ Global Fund

242,000 users of the official IYQ website from 203 countries and territories, generating nearly 299,000 sessions and over 1.5 million interactions with site content.

~34% of reported event focused on education and training (workshops, school activities, and awareness campaigns)

~31% of events engaged industry and private sector audiences

~42.5% average female participation across events

Source: IYQ Website and IYQ Organizers' Survey

Evidence from the UNESCO Global Survey: Where the divide is most acute

A central contribution of IYQ was the UNESCO Global Survey on the Research Status and Infrastructure in Quantum Science and Technology1, drawing on responses from institutions across 72 countries and complemented by interviews. The Survey provides structured evidence of the gaps most likely to shape the next phase of quantum development. Forty-three per cent of respondents identified shortages of skilled researchers and technical experts as a primary barrier to national quantum advancement. Nearly one third of responding institutions reported no access to basic quantum research infrastructure. When activities under IYQ are measured relative to population of UNESCO Member States, Europe and North America recorded more than seven times the event density of Africa. These figures indicate that the quantum divide is structural, reflecting long-standing disparities in human capital, infrastructure access, and connection to international networks.

The Survey also underscores that readiness is not solely technical. Policy coordination, institutional capacity, and governance readiness shape whether countries can translate interest in quantum science into sustained national capability. Closing the quantum divide therefore requires coordinated investment in people, access-enabling mechanisms, and governance frameworks capable of supporting trust and interoperability. Without deliberate and sustained action, disparities in access and capability are likely to become entrenched, shaping long-term patterns of participation, innovation and influence in a field that will carry substantial weight in the coming decades.

The long-term significance of the International Year of Quantum Science and Technology

IYQ translated a scientific centenary into a structured multilateral agenda aligned with public objectives. Building on the UNGA's declaration and UNESCO's convening role, the Year positioned quantum science and technology as a shared international priority, encompassing innovation, public value, international cooperation and inclusive capacity building. Through coordinated activities, evidence generation and multi-stakeholder engagement, quantum science has moved beyond specialist communities into education, public engagement and policy dialogue. At the same time, the Year made visible the substantial imbalances in infrastructure, talent, institutional readiness and opportunities for international participation that characterize the global quantum landscape. IYQ has laid the institutional and cooperative foundations for follow-up action beyond 2025, with particular attention to education and capacity building, public engagement and science literacy, standards and interoperability, ethics and responsible governance, and sustained international cooperation.

Agenda-setting and multilateral legitimacy:

Leveraging the declaration by the UNGA and UNESCO's convening role, it has anchored quantum science and technology as a shared international priority, shifting its focus from a competitive frontier to a clearer framework of public value, social trust, ethical responsibility and sustainable development. IYQ helped reframe international discussion of quantum technologies from questions of technological leadership toward questions of shared participation, shared benefit, and collective governance.

A global evidence baseline for decision-making:

It has produced a structured body of evidence on global engagement in quantum science, access to infrastructure, and capacity gaps. This provides governments, international organizations and partners with a practical evidence base for policy-making, which can be harnessed for investment planning, collaborative design, prioritizing capacity-building, and the ongoing monitoring of the quantum divide.

Scalable pathways from awareness to capability:

It established replicable entry points into quantum learning and practice through structured education and training models, access-enabling modalities including shared and remote access approaches, and targeted initiatives to broaden the participation of youth and women.

Foundations for cooperation, interoperability and responsible governance:

It strengthened the conditions needed for sustainable quantum development, including early alignment around standards, metrology and good practices, and supported sustained multilateral dialogue aimed at reducing fragmentation and building trust in international scientific cooperation.

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What must continue after 2025

IYQ has fulfilled its mandate as a platform for global mobilization. At the same time, addressing the structural determinants of the quantum divide requires sustained action well beyond a single year. Post-2025 efforts therefore call for an integrated set of actions: strengthening education and workforce pathways; expanding access to research infrastructure, resources, and practical learning opportunities, including shared and remote access models; deepening public awareness and societal engagement; reinforcing international cooperation and science diplomacy; and advancing standards, interoperability and responsible governance.

UNESCO has launched a three-year Global Quantum Initiative (GQI) to support sustained action following IYQ in 2026-2028, building on the broader framework of the International Decade of Sciences for Sustainable Development (IDSSD 2024–2033).

GQI aims to advance inclusive and coordinated international cooperation on quantum science through capacity building, policy dialogue, knowledge products and partnerships. It is designed not to replace existing efforts, but to connect them, broaden participation, and lay the practical and institutional foundations for a longer-term global quantum agenda.

Continuity may also be supported through recurring global moments, including the possible establishment of a World Quantum Day, with particular attention to the Global South and Priority Africa.

Call to action

IYQ has shown that advancing quantum science as a shared global capability requires coordinated action from all parts of the international community. One of its principal messages is that engagement with quantum science does not require advanced hardware infrastructure as a precondition. Member States can begin laying the foundations for the quantum era, supported by the scientific community, the private sector, educational institutions, and civil society, through the following priority areas:

1. Strengthening education and talent development.

Establishing learning pathways that link foundational knowledge, practical experience, and long-term career progression, and sustaining capacity building for teachers, researchers, technical staff, and young talent.

2. Expanding research capacity and access to infrastructure.

Improving the conditions for research, experimentation and training; and, where domestic capacity is limited, lowering barriers to infrastructure and training through shared, collaborative and remote access models.

3. Broadening public awareness and societal engagement.

Strengthening quantum literacy among the public, students, educators, the media and the wider community; deepening understanding of the potential, limitations and public significance of quantum technologies; and laying the foundations for broader and more inclusive participation.

4. Advancing international dialogue on standards, interoperability, ethics and responsible governance.

Building predictability, mutual trust, and sustained cooperation, and ensuring that the development of quantum technologies aligns with public interest, the protection of trust, and the Sustainable Development Goals.

5. Supporting inclusive partnerships.

In particular, partnerships that expand the participation and capacity of the Global South, align quantum cooperation with sustainable development priorities and national contexts, and help more countries and institutions develop practical pathways for engagement.

The quantum future should not be reserved for the few.

The International Year of Quantum Science and Technology has shown that the present moment offers an opportunity to work together toward a more open, equitable and responsible quantum future.

UNESCO stands ready to work with Member States, the scientific community, partners and other United Nations entities to translate this momentum into concrete capacity through evidence generation, policy dialogue and partnership development, in support of the broader sharing of the benefits of quantum science and continued efforts to bridge the quantum divide.

Part I:
The year that was

A close look through the small-animal in-beam PET scanner, a dedicated detector that enables monitoring of quantum-correlated gamma radiation following preclinical proton beam treatment, Technical University of Munich, Munich, Germany

Chapter 1

Genesis of a global effort

1.1. One hundred years ago

The year 2025 marks the centenary of the theoretical breakthroughs that gave birth to modern quantum mechanics and provides an occasion to reflect on the development and impact of quantum science over the past century. In 1925, the foundational concepts of physical science were fundamentally reformulated, as scientists developed new theoretical frameworks capable of accurately describing the behaviour of matter and energy. This pivotal year provided a unified theoretical framework capable of describing the general framework of quantum mechanics, which provided a method for predicting the behaviours of atoms and chemical bonds.

Following this foundational year, the field entered what is often termed the "First Quantum Revolution." From 1925 until the mid-1970s, quantum science provided a framework for understanding nature's fundamental physical principles (Kleppner and Jackiw, 2000) enabling manipulations of the collective behaviour of vast numbers of particles to make inventions that underpin the modern information age, including the transistor and the laser. In this sense, while 1925 marked the theoretical beginning, societies have been living in a quantum-enabled world for decades.

Since the late twentieth century, the field has entered a new phase. What distinguishes the current era, and underpins the rationale for an International Year, is the transition to a Second Quantum Revolution (Dowling and Milburn, 2003). This shift was catalyzed by experimental breakthroughs that allow scientists not merely to observe quantum phenomena, but to isolate and control individual quantum systems, including single atoms, electrons or photons. These capabilities have enabled quantum science to engineer new capabilities in computing, sensing and precision measurement.

At the core of this shift is the use of two quantum resources: superposition and entanglement. Superposition enables a quantum system to exist in a state that overlaps with other states, opening new computational possibilities. Entanglement links quantum systems in ways that enable advanced communication and sensing protocols. Together, these capabilities have driven substantial global investment and strategic attention to quantum computing, sensing and metrology.

Over the last century, quantum mechanics has transitioned from a theoretical framework into the foundation of modern technology, underpinning the semiconductor revolution, new material development and magnetic resonance imaging. Today, with the Second Quantum Revolution underway, the ability to manipulate individual quantum systems is unlocking new paradigms in computing, sensing and communication.

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1.2. The accelerated development and widening quantum divide calling for an international year

Quantum science and technologies entered 2025 at a moment of transition. As the ability to control and engineer individual quantum systems, such as single atoms, electrons or photons, continues to advance, quantum computing, quantum sensing, quantum communication and precision measurement are developing rapidly. Quantum science and technology are shifting from a phase dominated by fundamental research to one characterized by capabilities that can be applied, deployed and scaled, with significant potential across domains including cybersecurity, communications, health and medicine, energy systems and environmental monitoring (World Economic Forum, 2024; OECD, 2025). As these capabilities mature, their impacts are expected to extend beyond research communities and become embedded in industrial activities, public governance and broader societal systems.

The significance of this transition is reflected in the expanding application potential of quantum technologies. Quantum computing is expected to expand capability in areas such as complex optimization, materials discovery and molecular simulation, with potential implications for advanced manufacturing, drug development and digital infrastructure. Quantum communication and related security technologies are increasingly entering discussions on cybersecurity and the resilience of future information systems. Quantum sensing and precision measurement are also showing more concrete potential in areas such as environmental monitoring, Earth observation, water resource management, navigation and timing, and health and life sciences. As of October 2025, an estimated USD 55.7 billion in public funding has been committed to quantum science and technology by governments worldwide since 2013 (OECD, 2025). Although these applications remain at an early stage, their potential impact is already sufficient to place quantum science and technology at the centre of attention for policymakers, industry and the international scientific community.

Yet global quantum development remains highly uneven. Many countries still lack the research foundations, enabling infrastructure, education and training systems, and policy readiness needed to translate ambition into sustained capability. Fewer than 50 countries have published dedicated national quantum strategies, and participation from the Global South remains limited (UNESCO, 2026). The quantum divide exists not only between countries but also within them: disparities across gender, age, geography and socio-economic

Opening of the International Day of Light 2018, at UNESCO Headquarters in Paris.
© UNESCO / N. Houguenade

conditions shape unequal access to learning opportunities and participation pathways. For many countries in the Global South, limited infrastructure, under-resourced education systems, and insufficient policy and financial support constrain talent development, experimental capacity and connection to international networks (UNESCO, 2025).

At the same time, international cooperation in quantum science can no longer be taken as a given. In an increasingly differentiated global landscape, governments are placing greater emphasis on technological sovereignty and security considerations, while cross-border collaboration faces rising compliance costs and risks of fragmentation (QURECA, 2024). Shared global visions and policy coordination mechanisms remain underdeveloped, and international dialogue on standards, interoperability and responsible governance has not kept pace with the speed of technological advancement. These conditions raise an increasingly urgent question for the international community: how to ensure that the next phase of quantum development does not narrow the space for global participation and agenda-setting, but instead unfolds on a broader and more equitable basis.

Quantum science has become increasingly prominent in national policy and strategic planning. States view quantum capabilities not only as scientific achievements but also as drivers of innovation ecosystems and, in some contexts, national competitiveness and security (McKinsey and Company, 2024). This acceleration has sharpened concerns about equity and access: without deliberate international cooperation, advances may concentrate in a limited number of countries and institutions, widening the quantum divide. It was this convergence of centenary visibility, accelerating applications and the imperative of inclusion that generated momentum for the proclamation of an International Year.

1.3. The idea for an International Year of Quantum Science and Technology

From this shared concern, the scientific community moved toward coordinated action.

The movement began in April 2018, when the concept of an international observance was proposed within the Executive Committee of the American Physical Society's (APS) Forum on the History of Physics. Recognizing that 2025 would mark the centenary of quantum mechanics, a Quantum Century Working Group was convened to develop a global campaign and ensure that the centennial would serve not only as a moment of reflection but also as a forward-looking global initiative.

From 2018 to 2020, what began as a discussion among four individuals evolved into the Quantum Century International Coordination Meetings, attracting representatives from scientific societies and institutions worldwide. By 2020, the initiative had matured into a formal proposal endorsed by the APS Council.

From 2020 to 2022, the proposal developed into a global effort, securing endorsements from over 60 scientific societies and research institutes across six continents, together with backing from multiple international scientific unions, including the International Union of Pure and Applied Physics (IUPAP), the International Union of Pure and Applied Chemistry (IUPAC), the International Union of Crystallography (IUCr), and the International Union of History and Philosophy of Science and Technology (IUHPST). This broad scientific consensus provided the basis for advancing the initiative from community mobilization to international consideration.

1.4. Building international consensus: The UN Resolution and UNESCO as lead agency

The realization of the International Year was driven by a close partnership between UNESCO, its Member States and the global scientific community, building on UNESCO's prior experience as lead agency for the 2015 International Year of Light and its long-standing engagement with the basic sciences. Diplomatic momentum began in Paris in May 2023, where Mexico led the initiative at the 216th session of the UNESCO Executive Board. Recognizing both the potential of quantum technologies to accelerate progress towards the Sustainable Development Goals (SDGs), and the need to prevent a widening technological divide, Mexico built a broad coalition of support, securing 59 co-sponsoring countries for the initial proposal under 216 EX/Decision 37.[1] This strong multilateral endorsement paved the way for the adoption of the proposal for the International Year of Quantum Science and Technology (IYQ) at the 42nd session of the UNESCO General Conference in November 2023, under 42 C/Resolution 23.[2]

The initiative subsequently moved to the global stage at the United Nations in New York. In early 2024, Ghana assumed leadership of the process at the General Assembly, briefing Member States through a series of informational meetings. On 7 June 2024, the General Assembly adopted Resolution 78/287 by acclamation,[3] with over 70 co-sponsors. This transition from a physics-focused initiative to a United Nations-proclaimed International Year reflects a shared recognition that quantum science and technology should contribute to the benefit of all nations.

As the UN-designated lead agency, UNESCO served as the institutional anchor of IYQ 2025, providing strategic direction, convening Member States, ensuring alignment with the Sustainable Development Goals, and coordinating a distributed, multi-stakeholder delivery model that brought together scientific unions, national academies, Member States and private-sector partners under a unified global framework, while allowing regional stakeholders to adapt activities to local priorities. This implementation drew on UNESCO's existing instruments in the basic sciences, including the International Basic Sciences Programme (IBSP) and the Abdus Salam International Centre for Theoretical Physics (ICTP).

Vision, goals, and objectives

In line with the mandate established by the General Assembly, IYQ was to be observed through activities at all levels aimed at:

- increasing public awareness of the importance of quantum science and applications;
- enhancing international, multilateral and interdisciplinary scientific cooperation among research institutions, researchers and innovators in quantum science and technology; and
- ensuring a focus on the application of quantum science and technology for sustainable development.

The resolution's preambular provisions further called for promoting STEM education and research, with particular attention to youth, girls and women, especially in developing countries, and situated IYQ under the umbrella of the International Decade of Sciences for Sustainable Development (2024–2033). Building on these provisions, UNESCO articulated bridging the emerging "quantum divide" as a cross-cutting priority across all three directions, ensuring that the benefits of quantum science reach countries at all levels of readiness, rather than concentrating in a limited number of institutions.

216th session of the UNESCO Executive Board
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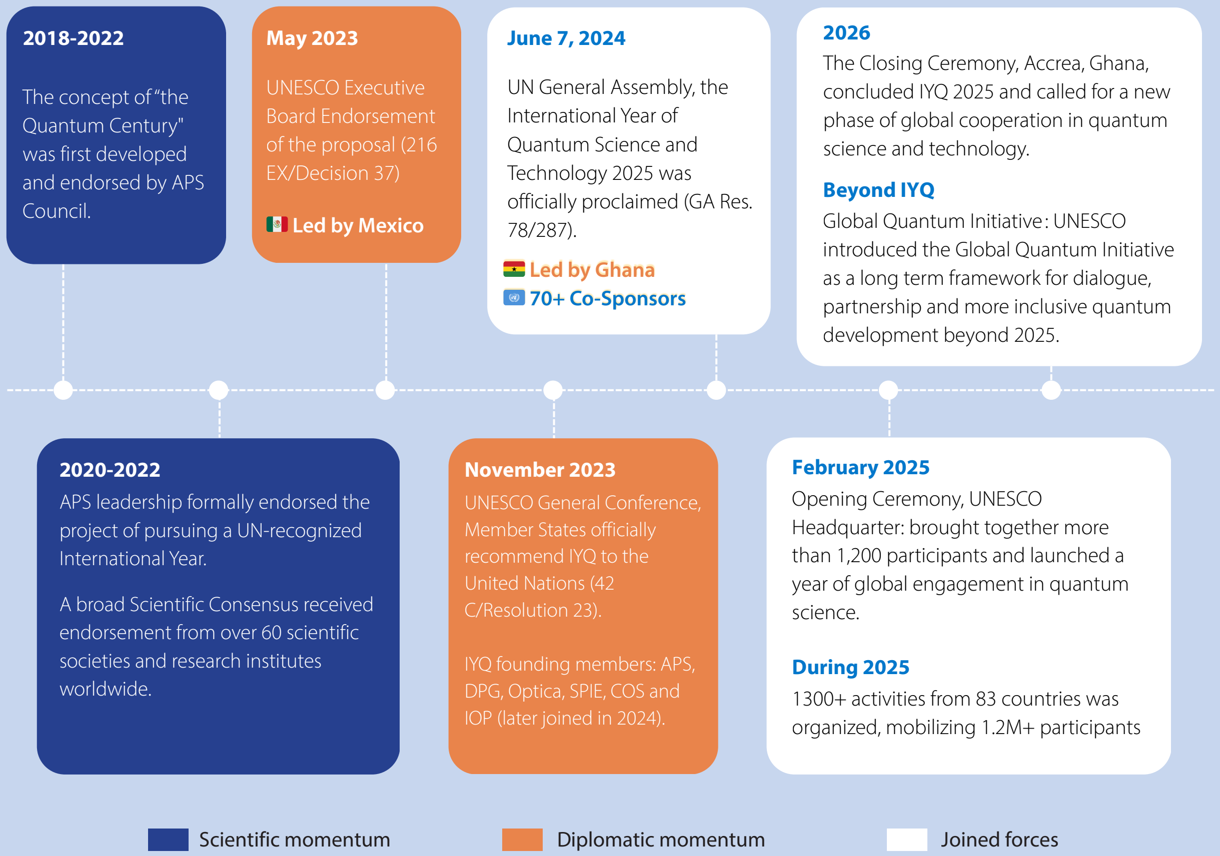
Figure 1-1. The IYQ journey: From scientific consensus to UN proclamation



1.5. Governance of IYQ

Following the adoption of UNGA Resolution 78/287 on 7 June 2024, a dedicated governance structure was established to ensure global coordination, transparent management and alignment with the mandate, comprising two principal bodies: the IYQ Secretariat and the IYQ Steering Committee.

UNESCO was designated as the lead agency for IYQ. Building on its unique mandate in the basic sciences and its long-standing work in science policy, education, and international scientific cooperation, UNESCO provided overall strategic direction for IYQ 2025. This included convening Member States, coordinating alignment with the SDGs, leading the design of flagship initiatives addressing the quantum divide, and ensuring continuity beyond 2025 through the Global Quantum Initiative.

The IYQ Secretariat

The Secretariat served as the primary operational body responsible for coordinating and managing activities related to the International Year. Its mandate included overseeing the implementation of endorsed initiatives, managing the IYQ Global Fund, serving as the central communication hub for stakeholders, and maintaining the official IYQ website.[4]

Its day-to-day operations were led by its Global Coordination Bureau.

- **UNESCO Team**: Amal Kasry and Jing Zhao
- **Global Coordination Bureau:** Claudia Fracchiolla, Mark Elsesser, Joe Niemela, and Paul Cadden-Zimansky.
- **Advisory Officers:** John Dudley and Ana María Cetto.
- **Secretariat Support Staff:** Yewande Lewis, Jackie Billek, and additional APS staff involved in IYQ.
- **Lead Fundraisers:** Marsha Maxwell and Kevin Kase
- **Program Managers:** Cesar Rodriguez and Brianne Wheeler
- **IYQ Media Fellows:** The Secretariat also included a communications and media team responsible for managing, curating and developing content for the official IYQ website and social media feeds throughout the Year:

Alexandra de Castro (Website Content Manager and Creator), Solmar Verela (Social Media Manager), Serena Krejci-Papa (Web and Social Content Creator), and the JUNIPER IYQ Student Social Media Fellows (Richard Sottie, Olivia Castillo, and Elle Roc).

The IYQ Steering Committee

The Steering Committee served as the high-level decision-making body of IYQ. Its governance structure was designed to connect scientific leadership with multilateral policy dialogue. Reflecting this dual mandate, the Committee was led by two Co-Chairs, one representing the global scientific community and one representing the international and multilateral policy community, ensuring both technical credibility and policy relevance.

The Steering Committee was responsible for reviewing and approving proposals for major global events, authorizing expenditures from the IYQ Global Fund, and endorsing strategic reports. Its composition included representatives from the six Founding Partners, the American Physical Society (APS), the German Physical Society (DPG), Optica, International Society for Optics and Photonics (SPIE), the Chinese Optical Society (COS), and the Institute of Physics (IOP), together with distinguished experts appointed through consultation with UNESCO and partner organizations.

Full List of Steering Committee Members:

- **Co-Chair: Sir Peter Knight** – Professor and Senior Research Investigator, Blackett Laboratory, Imperial College London; Chair of the Quantum Metrology Institute, National Physical Laboratory.
- **Co-Chair: Rosario Fazio –** Head, Condensed Matter and Statistical Physics Section, UNESCO-ICTP; Director, Trieste Institute for Quantum Technologies (TQT).
- **Aba Andam** – Fellow and Past President, Ghana Academy of Arts and Sciences.
- **Louis Barson –** Director of Science, Innovation and Skills, Institute of Physics (IOP).
- **Hyoung Joon Choi** – President, Association of Asia Pacific Physical Societies (AAPPS); Professor, Yonsei University.
- **Silvina Ponce Dawson** – President, International Union of Pure and Applied Physics (IUPAP); Professor, University of Buenos Aires; Higher Researcher, National Scientific and Technical Research Council of Argentina (CONICET).
- **John Doyle** – Past-President, American Physical Society (APS); Henry B. Silsbee Professor of Physics, Harvard University.
- **Emily Edwards** – Co-leader, US National Q-12 Education Partnership; Associate Research Professor, Duke University.
- **Jon Felbinger** – Deputy Director, Quantum Economic Development Consortium (QED-C).
- **Andrew Forbes** – Distinguished Professor of Physics, University of the Witwatersrand, Johannesburg.
- **Bo Gu** – Founder, President, and CTO, Bos Photonics; Chinese Optical Society (COS).
- **Taeghwan Hyeon** – Director, Center for Nanoparticle Research, Institute for Basic Science, Seoul National University.
- **Amal Kasry** – Chief of Basic Science, Research Innovation, and Engineering, Natural Sciences Sector, UNESCO.
- **Claus Lämmerzahl** – Member of the Executive Board | Public Relations, German Physical Society (DPG); Director, Space Sciences, ZARM, University of Bremen.
- **Gillian Makamara** – Project Officer, International Telecommunication Union (ITU).
- **Julio G. Mendoza-Álvarez** – President, Mexican Physical Society; Professor, Center for Research and Advanced Studies, National Polytechnic Institute (IPN).
- **Joe Niemela** – Emeritus Scientist, International Center for Theoretical Physics (ICTP).
- **Yasser Omar** – President, Portuguese Quantum Institute (PQI); Professor, University of Lisbon; EU Quantum Flagship.
- **Peggy Oti-Boateng** – Past Executive Director, African Academy of Sciences (2022-2025)
- **Enrica Porcari** – Head, Information Technology Department, CERN.
- **Kent Rochford** – CEO and Executive Director, International Society for Optics and Photonics (SPIE).

- **María Sánchez-Colina** – President, Iberoamerican Federation of Societies of Physics (FEIASOFI); President, Cuban Society of Physics.
- **Smitha Vishveshwara** – Professor of Physics, University of Illinois, Urbana-Champaign.
- **Carl Wieman** – Professor, Department of Physics and the Graduate School of Education, Stanford University.
- **Ahmed Younes** – Professor of Quantum Computing, Alexandria University; Vice Dean of Education and Student Affairs, Faculty of Science, Alexandria University.

1.6 Partners, sponsors and IYQ Global Fund

IYQ 2025 was delivered by a coalition of 71 partners and sponsors, including scientific societies, national academies, research institutions, international organizations and private-sector entities. The American Physical Society (APS) acted as the primary fiscal sponsor during the preparatory and implementation phases, hosting the IYQ Global Coordination Fund and providing administrative and financial oversight on behalf of the coalition.

APS also coordinated a global fundraising campaign that raised over USD 1 million. These funds supported 25 major global initiatives, including the official IYQ platform, the high-level convenings in Paris, Geneva and Accra, and seed support for education and capacity-building activities in the Global South. Funding decisions were reviewed and approved by the IYQ Steering Committee, with regular reporting to ensure that resources were used in line with the objectives of the International Year.

Figure 1-2. The IYQ Global Partnership Ecosystem, anchored by the Founding Partners and supported by a diverse coalition of 71 sponsors.

ACADEMIA

Distinguished

Berthold Leibinger Stiftung

Supporting

粤港澳大湾区量子科学中心 Quantum Science Center of Guangdong-Hongkong-Macao Greater Bay Area

University of Calgary

QIQB

University of Colorado Boulder

Participating

EUt+ European University of Technology

CUA

Quantum Algorithms Institute

University of Waterloo | IQC Institute for Quantum Computing

Purdue University

National Quantum Office Singapore

Duke Quantum Center

Johns Hopkins Krieger School of Arts & Sciences

YQ

PHILANTHROPIC

Leading

SQC South Carolina Quantum

Contributing

the Hertz Foundation

Participating

Open Quantum Design

SCIENTIFIC SOCIETIES

Founding

APS Advancing Physics

SPIE.

OPTICA

DPG Deutsche Physikalische Gesellschaft

COS The Chinese Optical Society

IOP Institute of Physics

Distinguished

AIP

IEEE

frontiers

NQSTI National Quantum Science and Technology Institute

Supporting

Xunta de Galicia

TII Technology Innovation Institute

Participating

PS Taiwan

EPS

IUPAP

OQI Open Quantum Institute

UKRI National Quantum Computing Centre

STRATEGIC PARTNERS

QuIC European Quantum Industry Consortium

Q-STAR

Quantum Insider powered by Resonance

Marketing Communications

QED-C

Quantum Industry Canada | Industrie Quantique Canada

T_ F_D_

levitate Marketing

MEDIA PARTNERS

Economist Impact

nature photonics

nature reviews electrical engineering

Resonance

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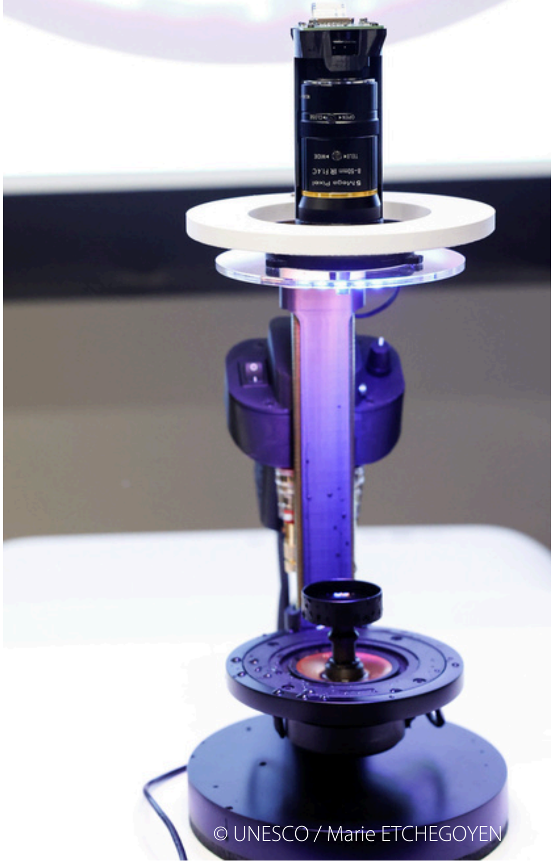
Endnotes

1 See: https://unesdoc.unesco.org/ark:/48223/pf0000385627.locale=en
2 See: https://unesdoc.unesco.org/ark:/48223/pf0000388394
3 See: https://docs.un.org/en/A/RES/78/287
4 See: quantum2025.org

Quantum Resonance, by Martijn Weber, Derek Lomas and team, at the Opening Ceremony of the International Year of Quantum Science and Technology, at UNESCO Headquarters in Paris. It allows visitors to explore how resonance and interference patterns shape both the invisible quantum world and the beautiful patterns of cymatics.



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Quantum Bullet Time, booth at the Opening Ceremony of the International Year of Quantum Science and Technology, at UNESCO Headquarters in Paris.

By Samuel Kolibaba, Oliver Musch, Tra My Doan, Astrid Pittschmann, Diana Karaybida, Pazmino Betancourt Nicole, Viktoria Schreider, Ebru Mecek, Jessica Uhl, Benjamin Heitz, Oliver Vauderwange, Dan Curticapean, Students and staff of the Offenburg University of Applied Sciences.

The artwork consists of an immersive experience in The Matrix movies or in a “Quantum World” where time appears to freeze while the camera “moves” around the visitors.

The BIPM Kibble balance

Chapter 2

IYQ global participation and key moments

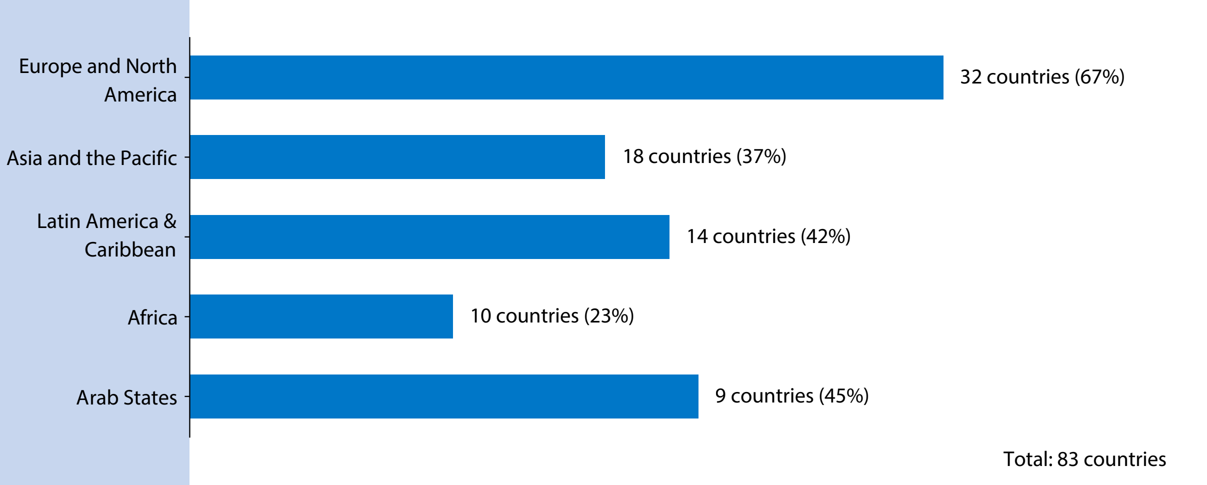
The International Year of Quantum Science and Technology (IYQ) was characterized by large-scale and diverse engagement, reflecting the global reach and multidisciplinary nature of quantum science. With over 1,300 registered events across 83 countries (Figure 2-1), and estimated 1.2 million participants worldwide, IYQ mobilized scientific communities, educators, policymakers, artists, industry leaders, and the public across all regions.

This chapter presents the major global moments that shaped the Year, summarizes IYQ-sponsored initiatives, and concludes with an overview of regional celebrations and partner contributions that enabled delivery across countries and regions.

2.1. Global moments of the year

Convened by UNESCO together with its Member States and IYQ partners, high-level multilateral moments served as key reference points for the International Year. These gatherings set shared priorities, raised the global profile of quantum science and technology, and supported coordination among partners across regions. They also established a common basis for dialogue on inclusive participation and long-term international collaboration.

Figure 2-1. Percentage of countries in each region with at least one response received



Note on Regional Groupings: Unless otherwise indicated, regional comparisons in this report follow UNESCO's official regional definitions, as set out in UNESCO Basic Texts, 2026 edition, "Definition of regions with a view to the execution by the Organization of regional activities". For analytical presentation in this report, the Europe region is presented as "Europe and North America", reflecting the inclusion of North American Member States within UNESCO's Europe regional grouping. The five regional groups used in this report are therefore: Africa, Arab States, Asia and the Pacific, Europe and North America, and Latin America and the Caribbean.

Opening Ceremony at UNESCO Headquarters, Paris *(4–5 February 2025)*

The International Year of Quantum Science and Technology was inaugurated at UNESCO Headquarters in Paris on 4-5 February 2025, bringing together more than 1,200 participants, including several Nobel Prize laureates. Dr Lidia Brito, the Assistant Director-General for Natural Sciences of UNESCO, outlined the ambition of a Global Quantum Agenda and emphasized the importance of national strategies, education and training, and investment in enabling infrastructure to widen participation.

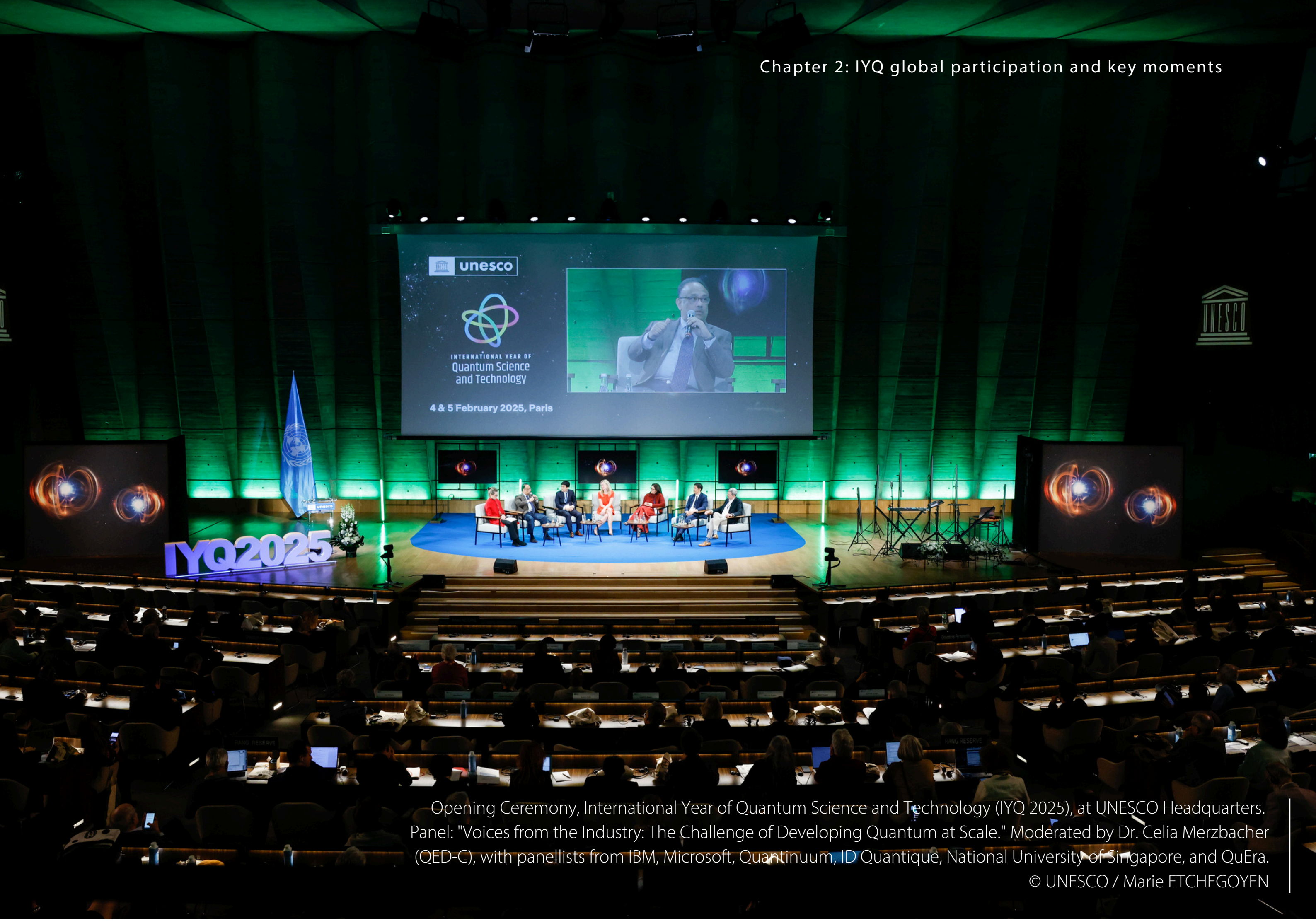
Sir Peter Knight, Co-Chair of the IYQ Steering Committee, highlighted the importance of diversity and equality to the long-term global advancement of quantum science and technology. Nobel Laureates Professor Anne L'Huillier and Professor William D. Phillips reflected on the centenary of quantum science and the implications of the Second Quantum Revolution for future discovery and societal benefit.

The opening also highlighted the widening quantum divide and the need to align quantum progress with inclusive development. UNESCO presented practical entry points linked to its mandate, including mapping global quantum capacities, expanding modalities for remote access to quantum computing, and supporting women scientists. Industry representatives emphasized the role of the private sector in translating scientific advances into applications and the importance of building a quantum-ready workforce.

Member State interventions, including statements from Ghana and Mexico, emphasized that international cooperation is essential to ensuring that no country is left behind. Reflecting UNESCO's multidisciplinary mandate, the ceremony also featured contributions from philosophers and ethicists, highlighting the importance of embedding ethical considerations into technology development to build societal trust and guide innovation towards outcomes that benefit all.

The formal sessions were complemented by a public exhibition in the Salle des Pas Perdus at UNESCO, presenting interactive installations, including Quantum Jungle and augmented-reality demonstrations.

Opening Ceremony, International Year of Quantum Science and Technology (IYQ 2025), at UNESCO Headquarters. Session: "UNESCO's Role in Reducing the Quantum Divide: Advancing Global Innovation and Inclusion." Hosted by Ms. Lidia Brito, UNESCO Assistant Director-General for Natural Sciences.



Opening Ceremony, International Year of Quantum Science and Technology (IYQ 2025), at UNESCO Headquarters. Panel: "Voices from the Industry: The Challenge of Developing Quantum at Scale." Moderated by Dr. Celia Merzbacher (QED-C), with panellists from IBM, Microsoft, Quantinuum, ID Quantique, National University of Singapore, and QuEra. © UNESCO / Marie ETCHEGOYEN

Opening Ceremony, International Year of Quantum Science and Technology (IYQ 2025), Interactive exhibition, Salle des Pas Perdus, UNESCO Headquarters, Paris (4–5 February 2025). © UNESCO / Marie ETCHEGOYEN

Launch of the Open Quantum Institute *(21 February 2025, Geneva)*

Following the Paris launch, attention shifted from agenda-setting to implementation and cooperation. At the CERN Science Gateway in Geneva, the official launch of the Open Quantum Institute (OQI) introduced an operational platform for quantum cooperation aligned with the Sustainable Development Goals. The OQI aims to accelerate quantum applications of societal benefit, expand equitable access, advance capacity building, and support multilateral governance for the SDGs.

Jointly hosted by the UNESCO Geneva Liaison Office and OQI, the event brought together ambassadors and scientists to connect discussions on quantum technologies with the Sustainable Development Goals. It provided a multilateral setting to support the principle that progress in areas such as high-performance computing and sensing contributes to inclusive benefit, rather than widening existing capability gaps between countries with and without quantum infrastructure.

Panel during the IYQ launch event in Geneva, including Dr Lidia Brito and representatives of Permanent Missions in Geneva (Italy, Mexico, Kenya, Vanuatu, Slovenia, India and the Kingdom of Saudi Arabia), discussing key themes of quantum science and technology and its societal implications.
© Marc Bader

The Quantum 100

A significant component of the Year's public engagement and visibility was The Quantum 100, an initiative designed to profile individuals and communities across the global quantum field. Developed in partnership with the APS and the communications agency TFD, the initiative recognized individuals advancing areas including research, innovation, education, and public engagement in quantum science.

A global call for nominations generated more than 400 submissions from all regions. The final cohort was selected by members of the IYQ Steering Committee and its Global Coordination Bureau to reflect a wide range of roles supporting the field, including academia, industry, education, journalism, the arts, and policy.

By highlighting contributors at different career stages, from doctoral researchers to organizational leaders, the initiative underscored the breadth of roles required to sustain progress in quantum science and technology. The campaign generated more than 15,000 visits to the IYQ website and dedicated media coverage.

The Quantum 100 collage, featuring the portraits of individuals recognized through the IYQ Quantum 100 initiative for their contributions to research, innovation, education, and public engagement in quantum science.
©APS

The closing ceremony: From celebration to continuity *(10–11 February 2026, Accra, Ghana)*

IYQ concluded not in Paris, New York, or Geneva, but on the African continent, a deliberate choice reflecting Ghana's leading role in securing the IYQ designation at the United Nations and the Year's core commitment that quantum science must be global in both participation and benefit.

Convened at the initiative of the Ghana Ministry of Education, the two-day event in Accra brought together hundreds of scientists, government ministers, diplomats, educators, and industry representatives from across the world. Opening addresses by Hon. Haruna Iddrisu, Ghana's Minister for Education, and Dr Lidia Brito, Assistant Director-General for Natural Sciences of UNESCO, set the tone for a gathering focused not on retrospective celebration alone, but on the transition to the next phase of global quantum cooperation.

Keynote speakers Professor Michele Dougherty of the Institute of Physics and Dr Heike Riel of the German Physical Society highlighted IYQ's principal outcomes: over 1,300 events in more than 80 countries, engaging more than a million people, with approximately 80 per cent of participating countries from the Global South.

The programme reflected the full breadth of IYQ community.

Day 1 focused on consolidating the outcomes of the Year, including a panel discussion on this Global Report and a dedicated dialogue on "Africa and the future of quantum science", which brought together researchers, policymakers, and innovators from across Africa. Cultural programming added a distinctive dimension, featuring a performance by a Ghanaian youth ensemble and a reading of Spooky Action at a Distance by Gary Hugh Day, the winning entry of the 2025 Brilliant (Quantum) Poetry Competition. Day 2 looked to the decade ahead, culminating in the formal launch of the UNESCO Global Quantum Initiative (GQI), which will support sustained international cooperation in quantum science and technology in the period 2026–2028.

Closing Ceremony, International Year of Quantum Science and Technology (IYQ 2025), End of Day 2
© AS S2A CONSULT

2.2. IYQ-sponsored events and initiatives

The IYQ Global Fund supported a series of IYQ-sponsored events selected through a competitive application process managed by the IYQ Steering Committee, based on ten official thematic priorities spanning education, research, public communication, ethics, industry, and global inclusion. Selections were guided by geographic and thematic diversity, the capacity to engage audiences beyond the established quantum community, and the potential to generate outputs with lasting relevance. Together, the funded events delivered activities in more than a dozen countries across six continents, reflecting a deliberate effort to extend the Year's reach beyond the regions with the most established quantum research infrastructure.

Education, outreach and inclusion

Education and youth engagement were at the central of IYQ. Throughout the Year, activities ranged from high-level educational convenings to open-access competitions designed to engage students with the field. In December 2025, the *Quantum Education Summit,* held at the CosmoCaixa Science Museum in Barcelona, brought together more than 300 participants from 34 countries to discuss emerging models for quantum education and workforce development. Organized by the Catalonia Quantum Academy, in partnership with the Institute of Photonic Sciences (ICFO), the Quantum Flagship initiatives, and other collaborating partners, the summit convened educators, researchers, and students from leading institutions worldwide and produced a white paper outlining priorities for quantum education systems.

Complementing this effort, the *Future Leaders in Quantum (FLiQ) Hackathon*, co-organized by the International Telecommunication Union (ITU) and the Quantum Coalition, engaged more than 500 participants from 30 countries in a global virtual competition combining workshops, mentorship, and project development. Outreach initiatives, including activities at BRAC University in Bangladesh, demonstrated how open and accessible formats can broaden participation and create entry points into the emerging quantum workforce, particularly in regions where formal quantum education infrastructure remains limited.

Research, capacity-building and international cooperation

Across Asia, Africa, and Latin America, IYQ served as a catalyst for strengthening regional quantum research capacity. The Abdus Salam International Centre for Theoretical Physics (ICTP), a UNESCO Category 1 Institute, hosted *Quantum Week* in Trieste, Rome, and São Paulo, extending participation across hemispheres. In Southeast Asia, *QISTCon.ph 2025* in Cebu marked the Philippines' first national conference on quantum computing and the public demonstration of the country's first quantum device. The meeting brought together international and local experts to develop the Philippines' National Quantum Roadmap and to explore education pipelines and regional cooperation within ASEAN.

Other major gatherings highlighted the expanding scale and ambition of quantum initiatives across scientific communities. *Quantum India Bengaluru* (QIB 2025) had nearly 2,000 participants from more than 19 countries, combining scientific exchange with industry engagement and reflecting momentum generated by India's *National Quantum Mission*. *Quantum Africa 7*, hosted at the Ibn Tofail University in Morocco, continued to strengthen continental collaboration, bringing together researchers and policymakers to discuss inclusive access to quantum technologies and future infrastructure development.

Quantum science, society and culture

IYQ placed strong emphasis on public communication and cultural engagement. As quantum science expands from a specialized research field towards wider technological and societal applications, strengthening public understanding has become an important element of responsible innovation. Throughout the Year, initiatives explored diverse formats, including film, photography, journalism training, public art, and cultural dialogue, demonstrating how creative approaches can translate complex scientific ideas for wider audiences and inspire curiosity among younger generations.

Several initiatives used media and storytelling to

Participants of ICTP's conference on "Quantum Physics: From Foundations to Emerging Technologies", including nine Nobel laureates. The conference was a cornerstone event of IYQ.
© Roberto Barnaba / ICTP Photo Archives

engage new audiences. The *Quantum Shorts Contest*, organized by the Harvard Quantum Initiative, invited students aged 14 to 19 to explain quantum concepts through short videos. Around 70 students participated, with roughly half of the submissions coming from outside the United States. Five winning entries addressed topics such as quantum tunnelling, Bose–Einstein condensates, band structures, quantum key distribution, and spin-½. Winners presented their films at the Museum of Science in Boston and visited Harvard's research facilities. *Quantum Shorts: Encore* extended the reach of the Singapore-based Quantum Shorts festival (2012–2024) through a series of screenings across 2025. The inaugural episode of Our Quantum Future debuted in November 2025. *The IUPAP IYQ 2025 Photo Contest* awarded second prize to an image of Stellenbosch University's optical ground station supporting the first quantum-satellite link in the Southern Hemisphere between South Africa and China. *Storytelling from the Lab*, a Global Event co-led by scientists and staff at Duke University and ITU, combined with science-themed storytime to reach some of the youngest learners, with episodes scheduled for release in 2026.

Other initiatives explored creative and cultural pathways for engaging society with quantum science. The *Quantum City Prize* invited cities and communities worldwide to develop public installations, performances, and artistic interventions that brought quantum ideas into everyday urban spaces. In New Zealand, *Quantum Crossroads*, held in Dunedin from 7 to 9 July, brought together quantum scientists, curators, artists, engineers, policy makers, and cultural leaders. It opened with a pōwhiri at Puketeraki Marae and integrated Māori perspectives throughout its programme, proposing initiatives such as *Quantum Sister Cities,* community "Qamp Quantum" camps, and artist residencies.

The 5th International Conference on the History of Quantum Physics, held in Salvador, Brazil, from 11 to 14 August, brought together historians and physicists to reflect on the centenary of quantum theory and produced a vision document outlining priorities for the field through 2035, including efforts to globalize the study of quantum history and improve access to archival sources. The 2025 Brilliant Poetry Competition received more than 350 submissions and selected three winning poems: *Spooky Action at a Distance* by Gary Hugh Day, *An End to Time* by Luisa A. Igloria, and *Schrödinger's Attic* by Muizzah Fatima Munir.

Innovation, industry, metrology and standardization

IYQ also highlighted the growing importance of innovation and industrial partnerships in translating quantum research into practical applications. Several initiatives brought together industry,

World Quantum City Prize Initiative in New Alamein City, Egypt
Organized by Alamein International University August 28-29, 2025.
© AIU Media Team, Alamein International University

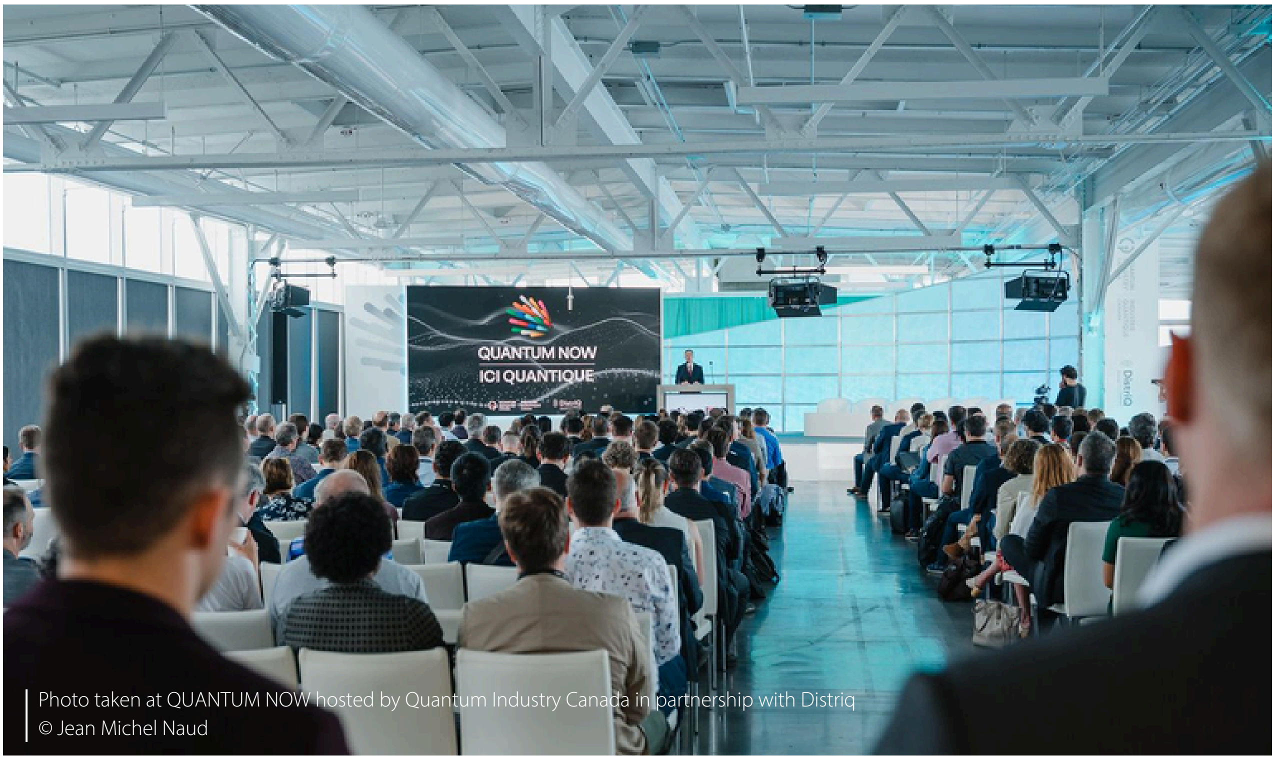


Photo taken at QUANTUM NOW hosted by Quantum Industry Canada in partnership with Distriq
© Jean Michel Naud

investors, researchers, and policymakers to explore how emerging quantum technologies can move from laboratory discovery to entrepreneurship, industrial deployment, and international standards.

Quantum Now / Ici Quantique, held in Montréal on 18–19 June, convened government representatives, investors, industry leaders, and researchers in Canada's first industry-led national quantum forum, organized by Quantum Industry Canada and Distriq. In Japan, *the International Symposium on Quantum Science, Technology and Innovation 2025 (Quantum Innovation 2025)* brought together 968 participants from 27 countries, including 148 invited speakers, 244 poster presentations, and 29 sponsoring organizations. Hosted within *EXPO 2025 Osaka*, the Symposium highlighted the growing role of quantum technologies in innovation strategies for the coming decade.

Other initiatives focused on the institutional and economic infrastructure required to support quantum development. In the United Kingdom, *the Quantum Metrology event*, held on 3 November at the National Physical Laboratory in Teddington, marked the launch of the National Metrology Institute for Quantum (NMI-Q), following the signing of a Memorandum of Understanding (MoU) by national metrology institutes from eight countries: Australia, Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. In Africa, *ARC-EDS: Driving Entrepreneurship and Innovation to Combat Youth Unemployment*, held in Accra from 5 to 7 August, positioned quantum skills within broader economic development strategies, launching a *Continental Agenda for Quantum Education, an IYQ Innovation Pavilion*, and new partnerships to integrate quantum literacy into technical and vocational education and training pathways.

Ethics, governance and responsible development

The rapid expansion of quantum research, innovation, and industrial activity has also raised important questions about governance and ethical responsibility. *The Ethical, Legal, and Social Aspects of Broadening Global Ownership of Quantum Technologies Symposium*, held at Sabancı University in Istanbul on 20–21 November, identified three priorities for the international community: strengthening global coordination on quantum ethics, aligning international principles with national quantum programmes, and ensuring that all states possess the institutional capacity to participate meaningfully in shaping the governance of quantum technologies. *The Workshop on Quantum for Journalists*, held in Pretoria, South Africa from 1 to 5 December during the 2025 World Conference of Science Journalists, contributed to this agenda by equipping journalists with more accessible and critical ways to report on quantum science and technology, including its ethical, political, and economic dimensions. *The IYQ Global*

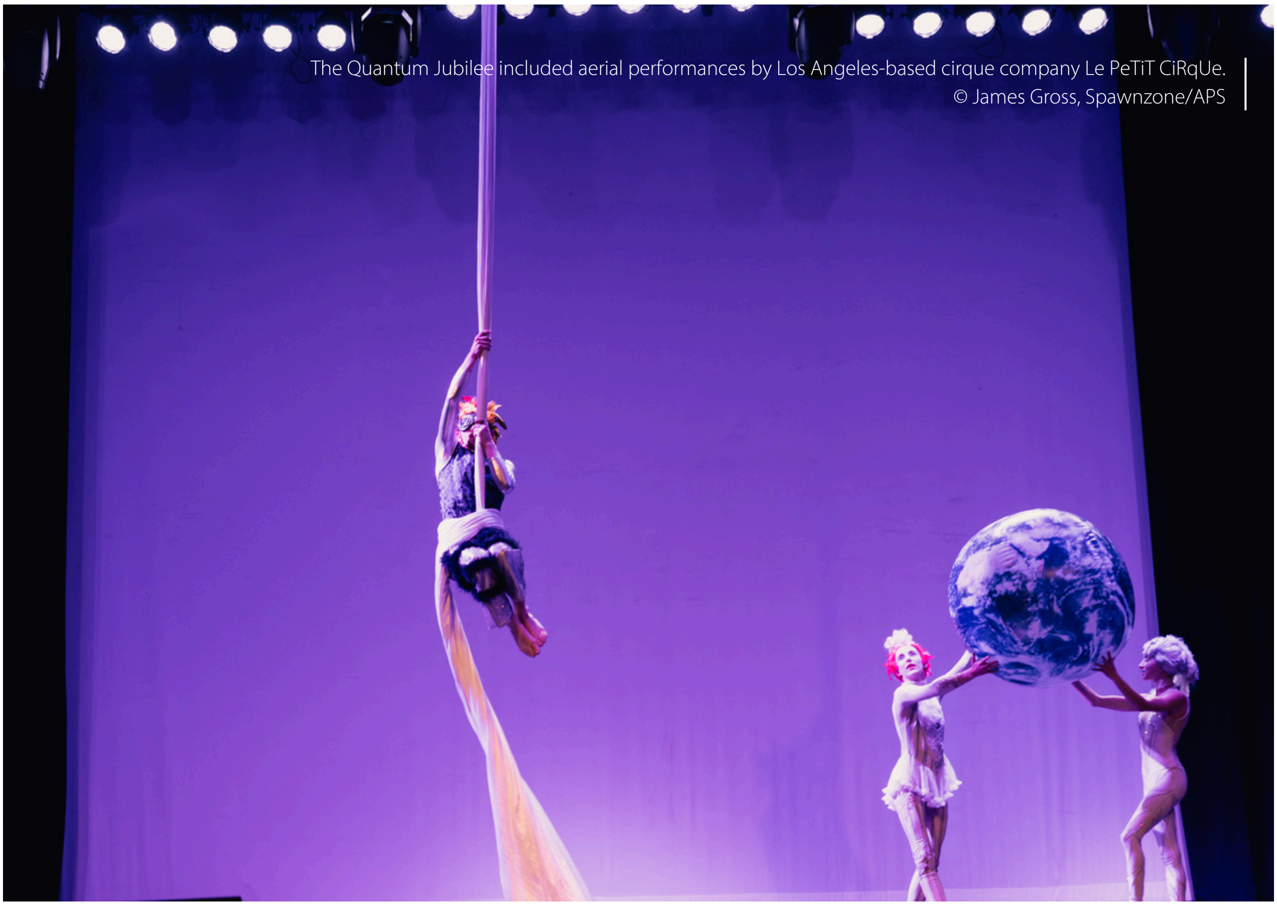
Event on Quantum Science and Technology for Sustainable Development, held at Khalifa University in Abu Dhabi on 10-11 December, complemented these efforts by focusing on how quantum science and technologies can be communicated in accessible ways in relation to sustainability goals and practical responses to global challenges.

2.3. Partner contributions and enabling support

The implementation of IYQ 2025 was supported by a coalition of 71 partners, spanning scientific societies, national academies, private-sector leaders, and philanthropic foundations. Their contributions extended beyond financial sponsorship to include operational support, infrastructure, networks, and expertise. While the IYQ Steering Committee provided governance and strategic oversight, the partner coalition provided much of the capacity needed to deliver the International Year at a global scale.

Private-sector partners contributed technological infrastructure, providing cloud-based access to quantum processors and development tools that enabled researchers, students, and innovators in regions without advanced hardware infrastructure to experiment with operational systems. Scientific societies, including the Founding Partners, mobilized their extensive membership networks to organize conferences, develop educational materials, and support international mobility through fellowships and travel grants.

Several initiatives illustrate how this partner coalition enabled concrete outcomes in infrastructure access and workforce development. *The Global Industry Challenge*, hosted by Connected DMV, provided finalists from 60 countries with in-kind access to quantum hardware from IBM, IonQ, QuEra, and Rigetti, allowing participants to test algorithms for applications such as finance and energy on operational processors rather than simulators. Workforce development was supported through initiatives such as Qiskit Fall Fest, which engaged approximately 40,000 students and professionals across more than 130 countries through open training materials, local campus events, and cloud-based exercises. By combining industry-supported infrastructure with open educational resources, these initiatives helped lower barriers to entry and expanded access to practical quantum skills.



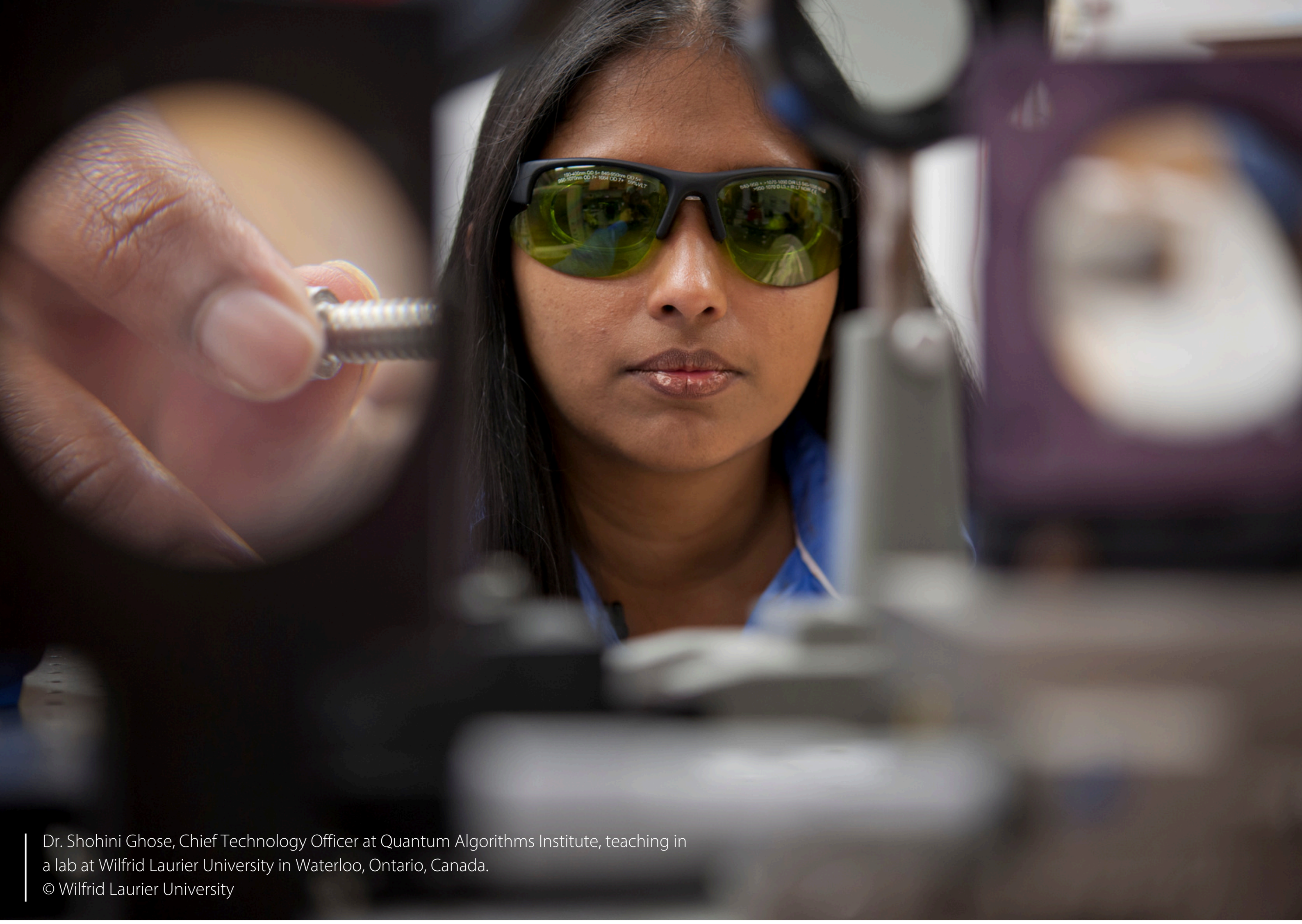
The Quantum Jubilee included aerial performances by Los Angeles-based cirque company Le PeTiT CiRqUe.
© James Gross, Spawnzone/APS

Partner contributions were also visible in regional innovation and creative public engagement. *The Amaravati Quantum Valley Hackathon (AQVH 2025)* in India brought together public institutions and industry partners to mentor student teams working on deep-tech applications in areas such as agriculture and logistics. This demonstrated how international technology partnerships can align with regional development priorities. At the *APS Global Physics Summit* in Anaheim, California, *QuantumFest* highlighted the role of art and creativity in public engagement with quantum science. Its opening public event, *Quantum Jubilee*, brought together performances, physicists, Nobel laureates, youth participants, a live link with the International Space Station, an escape room, and interactive exhibits. The programme featured performances such as *Tinguely Entangled* and *Quantum Voyages*, which used music, movement, theatre, and narrative to explore quantum ideas through artistic forms. Throughout the week, the *Quantum Playground* offered interactive installations, hands-on activities, storytelling, and quantum-generated art. Activities such as *Quantum Salvation*, the quantum-themed game *Save the Cat*, and the crowd-contributed installation *Birds of Science* illustrated how playful art-science formats can complement more conventional outreach approaches.

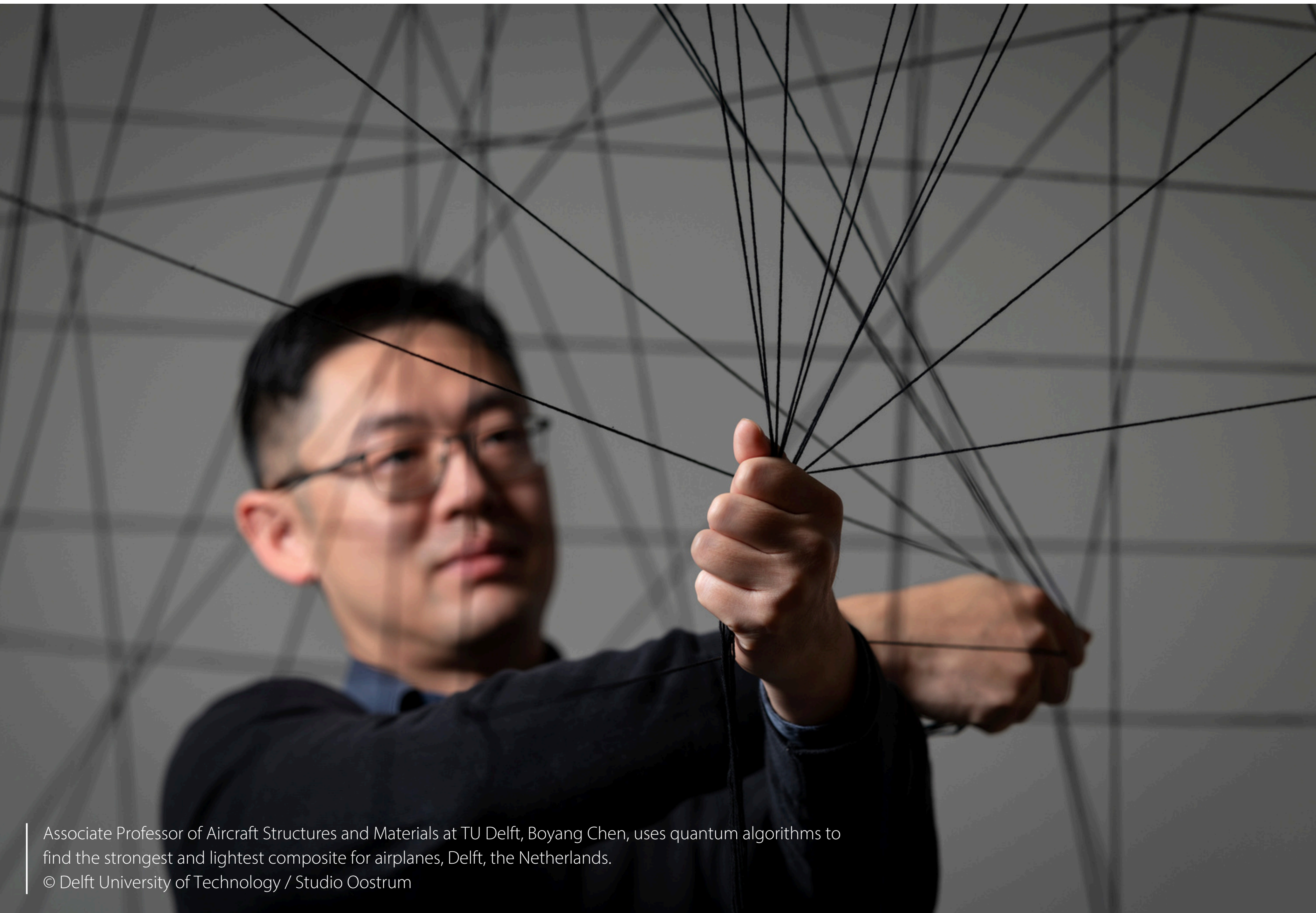
QuantumFest featured hands-on activities and games, including, at right, a quantum-themed escape room.
© James Gross, Spawnzone/APS


© James Gross, Spawnzone/APS


© James Gross, Spawnzone/APS



Dr. Shohini Ghose, Chief Technology Officer at Quantum Algorithms Institute, teaching in a lab at Wilfrid Laurier University in Waterloo, Ontario, Canada.



Associate Professor of Aircraft Structures and Materials at TU Delft, Boyang Chen, uses quantum algorithms to find the strongest and lightest composite for airplanes, Delft, the Netherlands.

Chapter 3

IYQ in numbers: A year of global mobilization

IYQ 2025 registered global mobilizations at a scale and diversity not previously recorded for quantum science and technology. Drawing on the IYQ events registry and a survey of event organizers conducted by the IYQ Secretariat, this chapter provides a quantitative account of the Year's reach, inclusion patterns, and reported outcomes.

Figure 3-1. IYQ by the numbers

1,300+ registered events worldwide

83 participating countries worldwide

1.2+ million participants directly engaged

$1M USD funding raised

71 sponsors

25 IYQ global events and initiatives supported by IYQ Global Fund

242,000 users of the official IYQ website[1] from 203 countries and territories, generating nearly 299,000 sessions and over 1.5 million interactions with site content.

~34% of reported event focused on education and training (workshops, school activities, and awareness campaigns)

~31% of events engaged industry and private sector audiences

~42.5% average female participation across events

Source: IYQ Website and IYQ Organizers' Survey

3.1. Event formats and delivery modes

Based on the IYQ Organizers' Survey, the Year's activities clustered around three principal categories of delivery: knowledge sharing and education, capacity building and skills development, and public engagement and awareness (Figure 3-2).

Delivery mode also varied. Of surveyed events, 60 per cent were held fully in person, 23 per cent in hybrid format, and 17 per cent online only. Seminars and webinars showed the highest digital reach(29 per cent online, 24 per cent hybrid), while hackathons had the highest share of hybrid delivery (37 per cent). Workshops and school-based activities were predominantly in person (67 and 69 per cent respectively), consistent with their hands-on design, as were exhibitions (84 per cent). See Figure 3-3.

Figure 3-2. Thematic Breakdown: Analysis of event formats based on the IYQ Organizers' Survey (n=314 respondents; 518 total format selections). Events could select multiple types. Percentages reflect share of all type-selections.

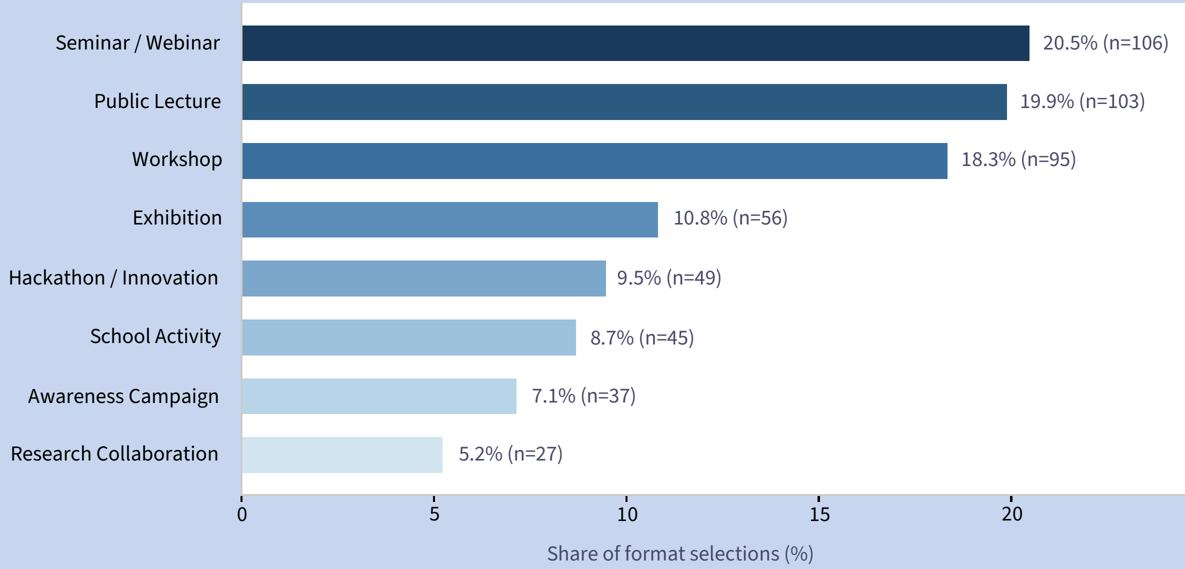
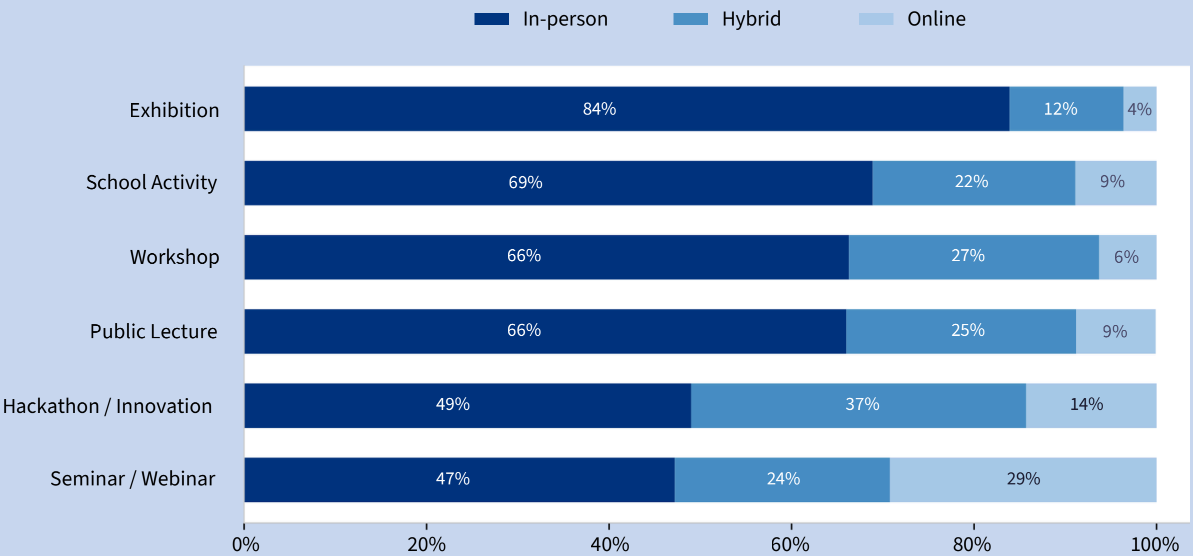


Figure 3-3. Delivery Mode by Event Format: percentage of events in each format category delivered in-person, hybrid, or online (IYQ Organizers' Survey). Events could report multiple formats.



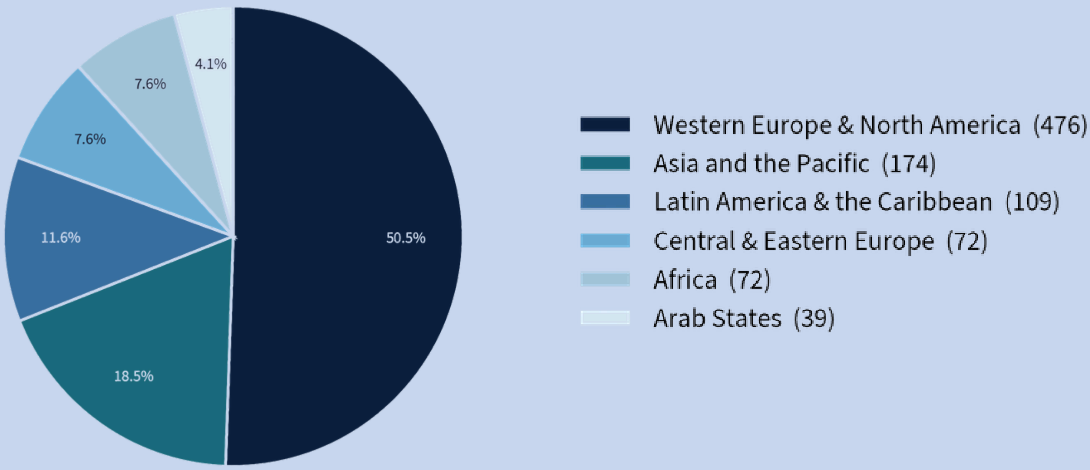
Measuring cryogenic microwave components in the IsoLab test facility at Lancaster University, Lancaster, United Kingdom
© Sean Conboy/Lancaster University

3.2. Reach and regional distribution

The scale of IYQ 2025 was realized through a distributed delivery model, allowing countries to adapt the global mission to their specific contexts. Regional distribution, however, was not uniform (Figure 3-4). Analysis of the more than 1,300 registered events reveals distinct regional trends.

Western Europe and North America hosted the largest share of events (43 per cent), reflecting the concentration of established research infrastructure in these regions, while Central and Eastern Europe contributed a further 7 per cent, together accounting for half of all registered activity. At the same time, the Year saw meaningful engagement from across the Global South: the Asia-Pacific region accounted for 16 per cent of events, Latin America and the Caribbean for 10 per cent, Africa for 7 per cent, and the Arab States for 4 per cent.

Figure 3-4. Global distribution of registered IYQ events across UNESCO regions. Share of events by region. Source: IYQ Events Registry (as at 5 January 2026).



Quantum divide quantified

Europe and North America host 7 times more quantum events per country than Africa.

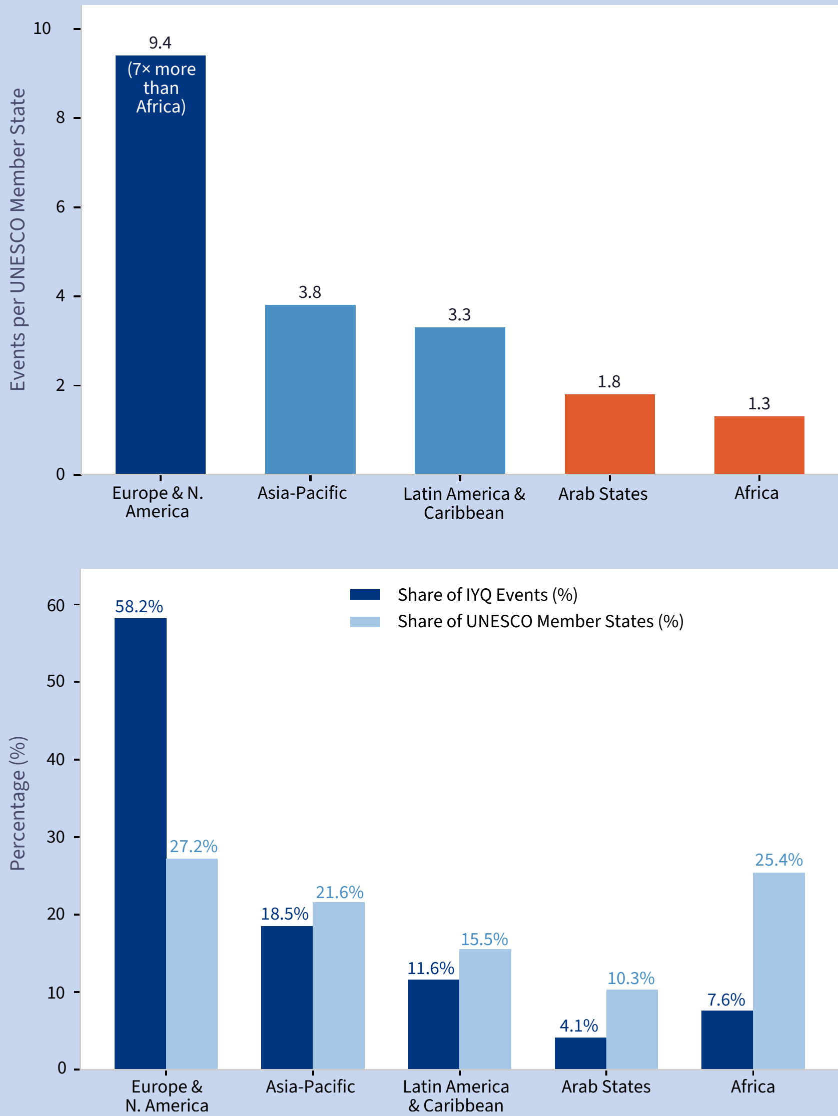
Regional distribution data provide an empirical basis for quantifying the quantum divide. When measured as events per UNESCO Member State, Europe and North America, with 58 Member States, recorded approximately 9.4 events per Member State, compared with approximately 1.3 in Africa, with 54 Member States. This represents a ratio of more than seven to one. Asia and the Pacific recorded 3.8 events per Member State, Latin America and the Caribbean 3.3, and the Arab States 1.8. Disparities are also visible when comparing shares of Member States with shares of registered activity: Africa accounts for approximately 25 per cent of UNESCO Member States but hosted 7.6 per cent of registered events, while the Arab States account for roughly 10 per cent of Member States but 4.1 per cent of events (Figure 3-5).

These figures do not capture online participation or the regional reach of globally targeted events and should be read as indicative rather than comprehensive. Regional disaggregation in Figure 3-5 draws on the 942 events for which complete and standardisable location data were available; events with missing, ambiguous, or non-mappable location records are excluded from this analysis.

Figure 3-5. The Quantum Divide in IYQ Activity. Left panel: Registered events per UNESCO Member State, by region. Right panel: Share of registered events compared with share of UNESCO Member States, by region. Source: IYQ Events Registry.

(a) Events per Member State by Region

(b) Share of Events vs. Share of Member States

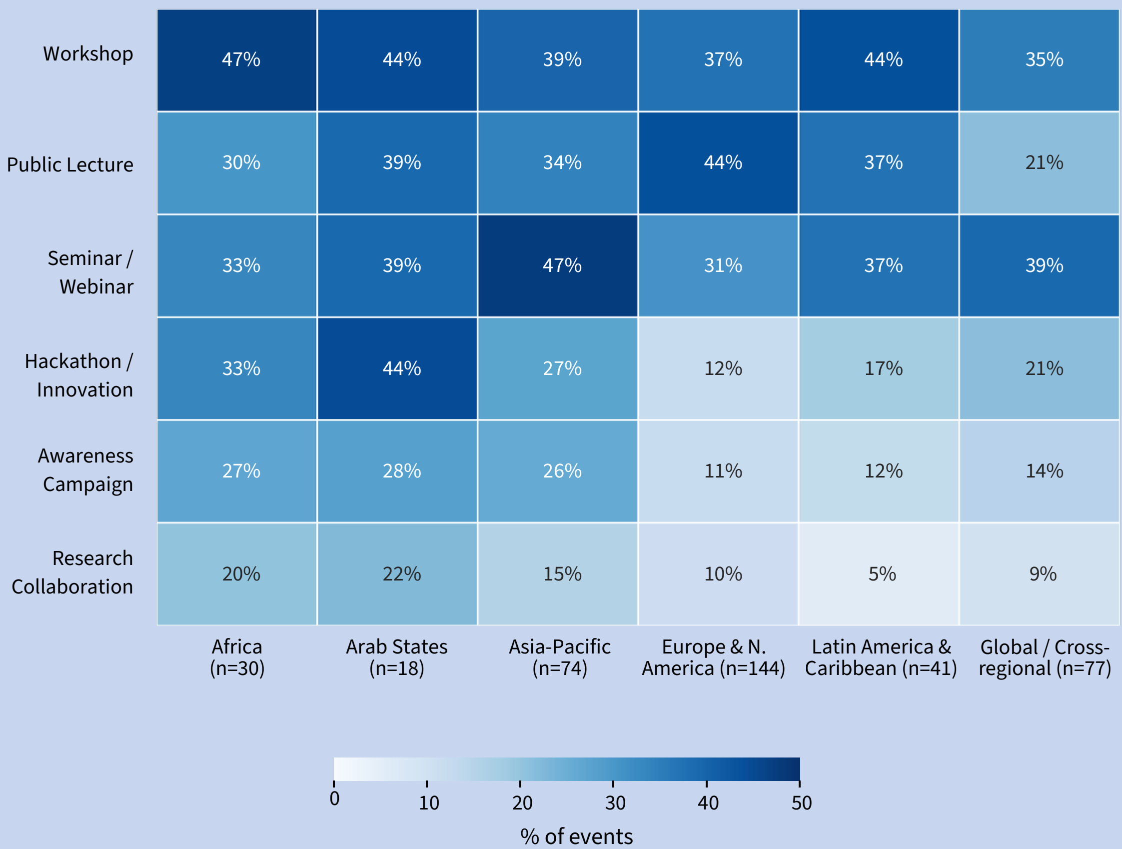


Regional differences in event formats

Event formats varied across regions, reflecting different priorities and levels of research capacity. Among events targeting Africa, workshops were reported in 47 per cent of cases, compared with a global average of 30 per cent. Hackathons and innovation events (33 per cent) and awareness campaigns (27 per cent) were also more common than in other regions, pointing to a strong emphasis on practical capacity building and community engagement. Research collaboration formats were reported more often among events targeting Africa, the Arab States and Asia and the Pacific, suggesting active efforts to build networks in contexts where quantum research communities are still emerging. By contrast, events in Europe and North America were more likely to take the form of public lectures, while hackathons and awareness campaigns appeared less frequently. Asia and the Pacific reported the highest share of seminars and webinars, consistent with a stronger use of digitally scalable formats.

This distribution may partly reflect structural constraints. The UNESCO Global Quantum Research and Infrastructure Survey, presented in Part II of this Report, found that approximately one third of respondent institutions reported lacking access to basic quantum research facilities. In contexts with lower infrastructure density, workshops, awareness campaigns and community-building formats may have been more feasible to organize than infrastructure-dependent activities. At the same time, the emphasis on people-centred formats in Africa should also be understood in relation to broader priorities of youth engagement, public outreach and long-term talent development, rather than as a simple reflection of constraints. The uneven distribution of event focus may also influence whose perspectives are prioritized in shaping the global quantum agenda, including research priorities, standards development, ethics, and governance discussions (Figure 3-6).

Figure 3-6. Regional differences in event formats. Percentage of surveyed events targeting each region that reported using a given format. Source: IYQ Organizers' Survey (n=314; multi-select choices).



3.3. Audiences, participation and inclusion

Based on the organizers' survey, the most frequently reported audiences were students (88 per cent of surveyed events) and scientists and researchers (75 per cent), with teachers and educators engaged in 68 per cent of events (Figure 3-7). Academic institutions therefore served as principal delivery channels, reaching both professional and student communities. Engagement with the general public (46 per cent) and industry (31 per cent) indicates that the Year also reached beyond specialist circles, although the relative share of non-academic audiences points to continued scope for broadening participation in subsequent years.

Increased interest in quantum science

The most widely reported outcome was increased interest in quantum science, cited by 79 per cent of organizers, and reported across regions and event types (Figure 3-8). Nearly half of surveyed events reported follow-up activity or institutional outputs, including follow-up events or projects, new partnerships, and media coverage. In addition, 36 per cent reported producing educational or outreach materials that can extend the impact of IYQ beyond the events themselves.

Policy engagement was also a notable outcome. 28 per cent of responding organizers (89 of 314 surveyed events) reported that their event initiated a policy dialogue. While this figure relates to the

Figure 3-7. Distribution of audience groups reached across surveyed events. Percentage of events targeting each group. Source: IYQ Organizers' Survey (n=314; multi-select).

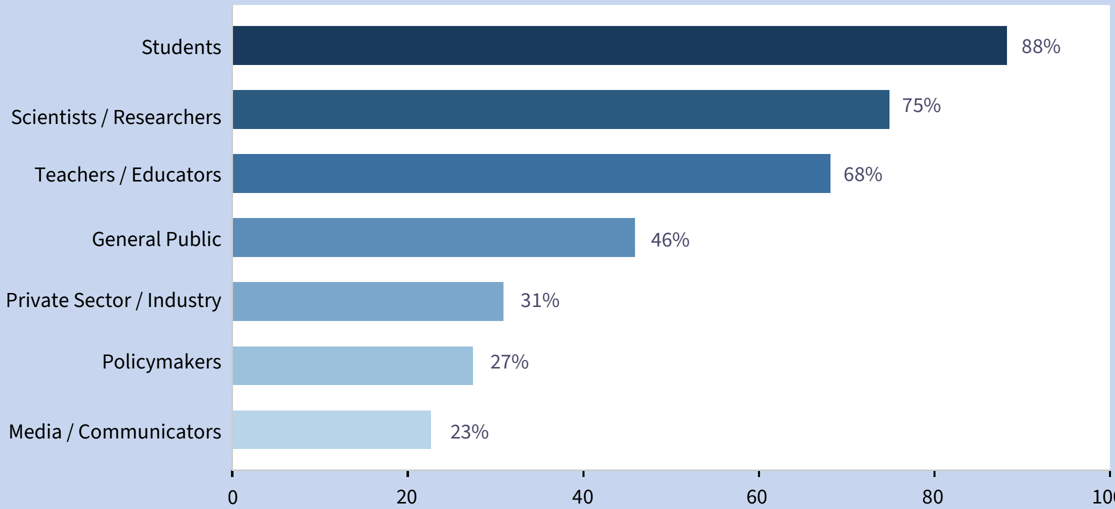
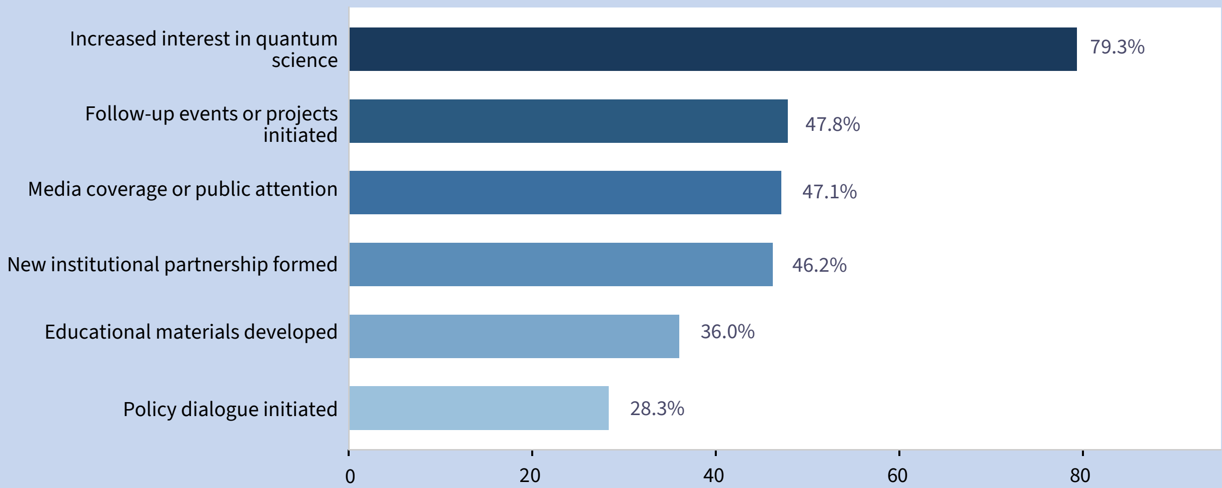


Figure 3-8. Reported outcomes of IYQ events. Percentage of surveyed event organizers reporting each outcome type. Source: IYQ Organizers' Survey (n=314; multi-select).



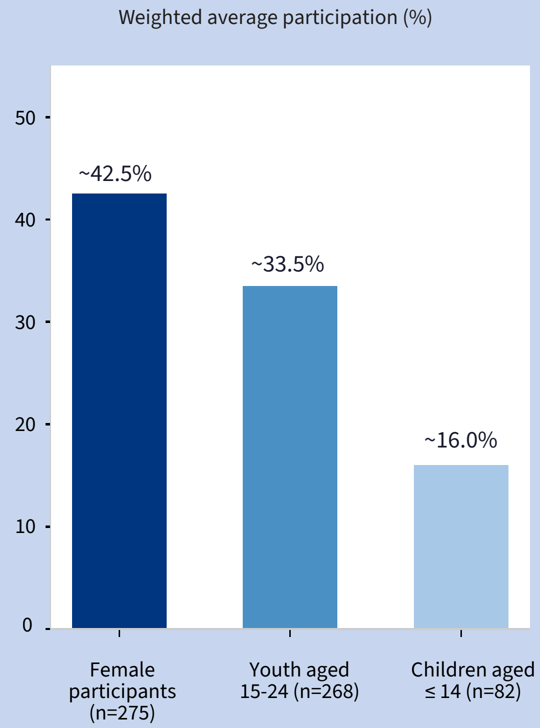
survey subset and should be read as indicative, it suggests that IYQ 2025 opened a meaningful number of entry points for policy engagement in a single year, and provides a useful foundation for the governance objectives of the Global Quantum Initiative.

Women, youth and children

Across events that reported gender data, women comprised an estimated 42.5 per cent of participants (n=275), exceeding by a substantial margin the long-term baseline of 20–25 per cent that UNESCO's Science Report documents for female participation at senior research levels in physics globally. While the IYQ data are self-reported and should be interpreted with caution, the pattern points to a meaningful shift in participation, likely supported by the Year's deliberate efforts to widen participation — including accessible event formats and targeted partnerships with initiatives such as Girls in Quantum and The Quantum 100.

Engagement of younger cohorts was also substantial: youth aged 15 to 24 comprised an estimated 33.5 per cent of participants (n=268), and children aged 14 and under 18 per cent (n=82). Together, these figures indicate that more than half of the participants reached by events reporting demographic data were under 25 years of age, suggesting a strong orientation towards building the next generation of quantum talent (Figure 3-9).

Figure 3-9. Inclusion Indicators. Weighted average participation estimates by demographic group across IYQ events that reported data. Source: IYQ Organizers' Survey. All figures are based on organizers' self-reporting using range brackets; events where participation data were not recorded are excluded.



All figures are based on organizers' self-reporting using range brackets; events where participation data were not recorded are excluded.

Graduate student Ramya Suresh explains how Prof. Alex Ruichao Ma's group builds and operates superconducting quantum processors. © Louis Tan / Photo provided by: Purdue University, Department of Physics and Astronomy.

3.4 Signals and trends beyond the Year

Reported outputs and durable assets

Aggregate reporting from organizers indicates that IYQ events generated durable assets beyond the activities themselves. The most reported outputs included open-source learning resources such as curricula and lecture repositories, structured training modules adaptable for future cohorts, and the formalization of collaborative research networks. Organizers also frequently cited the initiation of national policy dialogues as a direct outcome, suggesting that the Year provided momentum for moving from scientific interest toward governance frameworks. Taken together, these outputs reflect a meaningful shift from single-year engagement towards the creation of reusable public goods that can extend the legacy of IYQ 2025.

Complementary institutional roles

Analysis of event types by organizers shows that different institutions contributed in different ways. Universities and research centres were the main venues for academic seminars, lectures and other forms of knowledge sharing. Industry partners more often led workforce-oriented activities, including hackathons and certification workshops. Cultural institutions, although fewer in number, played an important role in reaching broader and non-traditional audiences, particularly through exhibitions and youth programmes. These patterns suggest that future national strategies would benefit from stronger cross-sectoral coordination, to build more complete pipelines for talent development and public engagement.

Early signals of policy engagement

Policymakers and public sector representatives were present in a notable share of IYQ events, with 27 per cent of responding events reporting their

The International Training Centre of the International Labour Organisation (ITCILO), jointly with Quantum Delta Leiden, Politecnico di Torino and in knowledge partnership with GESDA, developed a dedicated Masterclass on Quantum Readiness for the World of Work.[2] The Masterclass provides online training for a professional audience, including policymakers and workforce development practitioners, on quantum technologies and their implications.

© ITCILO/Marco Minotti

participation. IYQ served not only as a platform for scientific exchange, but also as a space in which research communities and government actors could interact directly. Several events also generated outputs with potential policy relevance. In the Philippines, QISTCon.PH 2025, the country's first national quantum computing conference, identified the development of a national quantum roadmap as a central objective; In Brazil, participants issued the Carta de Sorocaba, calling for national quantum technology policies; In France, a cross-disciplinary workshop in Grenoble generated policy and regulatory recommendations intended for further consideration.

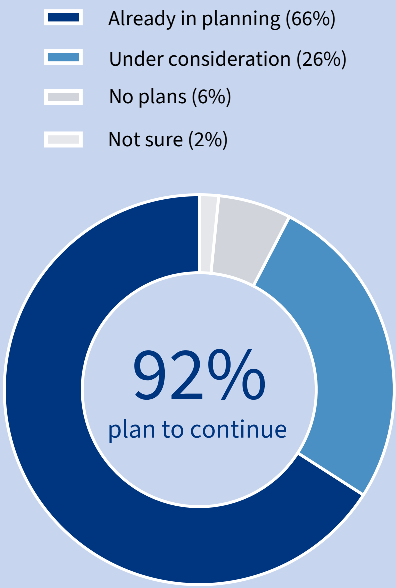
Looking beyond 2025

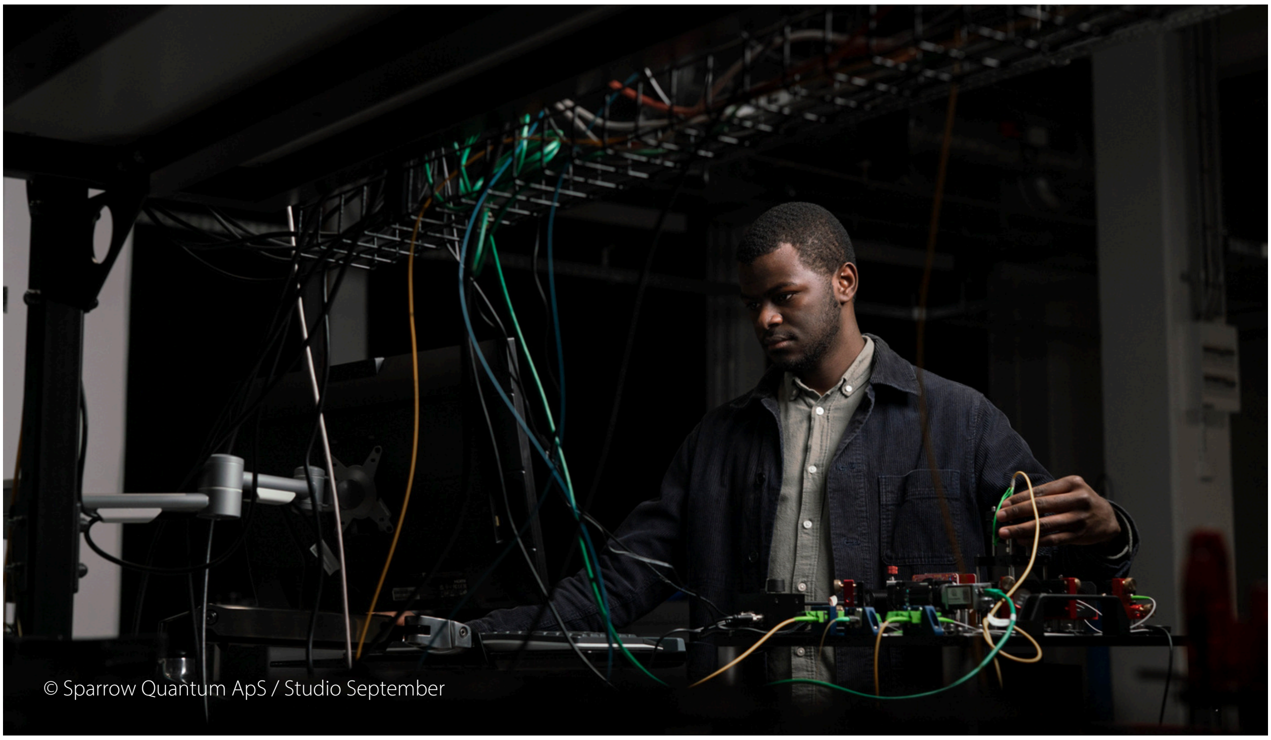
Survey responses point to strong interest in continuing IYQ's momentum beyond 2025. When asked about continuation plans, 66 per cent of organizers reported that follow-up initiatives were already being planned, and a further 26 per cent reported such plans under consideration. In total, 92 per cent of surveyed events indicated continuation beyond 2025. Interest in staying connected was similarly high: 91 per cent of respondents indicated they wished to remain informed about future global or regional quantum initiatives (Figure 3-10). IYQ helped to consolidate a community of practice with a sustained intention to continue its work. These signals provide the foundation for the longer-term international cooperation framework that IYQ 2025 was designed to initiate.

Endnotes

1 See: quantum2025.org
2 See: https://www.itcilo.org/training/masterclass/quantum-readiness-world-work

Figure 3-10. Continuation Intent: IYQ event organizers' reported plans for follow-up activities after 2025 (IYQ Organizers' Survey). The central figure reflects the combined share of respondents already planning or considering continuation.





Cleanroom, semiconductor chip fabrication facility.

Chapter 4

UNESCO and the International Year: Shaping an inclusive quantum future

The International Year of Quantum Science and Technology was, above all, a collective undertaking—shaped by scientific unions, Member States, research institutions, the private sector and civil society worldwide. As the United Nations lead agency for IYQ 2025, UNESCO's role was to provide the institutional anchor for this collective effort: to ensure that the Year advanced not only the visibility of quantum science, but also the conditions for its benefits to be shared across regions, generations and communities.

This chapter presents UNESCO's specific contributions to IYQ 2025 — the comparative advantages on which they drew, the programmes and activities delivered, and the knowledge products that will carry the legacy of the Year into the next phase of international cooperation through the Global Quantum Initiative.

Dr Lidia Brito, Assistant Director-General for Natural Sciences of UNESCO, at the Closing Ceremony of the International Year of Quantum Science and Technology (IYQ 2025)

4.1. UNESCO's comparative advantage

UNESCO's role as lead agency for IYQ 2025 drew on a set of institutional strengths that place the Organization in a distinctive position within the United Nations system. These strengths, developed over decades of work at the intersection of science, education, ethics and international cooperation, shaped both the design of the Year and the nature of UNESCO's contributions to it.

An integrated mandate in science, education and ethics

As the United Nations specialized agency with a cross-cutting mandate in education, sciences, culture, and communication and information, UNESCO is positioned to approach quantum development not only as a scientific or economic frontier, but as a societal and policy challenge—one that touches education systems, ethical frameworks, institutional readiness, and longer-term governance arrangements. This integrated mandate allowed IYQ 2025 to connect scientific progress with education pathways, public engagement, and ethical reflection within a single coherent framework, rather than as separate or parallel workstreams.

Standard-setting in open science and responsible innovation

UNESCO has extensive experience in leading global standard-setting processes for emerging technologies. The UNESCO Recommendation on Open Science, adopted unanimously by 193 Member States at the 41st session of the General Conference in November 2021, established the first global framework on open science. It affirms Open Science as a vital tool to bridge science, technology and innovation gaps between and within countries, and to advance the human right of access to science. Open Science is directly relevant to the development of quantum science and technology: open-access to publications, data, software and training resources is among the most concrete mechanisms through which research communities in under-resourced regions can engage with the field. Under IYQ 2025, this orientation was reflected in UNESCO's emphasis on open educational resources, open hardware-access modalities, and open knowledge products generated through the Year.

The Recommendation on the Ethics of Artificial Intelligence, adopted by UNESCO Member States in 2021, provides a practical template for anticipating the ethical and societal implications of quantum technologies while they remain at a formative stage. Similar experience has been developed in relation to neurotechnology and the broader governance of science. This approach is particularly valuable for quantum technologies, where governance frameworks are still taking shape. Under IYQ 2025, this experience informed UNESCO's contribution to ethical reflection on quantum technologies, including through COMEST's report on the Ethics of Quantum Computing.

Science diplomacy and multilateral convening

UNESCO has long served as a credible, neutral platform for multilateral scientific cooperation. In an international environment characterized by geopolitical tension and constrained scientific exchange, this convening role has gained new significance. UNESCO hosted the Global Ministerial Dialogue on Science Diplomacy at its Headquarters in Paris on 25–26 March 2025, bringing together approximately one thousand participants and 60 high-level national representatives, under the umbrella of the International Decade of Sciences for Sustainable Development (2024–2033). The Dialogue, co-chaired by Dr Lidia Brito, UNESCO Assistant Director-General for Natural Sciences, and ministerial representatives of Morocco, South Africa and Malaysia, advanced an international reflection on a new global framework for science diplomacy, including in relation to emerging technologies.

Mr. Shaofeng Hu, Director of the Division of Science Policy and Basic Sciences at UNESCO at the Global Ministerial Dialogue on Science Diplomacy
© Sacha HERON - UNESCO

This convening capacity is a structural feature of UNESCO's work. UNESCO regularly facilitates dialogue across science, policy and diplomacy communities through Member State consultations, intergovernmental committees, and partnerships with scientific unions, academies, and major research infrastructures. This convening role was visible throughout the Year, from the Opening Ceremony at UNESCO Headquarters in Paris, the launch of the Open Quantum Institute hosted by the UNESCO Geneva Liaison Office, to the Closing Ceremony in Accra. These moments situated quantum science and technology within a multilateral framework grounded in dialogue, cooperation and shared responsibility.

Longstanding engagement with the Global South

UNESCO's engagement with countries across the Global South, built through decades of capacity development and technical cooperation, provides a foundation of trust and continuity. This engagement operates through the International Basic Sciences Programme (IBSP), the Abdus Salam International Centre for Theoretical Physics (ICTP) as a UNESCO Category 1 Institute, and sustained cooperation with National Commissions, Ministries of Science and Research Councils across regions. Within the quantum domain, this experience shaped UNESCO's approach to widening access for researchers and students in under-resourced contexts during IYQ 2025, including through remote-access modalities, open educational resources, and targeted mentorship programmes for women scientists in Africa.

A global delivery network

UNESCO's institutional reach provides a delivery infrastructure that few organizations can replicate. This includes 53 field offices across all regions, National Commissions in 194 Member States, 10 Category 1 Institutes and more than 120 Category 2 Centres, the UNESCO Chairs and UNITWIN Networks across universities worldwide, and longstanding partnerships with scientific unions, academies and research institutions. Under IYQ 2025, this network enabled UNESCO to deliver activities across regions, support Member States in organizing national contributions to the Year and build partnerships that linked global coordination with regional and national priorities.

4.2. UNESCO quantum programmes under IYQ

Under IYQ 2025, UNESCO's programmes were organized around a set of interconnected priorities: generating evidence, widening access, advancing

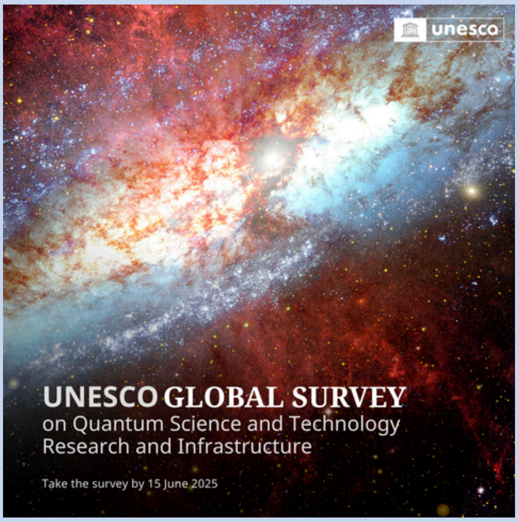
The Global Ministerial Dialogue on Science Diplomacy, hosted at UNESCO Headquarters in Paris
© Sacha HERON - UNESCO

inclusion, connecting science and society, and engaging the public. These were not isolated initiatives, but elements of a single approach: that the value of the International Year would be determined not only by its scale of participation, but by whether it expanded the conditions under which quantum science could be shared and shaped more widely.

4.2.1. Building the evidence base for global quantum cooperation: UNESCO Global Survey on Quantum Research and Infrastructure

When IYQ 2025 was proclaimed, the quantum divide was widely invoked but thinly documented. Systematic cross-country evidence on research capacity, education systems, infrastructure access and policy readiness was largely absent. Without such evidence, policy dialogue risked being shaped by the countries and institutions already at the frontier. To address this gap, UNESCO launched the *Global Survey on the Research Status and Infrastructure in Quantum Science and Technology*,[1] developed with partners and complemented by qualitative interviews with national stakeholders. The Survey was designed as a structured assessment of disparities across regions, income groups, and levels of quantum maturity. It drew 590 responses from institutions in 72 countries, including many from the Global South for which systematic quantum-related data had not previously been collected. The detailed findings of the Survey are presented in Part II of this Global Report.

Figure 4-1. The poster of the UNESCO Global Survey on the Research Status and Infrastructure in Quantum Science and Technology



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4.2.2. Infrastructure accessibility and capacity building: Remote access initiative in quantum science and technology

For researchers in many countries, the question is not how to use quantum hardware more effectively —it is how to access it at all. The UNESCO Global Survey showed that nearly one third of responding institutions reported having no access to basic quantum research infrastructure. In this context, remote-access modalities offer one of the few pathways through which researchers in under-resourced settings can begin to engage with operational quantum systems.

Building on UNESCO's Remote Access to Lab Equipment (UNESRALE) initiative,[2] UNESCO advanced a remote-access pilot project on quantum computing under IYQ, through a Partnership Agreement signed with Cleveland Clinic in November 2025. Cleveland Clinic hosts the first private-sector, on-site IBM Quantum System One in the United States, and the partnership provides a practical route through which researchers from under-represented regions can access that infrastructure remotely.

Through this joint initiative, the partners aim to train researchers in quantum computing via online learning resources and provide direct access to quantum hardware to test problem sets. To ensure equitable participation, the initiative launched "UNESCO – Cleveland Clinic Call for Remote Access to Quantum Computing for Healthcare and Life Sciences," targeting early-career researchers with concrete project proposals.[3] Selected fellows receive remote access to the Cleveland Clinic's infrastructure, fostering a sustainable ecosystem of quantum research and international scientific exchange.

4.2.3. Addressing gender gap: UNESCO quantum computing course for African female scientists

Women remain under-represented in quantum science. Within sub-Saharan Africa, the gap is compounded by limited access to specialized quantum training and to the international networks through which such training is most often distributed. During IYQ 2025, UNESCO launched the Empowering African Women in Quantum Science programme to address this gap.[4] The programme was developed in collaboration with Dr. Maria

Longobardi (University of Basel) and Dr. James Wootton (Moth Quantum), drawing on the open-source textbook Learn Quantum Computation using Qiskit—previously developed by Dr Wootton and colleagues at IBM—to provide a structured curriculum from single-qubit systems to advanced topics including Shor's and Grover's algorithms.. The programme combined open educational resources with dedicated live mentorship and training for a cohort of 41 female PhD students from Ghana, Nigeria, Mauritania, Tunisia, South Africa, Kenya, Togo, The Gambia, Namibia, Algeria, Morocco, Burkina Faso, Benin, Cameroon, and Ethiopia.

"The course has specifically allowed me to understand the advantages of this technology and to apply my theoretical knowledge in mathematics to something concrete and highly sophisticated."

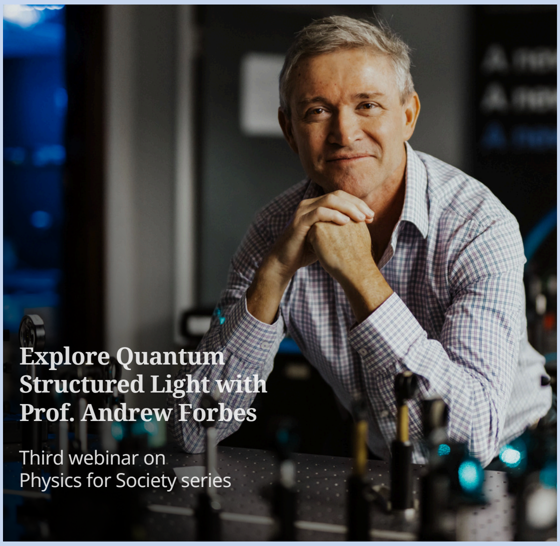
------ feedbacks from a participant in the UNESCO Quantum Computing Course for African Female Scientists

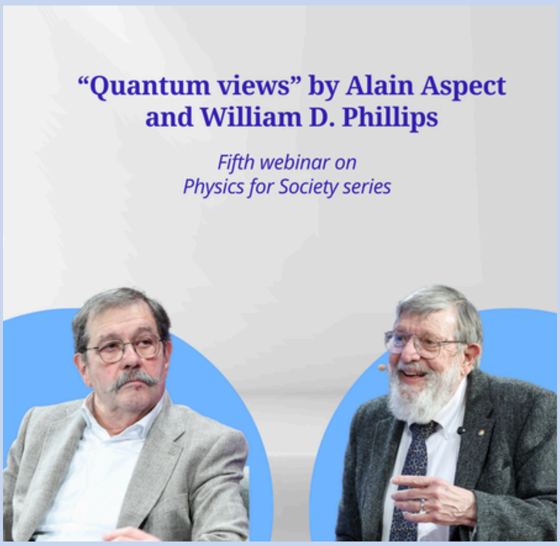
4.2.4. Connecting science and society: IUPAP/UNESCO International Colloquia on Physics for Society

To bridge the gap between technical research and societal impact, UNESCO and the International Union of Pure and Applied Physics (IUPAP) co-organized the IUPAP/UNESCO International Colloquia on Physics for Society.[5] The Colloquia were one of the most visible science diplomacy and multilateral dialogue mechanisms delivered under IYQ 2025. It was designed to be an interactive platform that systematically connected frontier physics with societal implications, education pathways, policy needs, and cooperation opportunities. In 2025, the series hosted five sessions and engaged more than 2,500 participants, gradually forming a cross-regional community of dialogue and practice.

The series included Nobel Laureate Anne L'Huillier in the launch session held on April 14, and concluded with a high-profile dialogue featuring Nobel Laureates Alain Aspect and William D. Phillips on the implications of recent quantum breakthroughs for science and society. The series also elevated perspectives relevant to Global South ecosystems and regional capability building, including contributions by Prof. Andrew Forbes and partners engaged in strengthening research infrastructure pathways. It further integrated industry and innovation voices, including representatives from IBM and Microsoft, alongside emerging innovators such as Estelle Inack, a Cameroonian founder of a quantum start-up. A dedicated session on synchrotron science and Africa's scientific future convened key institutional and scientific actors, with expert contributions from the African Light Source Foundation, SESAME, ESRF, and LAAAMP. Importantly, the series did not only convene discussion, but also helped catalyse follow-on work, including UNESCO's toolkit Empowering Africa through Synchrotron Science Toolkit,[6] illustrating how a structured dialogue format can generate tangible knowledge resources and sustained cooperation momentum.

Figure 4-2. Event flyer for the IUPAP–UNESCO International Colloquia on Physics for Society





4.2.5. Public engagement and science popularization through art and science

Quantum science has long been perceived as mysterious. A key question for IYQ 2025 was whether that perception could begin to shift, whether the curiosity, creativity and engagement of non-specialist audiences, and especially young people, could be engaged as part of the quantum community rather than as its observers.

UNESCO approached public engagement through two complementary channels: its institutional communication platforms and creative, youth-facing initiatives. UNESCO treated public engagement and youth pathways as a practical lever to strengthen quantum literacy. Through UNESCO social media platforms, such as Instagram, Facebook, LinkedIn and X, IYQ-related content generated over 1 million views and more than 31,000 engagements.

Through the visual contest, Quantum Light: A Visual Odyssey,[7] co-organized with the International Day of Light (IDL), ITU, ICTP, and the University of Illinois, participants were invited to translate quantum concepts into visual works. The contest received 3,062 submissions from 48 countries, with over 75 per cent of participants under 18, demonstrating strong youth interest and the potential of science communication to widen participation.

4.3. Strategic publications and policy frameworks

A key legacy of IYQ 2025 is the production of foundational knowledge resources designed to guide future governance. In collaboration with the Geneva Science and Diplomacy Anticipator (GESDA), UNESCO contributed to the *Intelligence Report: Quantum Diplomacy in Action 2025–2026* (Figure 4-4), specifically leading the chapter on "Quantum and the Global Divide". This work provided a critical analysis of the geopolitical risks of unequal access to quantum technologies.

Also contributing to the advancement of responsible global governance, the World Commission on the Ethics of Scientific Knowledge and Technology of UNESCO (COMEST) published the report *The Ethics of Quantum Computing* (Figure 4-4). This publication proposes a thorough ethical analysis of the opportunities and challenges of quantum computing, outlining the ethical principles and values that should underpin its research, development, deployment, implementation and use. It also provides concrete recommendations for Member States and stakeholders, encouraging anticipatory reflection and inclusive governance to ensure that the development of quantum computing serves the common good.

Figure 4-3. "The Hidden Pulse of the Universe", awarded "Most Popular" winning work of the visual contest, *Quantum Light: A Visual Odyssey*.
Infrared (IR) radiation, though invisible to the eye, plays a vital role in thermal imaging, astronomy, medical, and communication. Grounded in quantum principles like wave-particle duality and the Hamiltonian equation, this artwork visualizes IR energy. It reflects how the invisible shapes our reality—a universal glow that speaks not in light, but in energy and presence.

© Prachi Verma

UNESCO produced the policy brief *Quantum Science for Inclusion and Sustainability* (Figure 4-4)[8], which outlines actionable considerations for Member States in aligning national quantum strategies with sustainable development objectives, including in areas such as water security, energy and health.

UNESCO also produced the issue brief on Human Rights-Centered Global Governance of Quantum Technologies,[9] which underscores the importance of multistakeholder participation for aligning quantum innovation with the Sustainable Development Goals, embedding human rights principles within anticipatory responsible quantum governance frameworks, and addressing emerging risks associated with the existing digital divide and convergence of quantum technologies with artificial intelligence.

Building on the momentum of IYQ 2025, UNESCO has also framed a longer-term Global Quantum Initiative to support continued dialogue and inclusive capacity building. The Initiative is intended to provide a continuity platform, connecting partnerships, evidence and practical cooperation mechanisms in a way that sustains the legacy of the International Year and supports implementation objectives under the International Decade of Sciences for Sustainable Development.

Figure 4-4. UNESCO's publication on quantum during IYQ 2025

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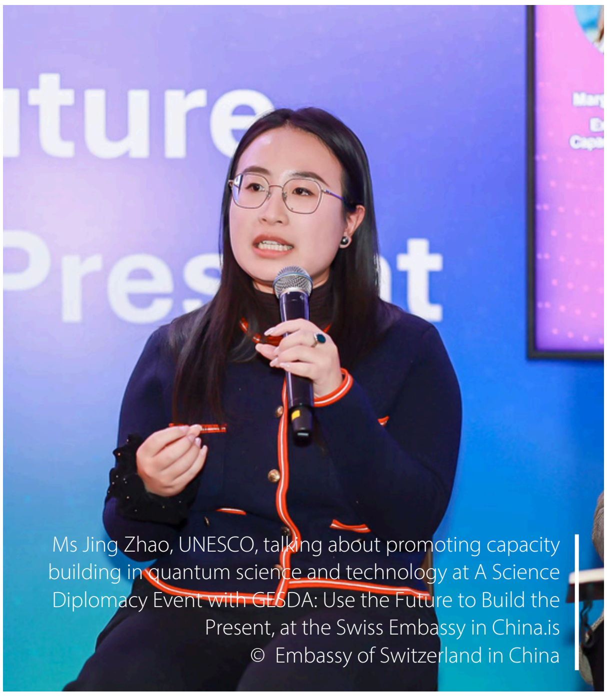

Ms Jing Zhao, UNESCO, talking about promoting capacity building in quantum science and technology at A Science Diplomacy Event with GESDA: Use the Future to Build the Present, at the Swiss Embassy in China.is
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Endnotes

1 See: https://www.unesco.org/en/articles/participate-unesco-survey-quantum-science-and-technology
2 See: https://www.unesco.org/en/basic-sciences-engineering/remote-access
3 See: https://www.unesco.org/en/articles/call-applications-remote-access-quantum-computing-healthcare-and-life-sciences
4 See: https://www.unesco.org/en/articles/unesco-advances-equitable-access-quantum-science-african-women-scientists?hub=79845
5 See: https://www.unesco.org/en/articles/unesco-and-iupap-lead-quantum-dialogue-global-action?hub=79845
6 See: https://unesdoc.unesco.org/ark:/48223/pf0000394941
7 See: https://www.unesco.org/en/articles/unesco-inspires-youth-worldwide-explore-quantum-science-through-art
8 See: https://unesdoc.unesco.org/ark:/48223/pf0000393921
9 See: https://unesdoc.unesco.org/ark:/48223/pf0000393402

Part II:
Mapping the quantum landscape

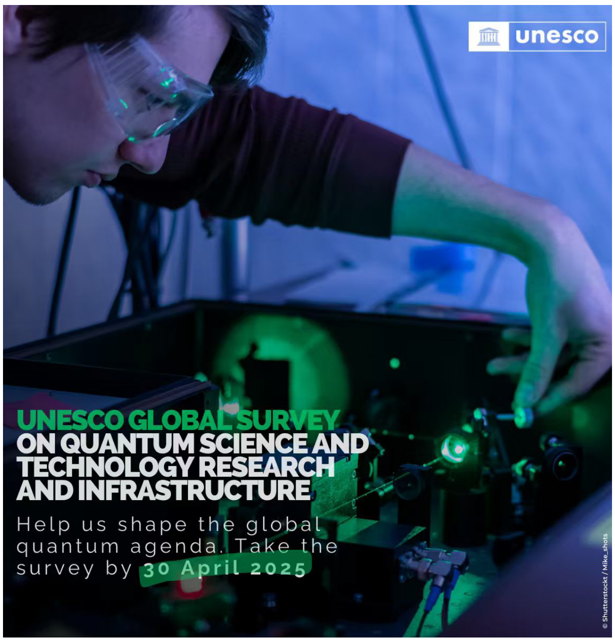
In Delft, The Netherlands, assistant-professor Shima Rajabali researches quantum photonics with the goal of building a worldwide quantum internet.

Chapter 5:

Findings from the UNESCO global quantum survey

IYQ 2025 brought quantum science and technology into wider scientific, policy and public discussion, and generated broad global mobilization. Yet attention alone does not amount to capability. As quantum computing, communication, sensing and precision measurement continue to develop, quantum science and technology are becoming increasingly connected to a wider range of real-world issues, including secure communications, health and life sciences, environmental monitoring, advanced manufacturing and digital infrastructure. These developments remain at an early stage, and the capacity to participate in them meaningfully remains highly concentrated in a limited number of countries and institutions. Three questions are central to the next phase of international cooperation:

- **What is the current state of global quantum research and innovation?** Chapter 5 addresses this question through evidence from the UNESCO Global Quantum Survey on the Research Status and Infrastructure in Quantum Science and Technology.
- **What constraints are shaping participation across countries and institutions?** Chapter 6 synthesizes survey findings with broader evidence to identify the principal structural gaps.
- **Where should action focus?** Chapter 7 sets out the priority areas for the next phase of international cooperation.



5.1. The UNESCO Global Quantum Survey: scope and method

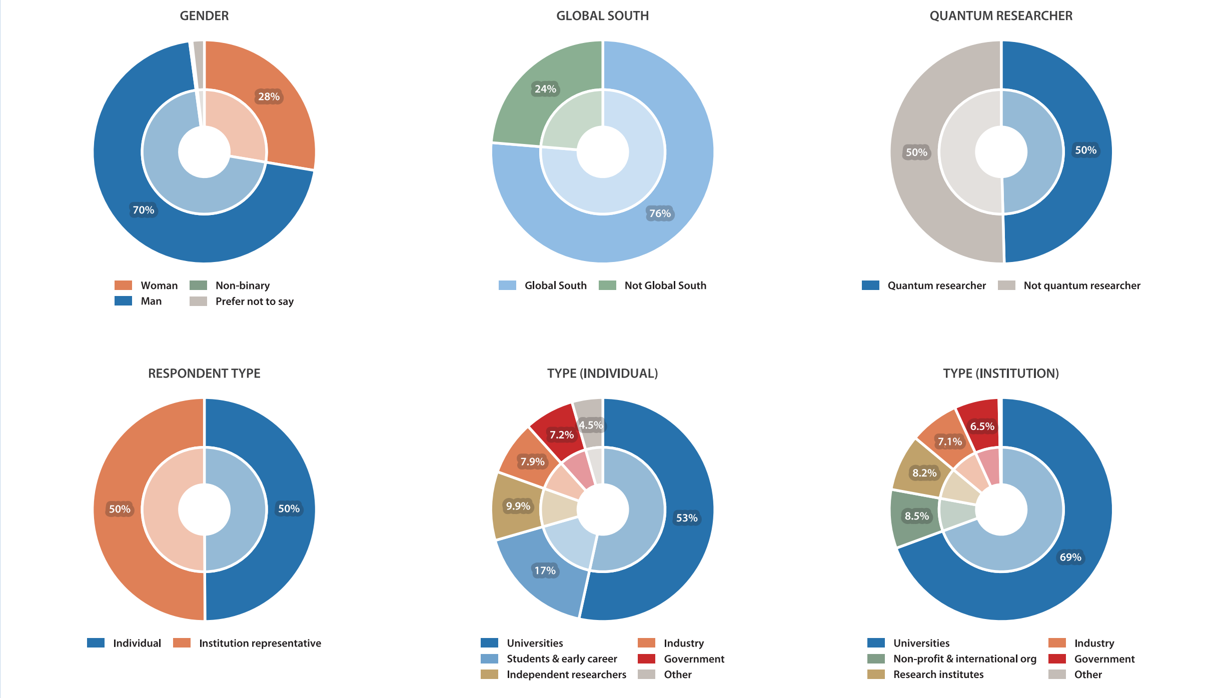
The UNESCO Global Quantum Survey on the Research Status and Infrastructure in Quantum Science and Technology was launched in June 2025 to provide a structured, cross-country evidence base on the current quantum landscape. Developed by UNESCO with technical partners IBM and the Unitary Foundation, the survey covered research infrastructure, talent and education, industry and innovation, and policy and governance dimensions. It was disseminated through UNESCO networks, partner institutions, scientific and professional communities, and open calls, with the aim of broadening participation across regions and stakeholder groups(Figure 5-1).

By the report's deadline, the survey had received 590 valid responses from 81 countries. All responses were subjected to completeness and internal

Figure 5-1. UNESCO Global Quantum Survey: Response Distribution and Country Coverage by Region

Region	Responses	Country Coverage (% of UNESCO MS in region)
Western Europe	114	65%
Eastern Europe	189	40%
Latin America and the Caribbean	122	27%
Asia and the Pacific	61	30%
Africa and Arab States	101	33%
	n=587	71/194 countries

Figure 5-2. Respondent profile of the UNESCO global quantum survey. source: unesco global quantum research and infrastructure surve



consistency checks, and entries that were clearly incomplete or unsuitable for analysis were excluded from the dataset. As the survey results are based on self-reported information provided voluntarily by respondents, the data do not constitute a statistically representative picture of national quantum capabilities or policy maturity. It is best understood as a structured snapshot of the perspectives and experiences of stakeholders actively engaged in quantum-related work in their respective countries and regions. This chapter therefore presents descriptive findings and comparative patterns, supplemented where relevant by qualitative insights from interviews. The findings are not used to produce country rankings or definitive national assessments; they are intended to establish an empirical baseline for the gap analysis and forward-looking discussions in subsequent chapters.

5.2. Respondent profile

This survey aims to provide a comprehensive picture of the global quantum science and technology ecosystem. Respondents include researchers and stakeholders from the fields of policy, education, industry and other supporting sectors (Figure 5-2).

Respondents from the Global South accounted for 76 per cent of the total, providing perspectives from contexts beyond traditional quantum hubs and offering insight into barriers to access and capacity needs across diverse institutional settings. Individual respondents and institutional representatives each represented 50 per cent of the sample.

Among individual respondents, higher education accounted for the largest share (53 per cent), followed by students and early career respondents (17 per cent). The dataset also includes independent researchers (9.9 per cent), industry respondents (7.9 per cent), government respondents (7.2 per cent), and other categories (approximately 4.5 per cent). Among institutional representatives, universities again formed the majority (69 per cent), followed by non-profit and international organizations (8.5 per cent), research institutes (8.2 per cent), industry actors (7.1 per cent), government entities (6.5 per cent), and other categories. The composition partly reflects the survey's dissemination channels and varying response patterns across stakeholder groups.

Gender composition and career stage

Women remain under-represented overall, with 28 per cent of total respondents and a marked decline at senior levels. Men accounted for 70 per cent of respondents; the remainder identified as non-binary or preferred not to say. Female representation was comparatively higher at student and early-career stages (approximately 41 to 43 per cent), but fell to around 16 per cent at senior level and remained low in leadership positions (Figure 5-3, 4).

Regional breakdowns indicate variation in female participation across regions, although differences should be read as indicative given regional sample sizes (Figure 5-6).

The experience profile of respondents varies across regions (Figure 5-5). In Europe and North America,

Figure 5-3. Gender distribution by years of experience

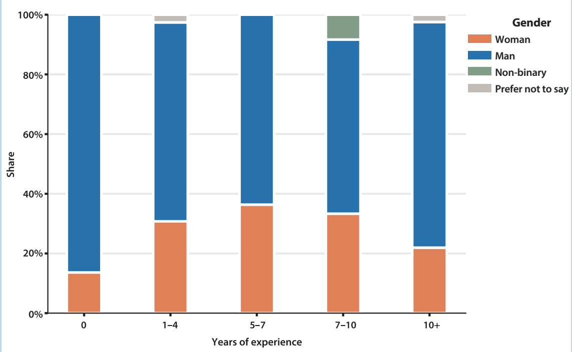


Figure 5-4. Gender distribution by career stage

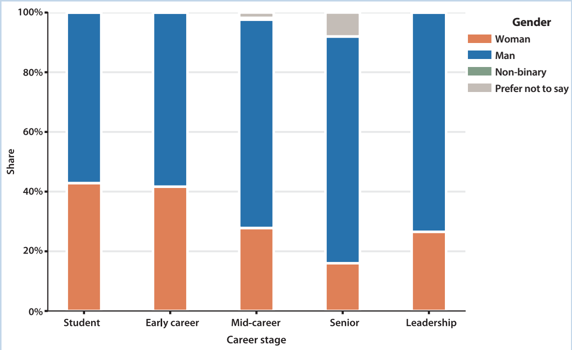


Figure 5-5. Years of experience of survey respondents by region

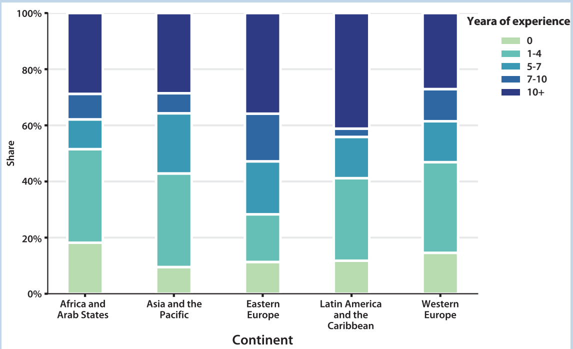
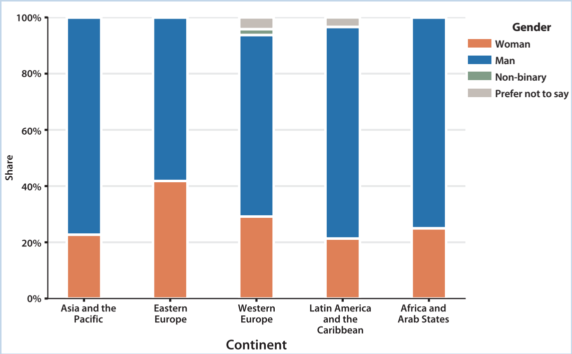


Figure 5-6. Gender distribution of survey respondents by region



The quantum phenomena demonstration with students involves them making a chemical solution on a small torch and lighting it to see the different colors (indicative of quantum effects at the smallest scales), at the 2025 Africa Regional Conference on Education & Skills Development (ARC-EDS).
© ESDEV Foundation Africa

respondents with more than ten years of professional experience represent a larger share of the regional sample, consistent with longer-established research communities and a higher concentration of senior researchers. In Africa, the Arab States, and parts of Asia and the Pacific, respondents at earlier career stages make up a more substantial share.

The pattern is consistent with UNESCO's broader findings on gender in STEM: although womenincreasingly participate in scientific education and early research careers, they remain under-represented in senior scientific and leadership positions. Within quantum science specifically, thedata point to growing entry-level participation alongside persistent constraints on retention,progression and visibility for senior women in the field (UNESCO 2017; UNESCO, 2024).

5.3. Accessibility to quantum research infrastructure

Roughly one in three respondents reported that their institution had no quantum research facilities of its own. Of the 590 respondents, 181 respondents (31.9 per cent) indicated that their institution did not have its own quantum facilities. Even after accounting for shared facilities, collaborative arrangements and cloud access, 127 respondents reported being unable to access the facilities they needed. Where institutional facilities were available, the most frequently reported types were quantum computing research facilities (22.3 per cent), quantum communication infrastructure (16.8 per cent) and quantum sensing equipment (16.0 per cent), typically including superconducting quantum computers, ion traps and photonic platforms, high-performance computing resources for simulation and verification, and access rights to cloud-based quantum computing platforms.
181 respondents (31.9%) indicated that their institution did not have its own quantum facilities. Even when shared facilities, collaborative arrangements and cloud access were taken into account, 127 respondents still reported that they were unable to access the required facilities. 22.3% of institutions reported possessing quantum computing research facilities. 16.8% reported possessing quantum communication infrastructure. 16.0% reported possessing quantum sensing equipment. These facilities primarily include: superconducting quantum computers, ion traps and photonic platforms, high-performance computing resources

Figure 5-7. Share of Respondents Reporting Different Access Pathwaysto Quantum Research Infrastructure, by Region

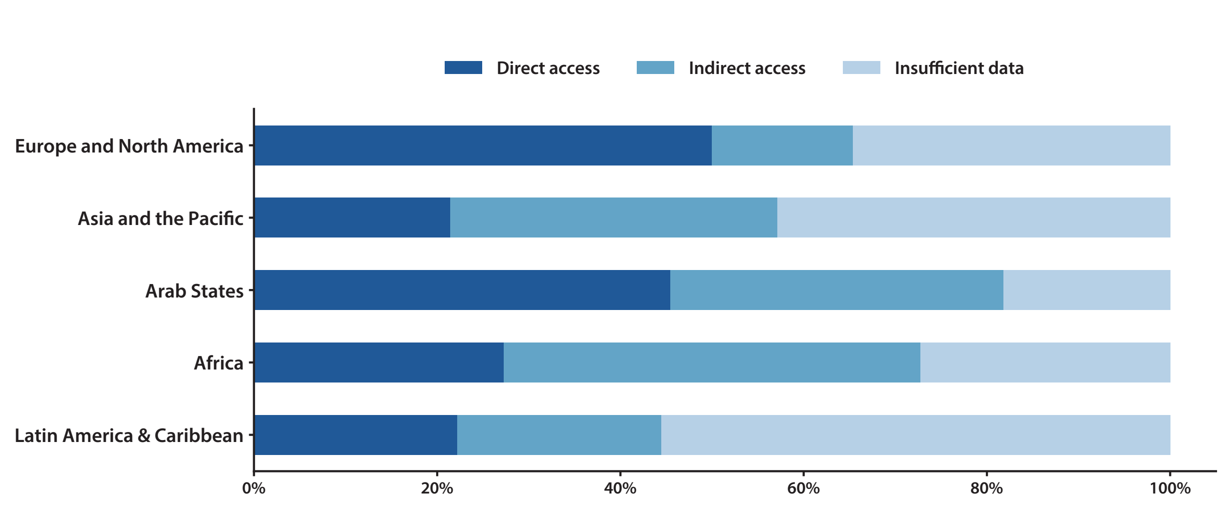
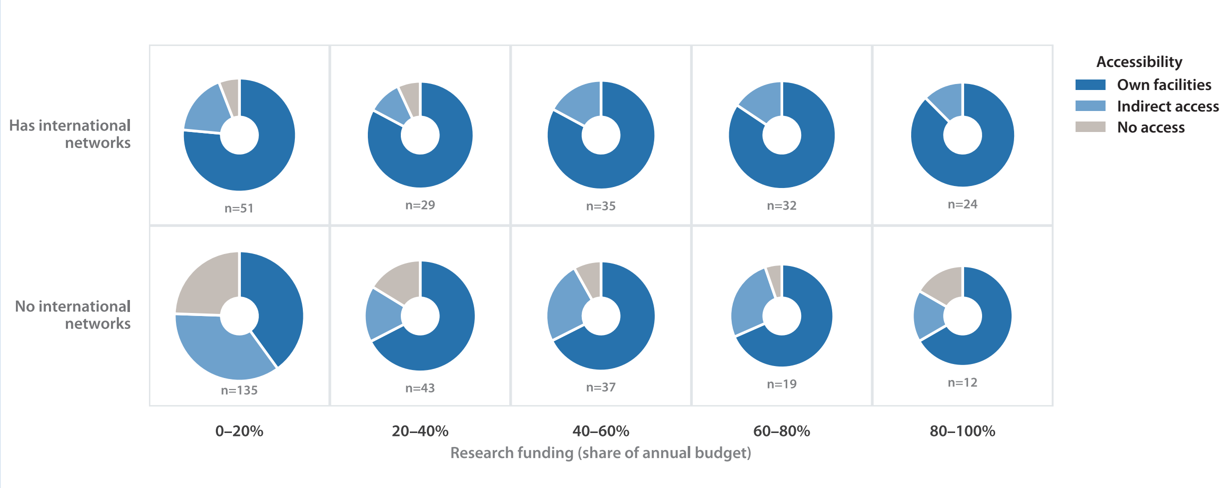


Figure 5-8. Accessibility by international network participation and share of institutional research funding. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.



for quantum algorithm simulation and verification, as well as access rights or subscription rights to cloud-based quantum computing platforms.

Access patterns vary considerably across countries (Figure 5-7). In some countries, respondents more often reported direct access, indicating that domestic facilities or institutional resources are available to support sustained research and experimentation. In others, access was more often indirect, with institutions depending on international partnerships, shared infrastructure, or remote and cloud-based arrangements. The figure also points to an important visibility gap, as a considerable number of countries fall into the category of insufficient data.

Access, international networks and research investment

Within similar funding brackets, institutions that participate in international quantum networks are markedly less likely to report no access to infrastructure. Among institutions in international networks, a higher share reported direct or indirect access. Among institutions outside such networks — particularly those allocating only 0 to 20 per cent of their annual budget to research — the combined share reporting indirect or no access was significantly higher. Where research funding levels were higher, direct access was more common even among institutions not participating in international networks (Figure 5-8).

Two findings emerge: research investment is associated with more stable direct access channels; participation in international networks is particularly important for securing indirect access where domestic resources are limited.

Barriers to access

High equipment procurement costs are the most widely reported constraint across all regions, identified by 64.4 per cent of respondents. This reflects the high capital requirements and specialized supply chains associated with quantum infrastructure (Figure 5-9). Beyond this common barrier, regional patterns differ.

In Asia and the Pacific, respondents reported comparatively high levels across most non-capital constraints, including the cost of accessing facilities or cloud platforms, limited collaboration channels, high entry barriers for users, insufficient training support, and limited maintenance and operational expertise. Access challenges in the region reflect a combination of cost, connectivity and capability constraints..

In Africa and the Arab States, limited collaboration channels feature prominently, alongside concerns about the cost of accessing facilities or cloud platforms and barriers faced by new users. Weak cooperation mechanisms appear to limit the reach of indirect access and reduce the benefits of shared infrastructure arrangements.

In Europe, procurement costs remain the dominant barrier, while the relative importance of collaboration channels, training support, and operational and maintenance capacity varies across countries. Access constraints persist even in contexts where parts of the research base are comparatively mature.

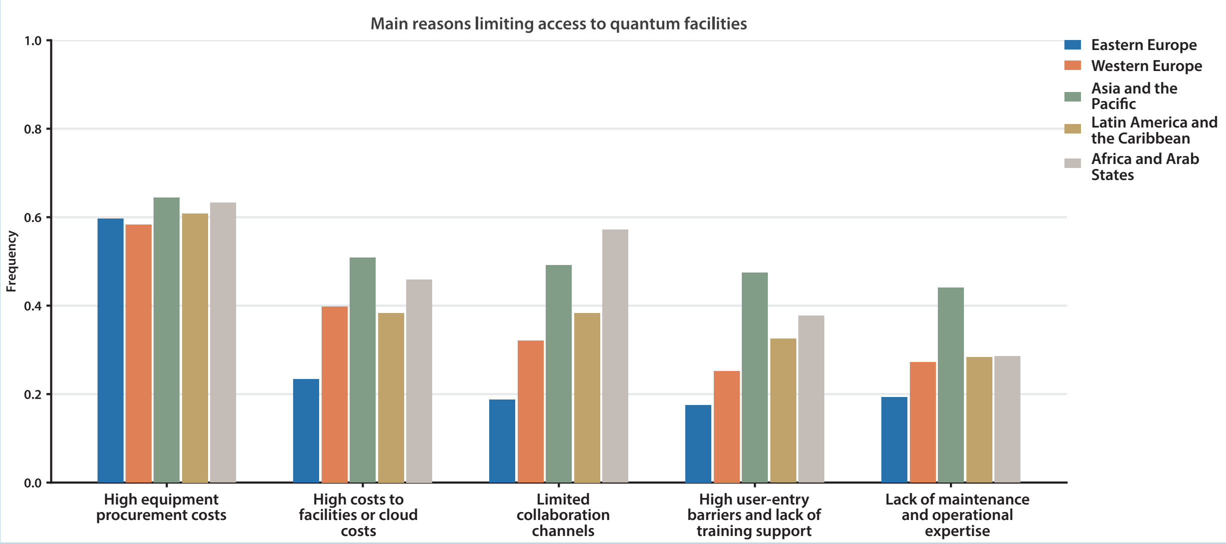
In Latin America and the Caribbean, procurement costs remain the principal constraint, with a second tier of facility or cloud access costs, limited collaboration channels, and training and support gaps, appearing at moderate levels.

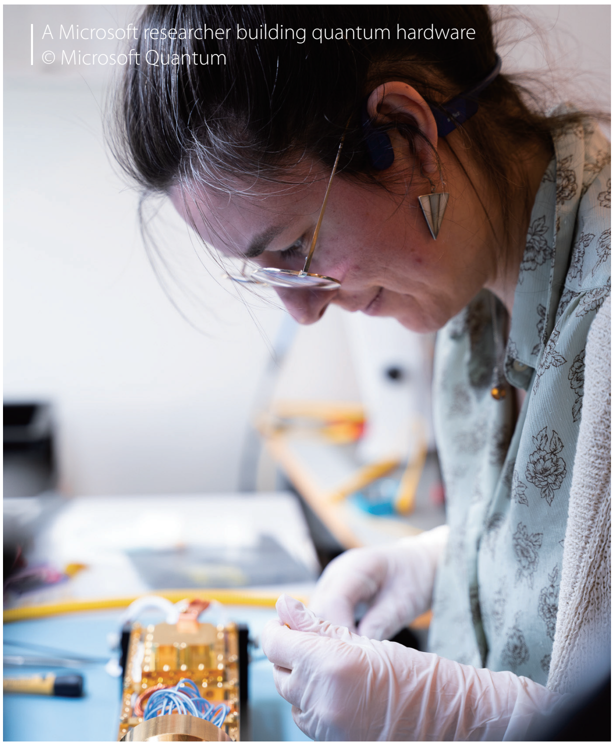
Across all regions, access depends not only on whether infrastructure exists or can be reached, but on whether institutions can afford it, build effective collaboration channels, and maintain the skills and operational capacity needed to use it productively over time.

5.4. Quantum talent: training, retention and mobility

Talent shortages are widely perceived as a primary barrier to quantum advancement. Of the 590 respondents, 43 per cent identified shortages of

Figure 5-9. Main barriers limiting access to quantum facilities, by region. Respondents could select more than one option; percentages reflect the share of respondents identifying each constraint. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.





A Microsoft researcher building quantum hardware
© Microsoft Quantum

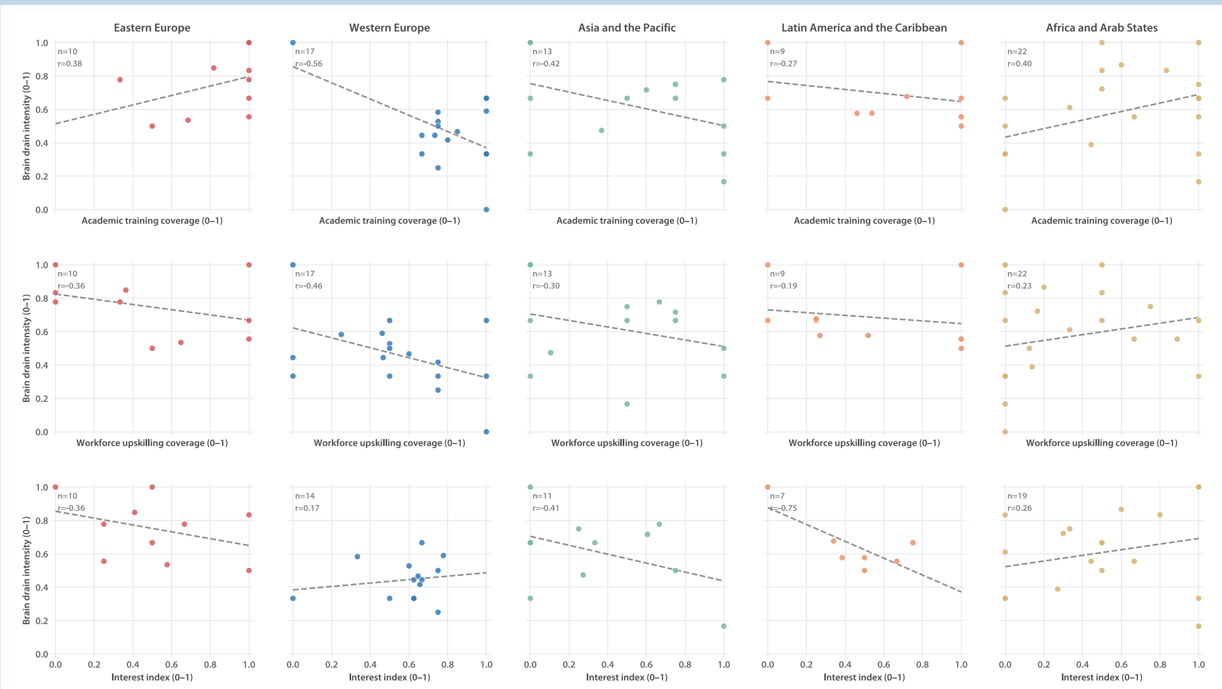
skilled researchers and technical experts as one of the principal barriers to quantum research and application in their country. A further 52 per cent identified attracting, training and retaining skilled researchers as a key area for action, pointing to a recognized need for workforce strategies covering the full talent lifecycle: attraction, training, and retention.

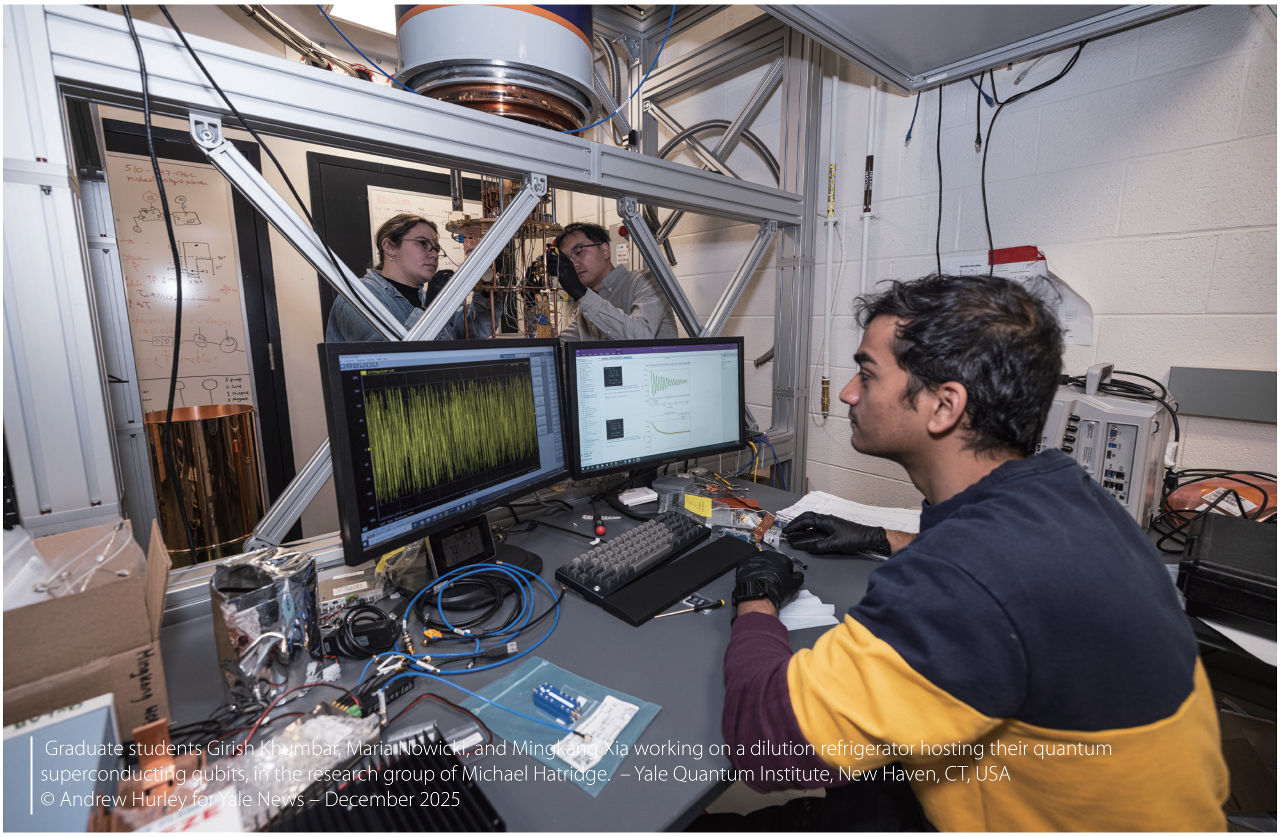
Retention pressures are closely connected to the availability of industrial opportunities and pathways for technology transfer. Forty-six per cent of respondents identified technology transfer and commercialization as a key area of opportunity. As countries move from research towards commercialization, the talent base required broadens beyond academic researchers to include applied engineers, entrepreneurs, industrial R&D staff, laboratory technicians, and product and business development professionals. Where such roles and supporting mechanisms remain underdeveloped, talent is more likely to move to countries and regions with more mature industrial bases and stronger technology platforms.

Training and retention do not move together everywhere

Expanding academic training does not automatically translate into stronger retention (Figure 5-10). In Eastern Europe and in Africa and the Arab States,

Figure 5-10. Reported brain drain intensity in relation to academic training coverage, workforce upskilling coverage, and interest in quantum science and technology, by region. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.





Graduate students Girish Khumbar, Maria Nowicki, and Mingkang Xia working on a dilution refrigerator hosting their quantum superconducting qubits, in the research group of Michael Hatridge. – Yale Quantum Institute, New Haven, CT, USA
© Andrew Hurley for Yale News – December 2025

broader academic training coverage coexists with higher reported brain drain intensity. In Western Europe, Asia and the Pacific, and Latin America and the Caribbean, the relationship is reversed: higher training coverage is associated with lower brain drain intensity.

A similar regional contrast appears for workforce upskilling. In Western Europe, Asia and the Pacific, Eastern Europe, and to a lesser extent Latin America and the Caribbean, higher upskilling coverage is associated with lower brain drain intensity. In Africa and the Arab States, the relationship remains positive, indicating that training expansion may be outpacing the domestic availability of stable and attractive career pathways.

The relationship with reported interest in quantum science follows a comparable pattern. The negative association is strongest in Latin America and the Caribbean and is also visible in Asia and the Pacific and Eastern Europe. In Western Europe and North America, the relationship is weakly positive; in Africa and the Arab States, it is modestly positive. Where research systems, industry opportunities and applied career tracks remain limited, stronger training or interest can coincide with greater outward mobility rather than stronger domestic retention.

What respondents identified as constraints

Respondents pointed to a recurring disconnect between education and sustainable careers. Recurring concerns included:

- 1.Lack of Exposure: Restricted collaboration limits researchers' access to diverse projects and institutions, which is vital for building a robust and flexible career path.
- 2.Career Mobility Barriers: A lack of training in these professional skills makes it difficult for researchers to transition into leadership, secure funding, or succeed in managerial roles within the industry—essential steps for career advancement.
- 3.Geographic Barrier: Career pathways are heavily restricted to institutions with expensive infrastructure, creating a significant challenge for talented individuals whose academic or geographic location prevents them from accessing a competitive career trajectory.
- 4.Retention: Existing pathways are not sustainable (e.g., lack of permanent faculty

positions, limited industry openings, non-competitive salaries), causing talent to leave the field.

Mitigating brain drain in quantum talent therefore requires more than expanded recruitment and training. It requires improving career sustainability and domestic absorption capacity, including stable research positions, mid-career progression opportunities, a broader range of applied and engineering roles, inter-institutional collaboration platforms, and international cooperation mechanisms that support talent mobility and skills exchange. These observations are based on a survey sample with limited regional sub-samples and do not establish causal relationships, but they consistently point to retention as a structural challenge alongside training provision.

5.5. Quantum education and training: provision and gaps

Demand for quantum education is rising, but provision remains uneven and constrained by infrastructure and collaboration gaps. Although educational opportunities are expanding, respondents identified persistent shortcomings in the coverage and practical relevance of existing resources. Structured pathways for skills development and applied learning remain less developed than formal education, making it more difficult to translate foundational knowledge into operational capability.

Programme coverage is concentrated in a relatively small number of countries (Figure 5-11). A wide group of countries reported limited or no provision, particularly across parts of the Global South. Even in countries reporting some provision, coverage is uneven across academic levels and across the balance between formal academic programmes and applied skills development.

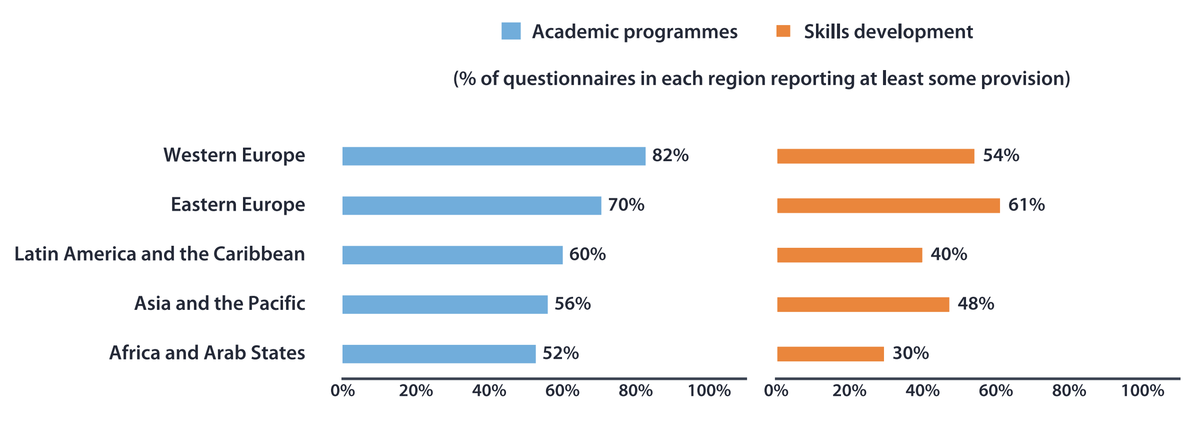
Reported priorities for strengthening education and training

Respondents identified clear priorities for action. Multiple selections were permitted; percentages reflect the share of respondents identifying each priority:

- programmes to attract, develop and retain high-calibre researchers (52 per cent);
- dedicated education and training resources for students and teachers (41 per cent);
- expanded opportunities for practical research experience (40 per cent).

These priorities point to action on three fronts simultaneously: strengthening curriculum design and faculty support; establishing more systematic and replicable training and mentorship pathways; and providing broader opportunities for practical

Figure 5-11. Coverage of Quantum Academic and Skills Development Programmes, by UNESCO Region



research and engineering experience through shared facilities, internships and project-based learning.

Trends from adjacent learning communities

Learners are increasingly entering the field through shorter, practice-oriented routes. The 2025 Quantum Open Source Software Survey[3] by the Unitary Foundation, which had over 1,000 respondents, revealed a significant trend: individuals with Master's degrees surpassed those with PhDs for the first time in the survey's four-year history[4].Both findings — UNESCO's emphasis on practical training opportunities, and the QOSS Survey's shift towards earlier-career entry — reinforce the case for widening access to applied learning environments beyond a small number of well-resourced institutions. Respondents to the QOSS survey cited similar reasons for joining more community-led, open-source learning opportunities with "Learning, Mentorship, and Training" being the top motivator and videos and digital education text resources being the main avenue of learning at this moment.

The reach of education and training opportunities is increasingly dependent on knowledge-sharing and partnership mechanisms. Around one-third of respondents view knowledge-sharing platforms and industry partnerships as priority opportunities, while 46 per cent regard technology transfer and commercialization as avenues for industry-linked outreach. However, 33 per cent of respondents reported that channels for cross-institutional or international collaboration are currently limited, restricting the reach of existing quantum centres and confining their work to a smaller set of well-connected institutions. Where under-represented groups face barriers to entering or remaining in the field due to limited resources, opportunities or career pathways, the long-term talent base will narrow accordingly.

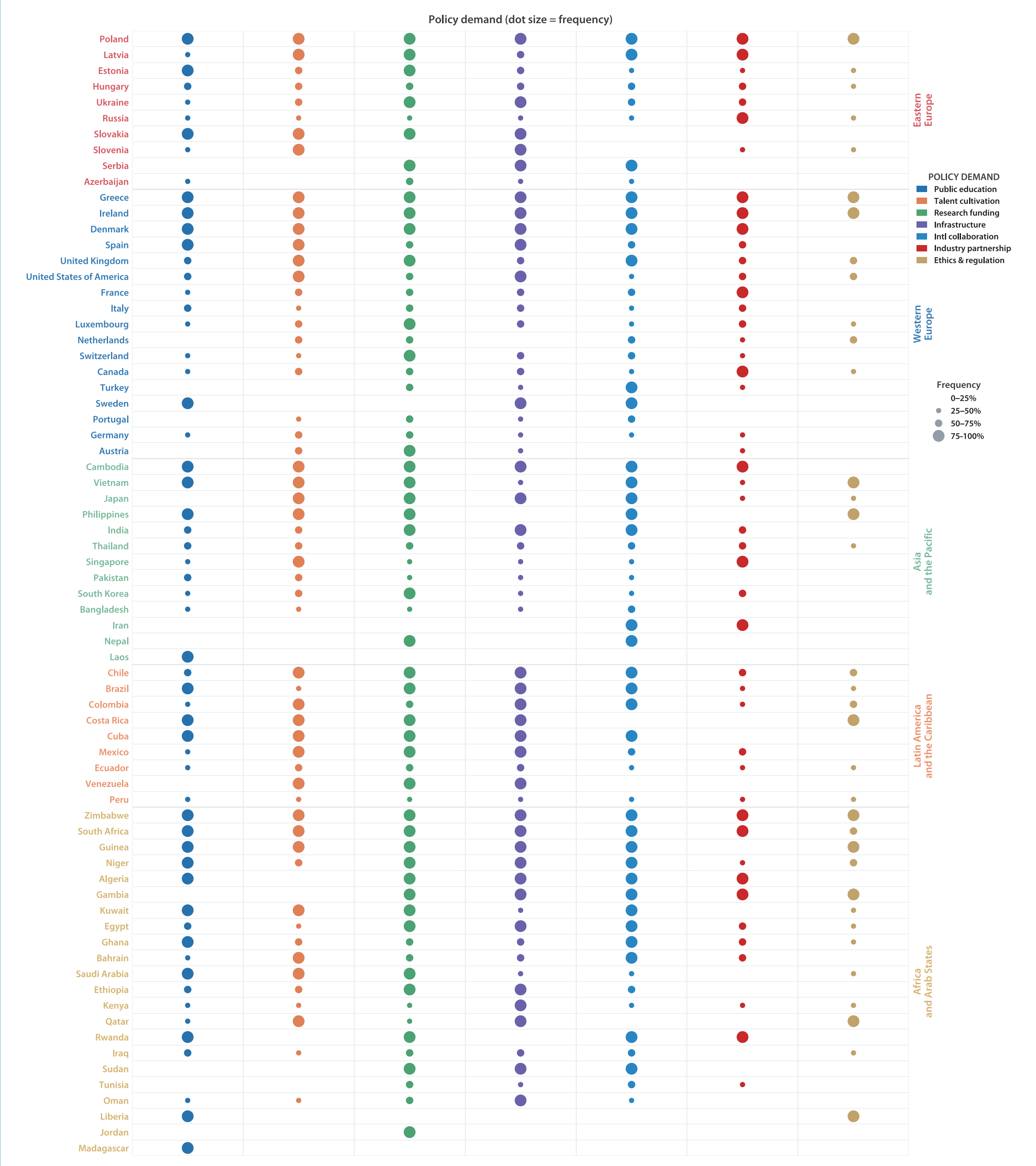
5.6. Policy priorities, funding and research stages

This section summarizes respondents' views on the policy and governance priorities for advancing quantum science and technology across countries and regions. Four interrelated dimensions are examined: policy priorities, the distribution of activity across the research-to-application chain, the corresponding collaboration patterns, and the structure of funding sources.

The data in the figures are presented at the country level. The size of the dots indicates the frequency with which respondents from that country selected a particular option. The results should be regarded as observations from the survey sample. Findings

A member of the Nano-Assembly 1 team
© Sophie Derrien / C12 Quantum Electronics

Figure 5-12. Country-Level Policy Demand Priorities, with Dot Size Reflecting the Frequency of Mention within each country sample. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.

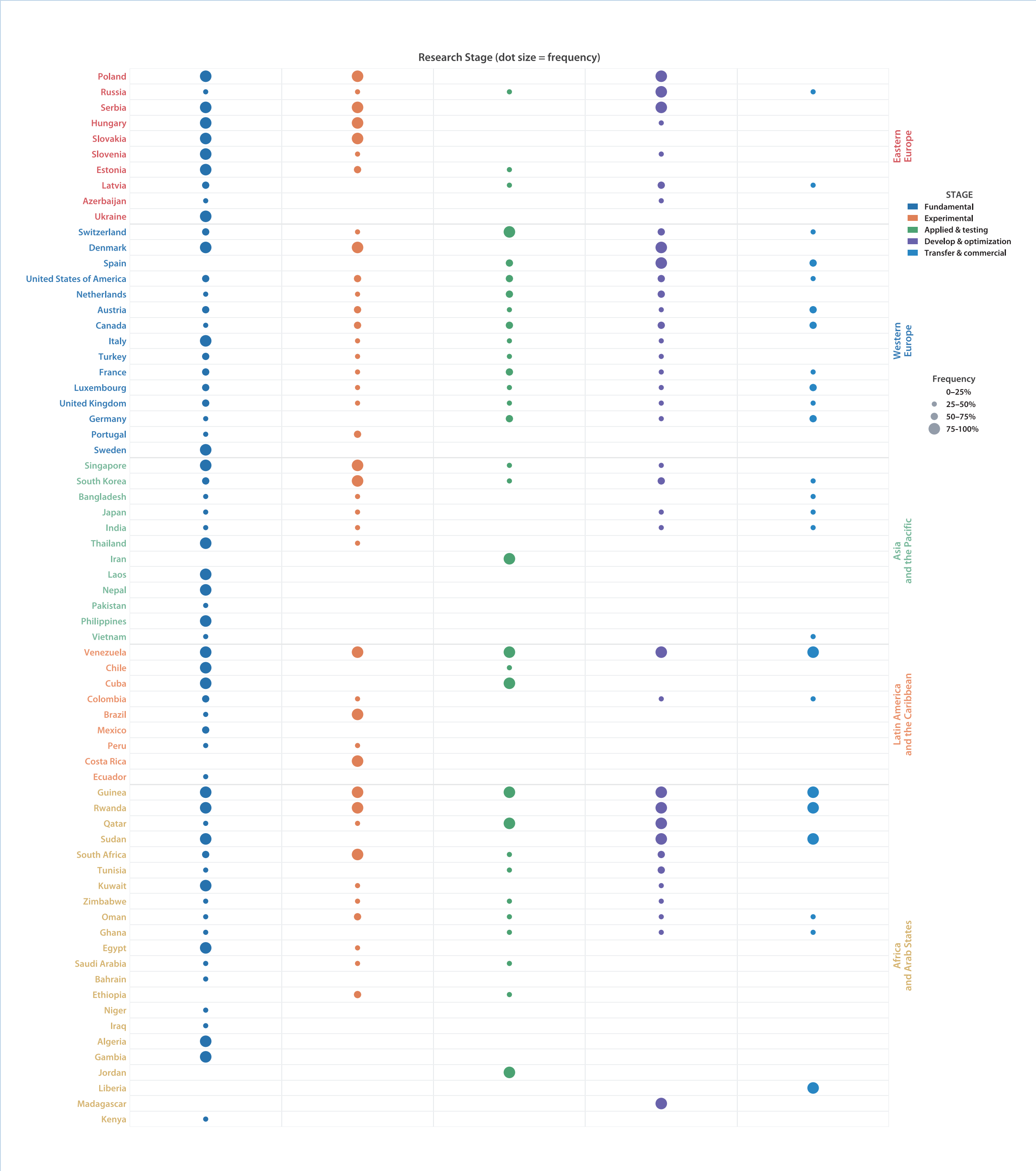


are observations from the survey sample and are useful for identifying indicative patterns and relative priorities; they do not constitute a direct measure of national policy positions.

Policy priorities across regions

Across all regions, respondents most frequently prioritize public education, talent development, research funding, research infrastructure, and international cooperation (Figure 5-12). The relative emphasis varies. In many countries across Africa, the Arab States, Asia and the Pacific, and Latin America and the Caribbean, demand signals are concentrated on foundational enablers — education, talent, infrastructure and international cooperation. In parts of Europe and North America, alongside these foundational priorities, industry

Figure 5-13. Country-level distribution of quantum-related activity along the research-to-application chain. Dot size reflects the frequency of selection within each country sample. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.



partnerships and ethics and regulation appear more prominently in a number of countries. The pattern is consistent with differences in the maturity of national quantum activity and the extent to which policy agendas already engage with later-stage development, diffusion and governance.

Research stages and the development chain

This survey groups quantum-related activities into a simplified chain, covering basic research, experimental research, application and testing activities, development and optimization, and transfer and commercialization (Figure 5-13). Across most countries, signals were most frequent for early-stage activity, while signals related to transfer and commercialization were rarer and tended to appear in lower-frequency ranges. The investments, institutions and mechanisms required to convert quantum research into scalable technology pathways remain concentrated in a limited number of countries.

Regional comparisons indicate that this pattern is uneven. In parts of Europe, signals from later stages such as development and optimization, and transfer and commercialization, are more visible across multiple countries. In many countries across Africa, the Arab States, the Asia-Pacific region, and Latin America and the Caribbean, reported activity remains concentrated in the early stages.

Collaboration patterns

The collaboration landscape mirrors the stage distribution (Figure 5-14). In most countries, reported collaboration is primarily research-led, centred on academic and research institutions. In a smaller set of contexts, the coexistence of research and industry partners is more visible — consistent with a more developed research-to-application chain. Where reported activity is concentrated in earlier stages, collaboration is more commonly centred on academic and research institutions; where later-stage signals are more visible, industry participation and research–industry collaboration tend to appear together.

These patterns indicate that in many contexts, policy frameworks need to complement foundational measures on education, talent and infrastructure with more systematic support for translation pathways, applied collaboration channels, and mechanisms enabling movement from research to development and deployment.

Funding structures

Government funding and international funding are the most commonly reported sources, reflecting the central role of public investment and cooperation-based channels (Figure 5-15). Private and industry funding, while prominent in some countries, is more selectively distributed overall. Defence and security-related funding is concentrated in a smaller number of countries.

Read together with the stage distribution in Figure 5-13, these patterns indicate that quantum development in most contexts continues to rely on sustained public investment and international cooperation to underpin foundational research and capacity building. The more selective distribution of private and industry funding is consistent with the uneven availability of translation and commercialization pathways across countries.

Figure 5-14. Quantum Collaboration Patterns by UNESCO Region: Distribution of Country Profiles

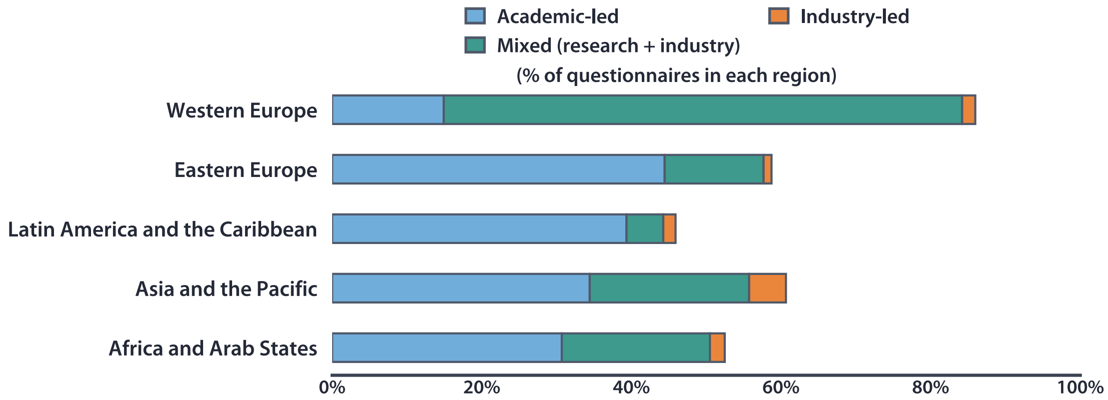
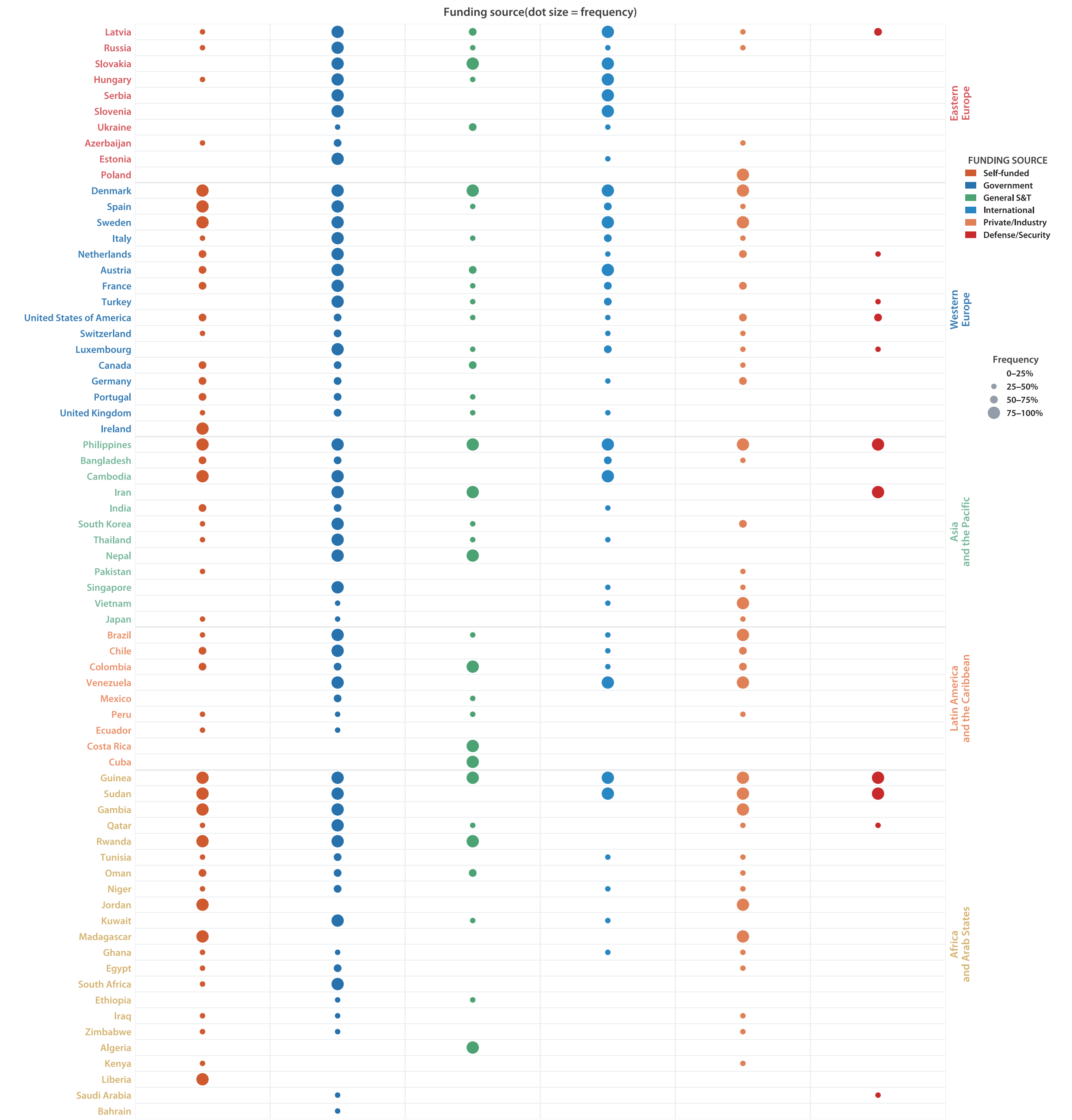


Figure 5-15. Country-level distribution of funding sources for quantum-related activity, by region. Dot size reflects the frequency of selection within each country sample. Source: UNESCO Global Quantum Research and Infrastructure Survey, 2025.



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Endnotes

1. See: https://unitary.foundation/posts/2025_survey_results/
2. See: https://unitaryfoundation.github.io/survey-2025/#educational-background

Chapter 6

Critical gaps in infrastructure, policy and human capacity

Global momentum in quantum science and technology are increasing, yet access, participation, and capacity remain uneven across and within regions. Persistent disparities in infrastructure, policy readiness, and human development continue to shape who can engage meaningfully in quantum research, training, and innovation, and on what terms. These gaps are not separate constraints. They interact with one another and are further influenced by broader enabling conditions, including digital connectivity, education and training systems, financing, and institutional coordination.

6.1. Infrastructure disparities

Infrastructure disparities in quantum science do not reduce to differences in equipment access alone. It is important to examine how access to quantum relevant infrastructure and enabling conditions varies across regions, as these differences shape both the development of local workforces and the trajectory of research and, eventually, commercialization efforts. The infrastructure considered in this study includes high performance computing (HPC) resources for quantum algorithm simulation and validation, quantum computing hardware, access or purchase rights to cloud-based quantum computing platforms, quantum communication test platforms, and quantum sensing experimental equipment. It also includes the enabling conditions required for effective and sustained use of such resources, including reliable internet connectivity, stable electricity supply, maintenance and technical support capacity, and procurement and repair pathways.

Figure 6-1. Quantum-relevant infrastructure access within a region as a percentage of responses from each region. Cloud-based quantum computing refers to access or purchase rights to the technology and HPC indicates availability of the resource for the purposes of exploring quantum algorithms or simulation.

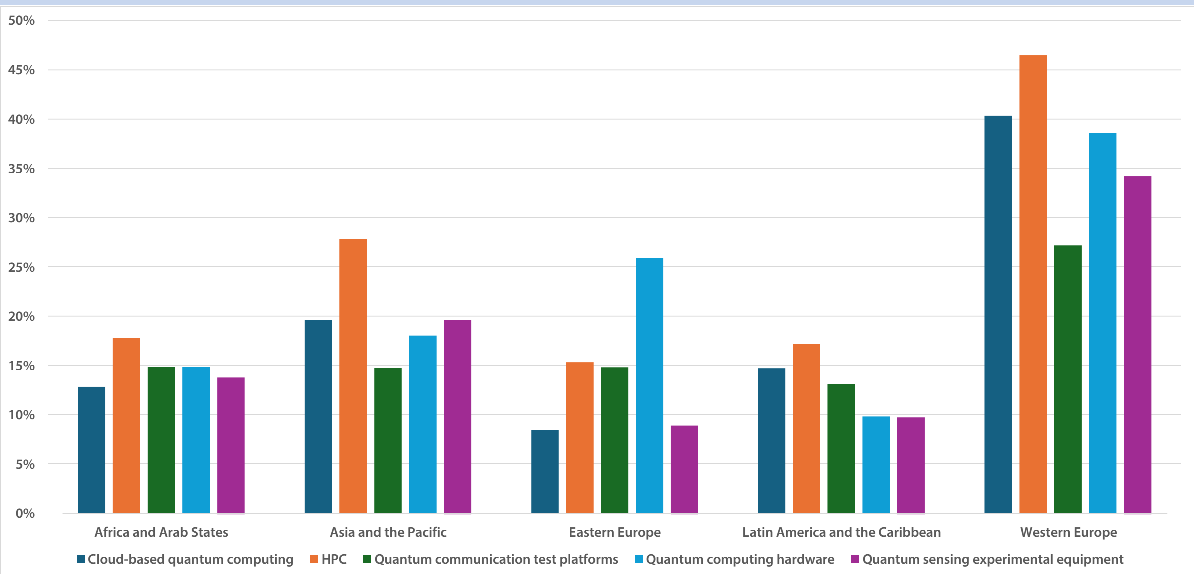


Figure 6-2. Responses indicating no relevant infrastructure facilities or that the facilities are not applicable by region.

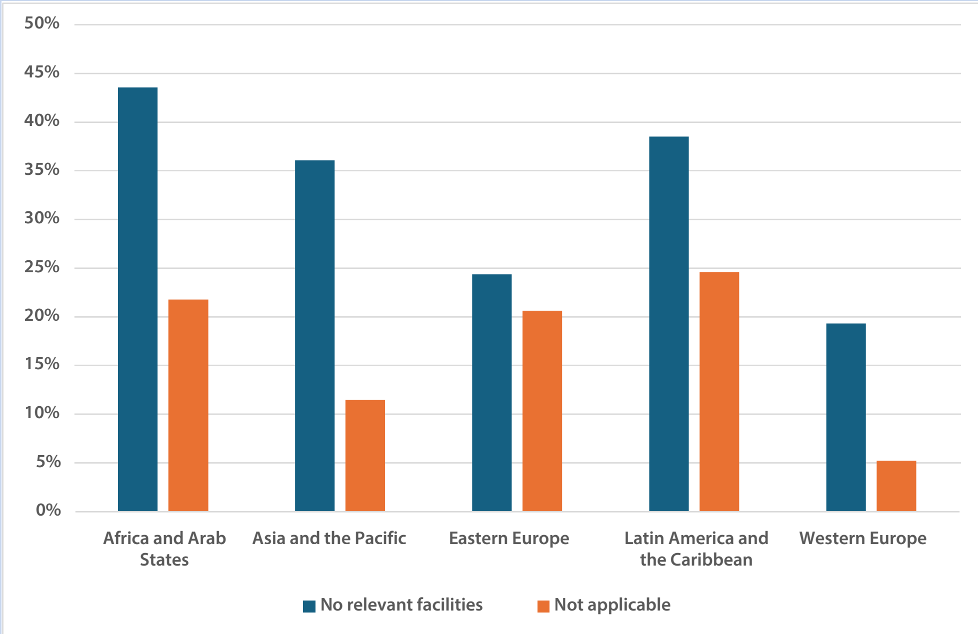
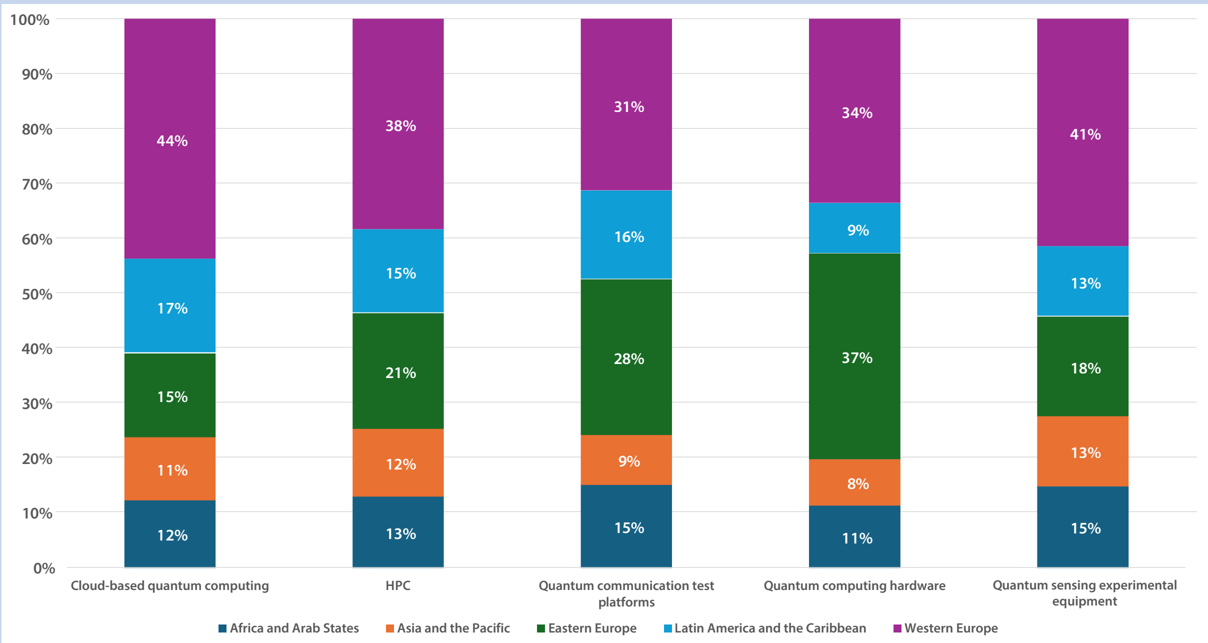


Figure 6-2. Quantum technology infrastructure access by region.



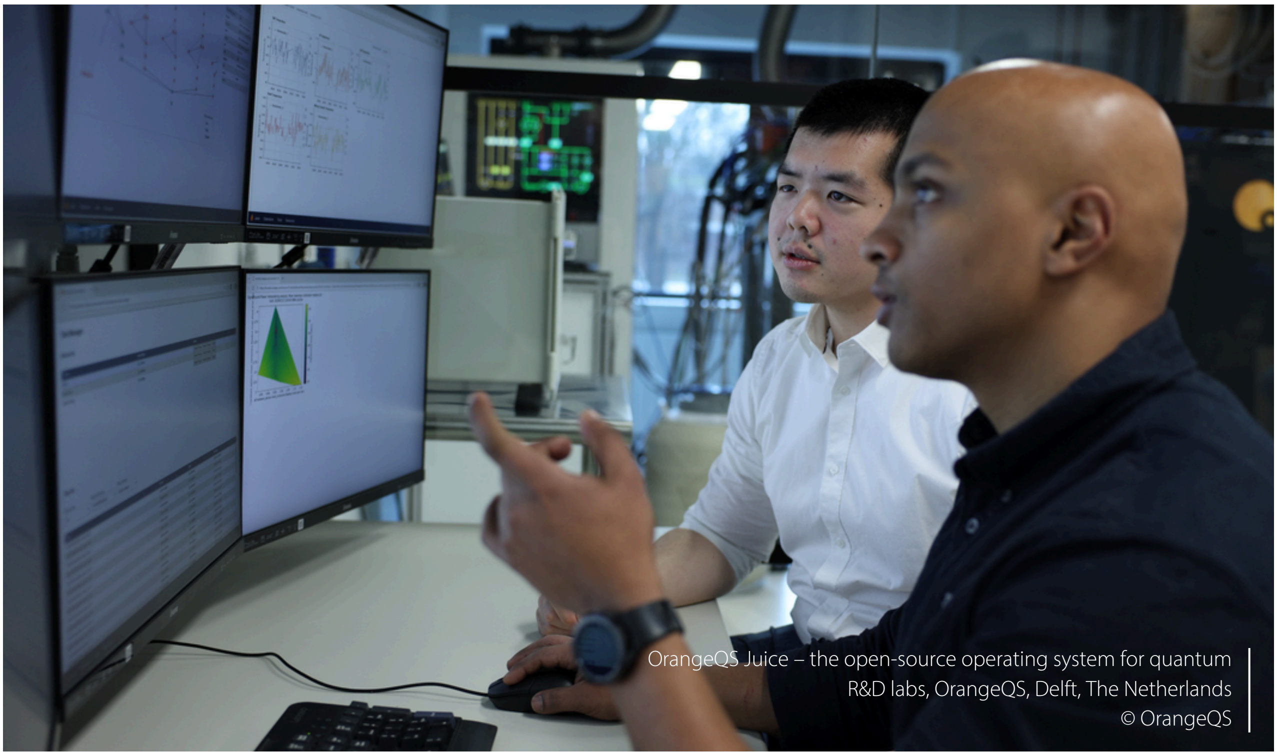
HPC is the most widely reported form of infrastructure access across the globe and was noted as the predominant resource available to respondents everywhere except Eastern Europe, where it is marked as the second highest next to quantum computing hardware. It is important to keep in mind that these statistics represent the response to one survey, they are not prescriptive of the entire region. Interestingly, 72 per cent of responses from Eastern Europe are representatives of non-quantum fields ranging from administration to applied mathematics, artificial intelligence, and applied physics. Of the respondents from Eastern Europe who self-identified as part of quantum science and technologies, 28 per cent are in quantum computing and 32 per cent in quantum communications. It is possible, then, that the other respondents, while not identifying as quantum practitioners for the sake of the survey, may be at institutions with access to quantum computing hardware. If these results are representative of the region's quantum-related infrastructure, then that may show Eastern Europe is currently more involved in the building of quantum computing hardware than the applications end, which often requires classical HPC resources. Given that classical HPC is a well-established technology that is central to many industries and fields of research, its dominance across the rest of the regions may not be surprising.

Interestingly, quantum communication test platforms represent around 15 per cent of responses from all regions except Western Europe. In Africa and Arab States, it is tied with availability of quantum computing hardware. In Eastern Europe and Latin America and the Caribbean, it is the third most common resource, closely trailing behind HPC and access to cloud-based quantum computing in each respective region. In Asia the Pacific, and Western Europe, it is the least available quantum infrastructure; however, even as the least available infrastructure in Western Europe, a higher percentage of respondents from that region have access to quantum communications testing platforms than most respondents from any other region due to any other resource. In general, the region of Western Europe dominates in terms of broadest access to a diverse suite of quantum tools. The only infrastructure where Western Europe comes in second place for access is quantum computing hardware, which is led by Eastern Europe.

In Western Europe, access or purchase rights to cloud-based quantum computing is more common than direct quantum computing hardware. This is also true in Latin America and the Caribbean and Asia and the Pacific. Whereas in Africa and the Arab States and Eastern Europe, on-premises quantum computing hardware is more accessible. Aside from Western Europe, access to cloud-based quantum computing hovers around 12 per cent in all other regions with a smaller deviation compared to most other resources.

Cloud-based access lowers entry barriers but does not, on its own, deliver equitable participation. The survey results indicate that cloud-based quantum computing can support initial engagement with the field — particularly for students and stakeholders building familiarity, and as a basis for early national strategy work. Sustained use, however, typically requires paid subscriptions. Without financial support, free cloud access addresses only the initial barrier to entry, and recurring access costs can become a significant constraint over time.

More fundamentally, cloud-based access depends on enabling conditions that are themselves unevenly distributed. In one interview, a participant from Nigeria reported that all quantum computing work in the country is cloud-based because no domestic hardware is available. This became a challenge during a student-organized hackathon: organizers had to offer their own personal data



OrangeQS Juice – the open-source operating system for quantum R&D labs, OrangeQS, Delft, The Netherlands
© OrangeQS

access so that participants could connect to cloud-based systems, as not all participants had reliable internet access. Nominal cloud availability does not translate into equitable participation where electricity, bandwidth, data costs and connectivity reliability remain uneven.

In the same way that internet connectivity is necessary for cloud access to quantum computers, quantum technologies often do not operate in isolation from their classical counterparts. Quantum computing, in particular, places strong emphasis on hybrid compute architectures involving both classical HPC and quantum systems. Regions with greater and more stable access to non-quantum infrastructure, including HPC and internet connectivity, and which are also strengthening support for newer quantum technologies, whether through cloud-based or on premises-access, are likely to see greater returns from their investments in quantum. More broadly, effective use of quantum infrastructure depends on a wider support ecosystem, including stable power supply, technical maintenance capacity, equipment servicing arrangements, and institutional procurement systems that can sustain operation over time.

Given this potential and the necessity of financial support, respondents emphasized the importance of establishing a global fund to support dedicated infrastructure development and long-term training in the Global South. They expressed concern that, without such support, the global divide in access to quantum technology would widen further as other regions continue to make progress. Feedback from the interviews also indicated that infrastructure financing would be significantly more effective if supported by operational continuity.

6.2. Policy and governance gaps

Many countries remain in early stages of quantum policy formulation. According to tracking data from the Organisation for Economic Co-operation and Development (OECD), as of November 2025, only 18 OECD member states and the European Union had adopted national quantum strategies (OECD, 2025). The gap is therefore not only one of policy adoption — it is one of policy coordination. Where strategies exist, their effectiveness depends on alignment with adjacent policy domains; where strategies do not yet exist, the conditions for effective formulation rest on the same coordination challenges.

At the national level, the central weakness reported

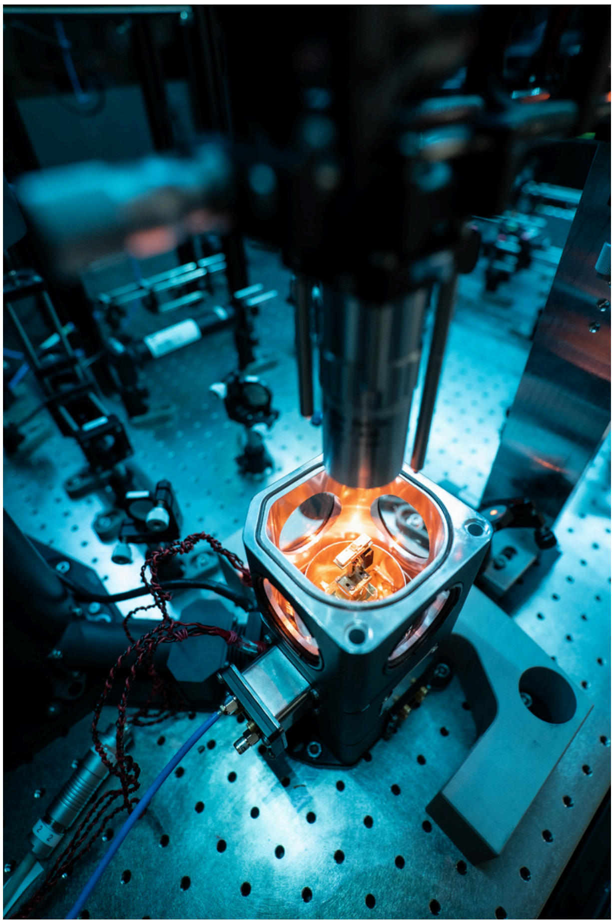
Quantum Open House participants explore superconducting levitation and the physics of quantum locking through hands-on demonstrations.
© Alin Mesaros / Photo provided by: Purdue University, Department of Physics and Astronomy

by respondents is the disconnect between adjacent policy domains. Education and training policies may expand the provision of STEM education yet lack quantum-related content and practical experience. Research policies may support scientific centres yet fail to provide sustained support and funding. Digital policies may improve connectivity and data infrastructure, but research and educational institutions involved in quantum learning and experimentation may remain unconnected. Industrial and innovation policies may drive the development of cutting-edge technologies, yet mechanisms for attracting, retaining and facilitating the mobility of talent remain weak. Policies may appear to be advancing, while actual progress remains fragmented.

This coordination challenge becomes even more pronounced when access relies on cloud platforms and hybrid quantum-classical workflows. In such contexts, the effectiveness of policies is closely linked to broader digital readiness, including connectivity quality, affordability and the integration of high-performance computing. Reports from the International Telecommunication Union (ITU) indicate continued progress in network connectivity and affordability, yet they also confirm that the digital divide remains significant, including disparities between different income groups and regions, with network affordability and substantive access still unevenly distributed (International Telecommunication Union, 2024). Consequently, if a national quantum strategy fails to align with broader policy initiatives such as broadband access, digital inclusion, public research infrastructure and inter-institutional connectivity, the strategy may only be partially implemented.

At the regional level, the principal gap is a shortfall in cooperation mechanisms that can reduce costs, pool capacities and sustain continuity of participation. Regional frameworks can play a decisive role in shared infrastructure access, mobility pathways, joint training, qualification recognition, standards engagement, and coordinated financing, especially for countries that cannot build a full domestic quantum stack in the near term. The European experience illustrates the value of this layer. The European Declaration on Quantum Technologies commits Member States to collaborate on a common ecosystem, the Quantum Technologies Flagship links long-term research and innovation support, and EuroHPC is deploying quantum systems tightly coupled to supercomputers to enable hybrid workflows and broader access (European Commission, 2023). The European Quantum Communication Infrastructure (EuroQCI) aims to establish a secure quantum communication network across the European Union, combining terrestrial fiber networks with satellite systems to support secure data transmission for governments, institutions, and critical infrastructure (European Commission, 2026). However, the European Commission's 'European Quantum Strategy 2025' also clearly states that the fragmentation of strategies and roadmaps among Member States remains an ongoing challenge. In other regions, progress may be even slower (European Commission, 2025).

In Africa and other regions with uneven capacity distribution, the policy foundations exist but are not yet connected to a quantum-specific implementation pathway. The African Union Digital Transformation Strategy for Africa provides a coordinated ecosystem model built on foundational pillars including enabling environment and regulation, digital infrastructure, digital skills and human capacity, and digital innovation and entrepreneurship (African Union Commission, 2020). It also calls for regional collaboration, blended finance and dedicated



Electric readout of color centers in diamond for highly integrated quantum sensors, Walther Schottky Institute, Munich, Germany
© Christoph Hohmann / MCQST

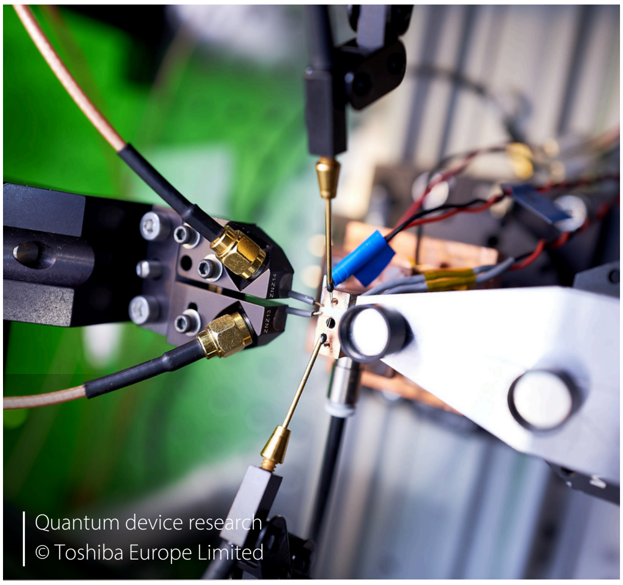
funding approaches for digital infrastructure and innovation support, which are highly relevant to future quantum readiness where national markets and budgets are limited. Complementary policy documents such as African Union Data Policy Framework (AUDPF) also establish a continental vision for harmonized data governance aimed at strengthening national data systems, enabling secure cross-border data flows, and supporting the development of an integrated digital economy across the continent (African Union, 2022). Within this framework, African Union Member States are encouraged to promote research, development, and innovation in data-driven technologies, including big data analytics, artificial intelligence, and quantum computing. STISA 2034 provides a second major policy anchor. It explicitly situates Africa within ongoing global technological change, including quantum sciences, and places strong emphasis on frontier and emerging technologies, collective action, pooling of resources, science diplomacy and partnerships, open science practices, and implementation across Member States, Regional Economic Communities and wider stakeholders (African Union Commission, 2025). These are highly relevant building blocks for quantum policy development. What remains absent is a practical implementation mechanism that translates these overarching frameworks into concrete action in the quantum domain.

At the international level, several relevant frameworks already exist — but their connection to quantum-specific objectives remains underdeveloped. The international community has in fact established several relevant frameworks and cooperation platforms centred on open science, digital inclusion, development finance, capacity building and global digital governance. These frameworks provide the foundation for more equitable access to knowledge, resources and digital capabilities, and are closely linked to many of the prerequisites for participation in the quantum field. UNESCO's Recommendation on Open Science provides a global normative framework oriented towards more inclusive and equitable science and explicitly links open science to bridging knowledge and technology gaps (UNESCO, 2021). The ITU Partner2Connect Digital Coalition and the ITU UNESCO Broadband Commission demonstrate that there are active international platforms for mobilizing partnerships, policy attention, and financing around universal and meaningful connectivity, which remains a foundational condition for cloud-based and network-dependent quantum participation (International Telecommunication Union, 2024).

The UN Pact for the Future and its annexed Global Digital Compact further strengthen the international policy basis for inclusive digital cooperation, including commitments on digital development and governance (United Nations, 2024). Although still in its early stages, the UN Internet Governance Forum (IGF), through the Policy Network on Artificial Intelligence (PNAI) is expanding discussions on the need for early policy coordination on quantum–AI convergence, including quantum-resilient cybersecurity, post-quantum cryptography standards, and cross-border data security frameworks (Policy Network on Artificial Intelligence, 2025).

These frameworks are not yet systematically connected to quantum-specific capacity objectives — including specialized skills pipelines, research access pathways, laboratory readiness, standards participation, and long-term institutional capability building. The result is a growing risk that quantum initiatives evolve in parallel with digital inclusion and science capacity frameworks, rather than drawing on them strategically (Metwalli *et al.*, 2026).

Closing this policy coordination gap requires action across all three levels. National coordination is needed to connect education, research, digitalization, industry and talent measures into coherent delivery pathways. Regional cooperation mechanisms are needed to make shared access, mobility, joint training, and standards-related participation more feasible and affordable. International support frameworks are needed so that quantum readiness can draw more systematically on existing instruments for digital inclusion, open science, internet governance, science diplomacy and development financing.


Quantum device research
© Toshiba Europe Limited

Handling a quantum chip under a microscope
© Sophie Derrien / C12 Quantum Electronics

6.3. Human capacity: A pipeline under strain

The human capacity gap in quantum science and technology is a systemic issue, with discontinuities at every stage — entry, learning, practical training, commercialization, and retention (Metwalli *et al.*, 2026; El-Adawy *et al.*, 2025a).

Specialized education provision remains insufficient and poorly linked across stages of learning. Recent research indicates that although global quantum education is expanding rapidly, it remains largely fragmented overall, lacking sufficient coordination in terms of regional coverage, educational stages, curriculum coherence and competency frameworks; it is therefore better understood as a non-linear educational ecosystem rather than a linear talent pipeline (Metwalli *et al.*, 2026). Even where some countries and institutions have begun offering quantum courses, learners still face significant gaps as they progress from early interest and initiation to systematic study and professional development (Metwalli *et al.*, 2026; El-Adawy *et al.*, 2025a; Krijtenburg-Lewerissa *et al.*, 2017). The UNESCO survey reinforced that respondents have a clear need for stronger specialized education and training resources, particularly in curriculum support, mentoring mechanisms, and systemic resources for students and faculty.

The most acute bottlenecks lie in practical training, skills transfer and industry engagement. Hands-on learning, research exposure, internships, shared facilities and project-based learning remain significantly weaker than formal curriculum delivery, while industry places particular emphasis on experimental experience, software proficiency, system design, team collaboration and practical skills relevant to real-world technical scenarios (Fox, Zwickl and Lewandowski, 2020; UK Quantum Skills Taskforce, 2025). Industry expectations of higher education are also increasingly shifting towards more targeted quantum awareness courses, practical projects and transformative training for students from diverse disciplinary backgrounds, rather than merely traditional research-oriented training (Fox, Zwickl and Lewandowski, 2020; El-Adawy *et al.*, 2025b). The gap between formal education and real-world application is therefore both substantive and persistent.

Inadequate teacher preparation is a fundamental constraint on the expansion of quantum education. The effectiveness of quantum learning depends heavily on educators, yet most teachers lack systematic training in quantum science (Krijtenburg-Lewerissa *et al.*, 2017;

Ghimire *et al*., 2025). Existing professional development programmes provide useful support, but their coverage and scale remain limited (Ghimire *et al*., 2025). At secondary and early undergraduate levels, teaching strategies, assessment tools and pedagogical research on quantum concepts also remain underdeveloped, further constraining the expansion of quantum content to earlier educational stages and to wider audiences (Krijtenburg-Lewerissa *et al*., 2017; Halfhill *et al*., 2026).

Educational expansion alone does not translate into talent retention. Talent loss is not primarily a problem of insufficient training; it is linked to limited local industrial opportunities, technology transfer pathways, applied roles, compensation conditions, long-term positions and career progression routes (UK Quantum Skills Taskforce, 2025). Where the research, engineering and industrial systems cannot absorb trained personnel, expanded training can coexist with increased outflow. Without a broader range of applied and engineering roles, clearer mid-career progression, and cross-institutional practical platforms, training systems remain prone to a "train and lose" cycle.

Quantum capacity building should extend beyond students and researchers to encompass educators, industry practitioners and policymakers. As quantum technologies advance, the demand for working understanding of the field is rising simultaneously across education, business and policy (Seskir, Z. C. *et al*, 2022). Higher education has a role not only in preparing students for entry into the quantum sector, but also in supporting the retraining of current employees through short courses and bespoke training programmes. Future capacity-building frameworks should therefore include a broader range of professionals — teachers, engineers, technicians, managers and public sector staff — alongside the conventional research and student audiences.

Quantum literacy for non-specialist audiences remains underdeveloped. Quantum technology remains abstract for the public, and accessible materials are still limited — yet public engagement and quantum literacy are widely regarded as essential pathways for broadening participation, establishing a common language, and supporting long-term talent development. Games, interactive tools, visualizations and narrative-based approaches are valuable not only because they are more engaging, but because they lower the cognitive threshold for entry, helping students, teachers, the public and policymakers to develop a working "quantum intuition" and creating entry points for more formal learning and engagement. Talent and human capacity development therefore cannot be understood through the lens of formal education alone; quantum literacy and public engagement are integral elements of a broader capacity-building agenda.

UNESCO's Role in Reducing the Quantum Divide: Advancing Global Innovation and Inclusion, at the Opening Ceremony of the International Year of Quantum Science and Technology (IYQ 2025), at UNESCO Headquarters.
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The Quantum Jubilee included aerial performances by Los Angeles-based cirque company Le PeTiT CiRqUe.
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Chapter 7: Priority areas for action

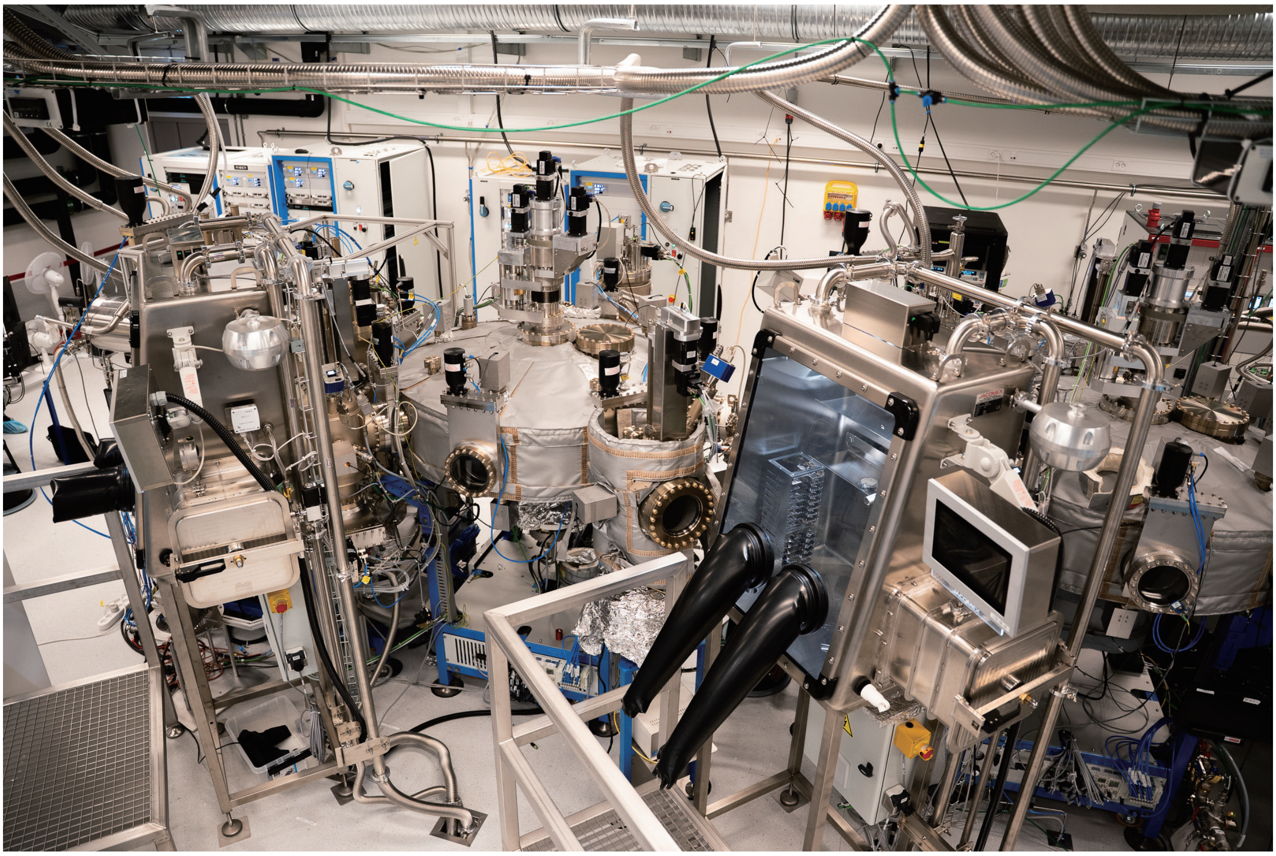
The structural gaps identified in Chapter 6 — uneven infrastructure and access conditions, fragmented education and skills pathways, weak coordination across policy and governance levels, and limited mechanisms for international cooperation — point to a set of priority areas where action in the next phase can shift the balance from awareness to capability. The quantum divide is not the product of resource disparities alone; it is the cumulative effect of uneven technical conditions, institutional capacities, and cooperation structures. This chapter sets out six priority directions for action: technology convergence and access pathways; education, capacity building and talent development; infrastructure sharing and resource pooling; policy preparedness and multi-level cooperation; public value, inclusive innovation and the Sustainable Development Goals; and open science and knowledge sharing.

7.1. Technology convergence and access pathways

Quantum science is increasingly advancing through convergence with adjacent technology domains (EPO/OECD, 2025; OECD, 2025a). Across IYQ 2025, a consistent signal was that progress and adoption accelerate when quantum capabilities are integrated into existing digital and scientific infrastructures, including high-performance computing, cloud services, advanced photonics, microelectronics, and data-intensive methods such as artificial intelligence (EPO/OECD, 2025). This pattern shapes both research trajectories and the practical pathways through which institutions, educators, and innovators engage with quantum science, including in contexts where domestic hardware remains limited.

Hybrid workflows are emerging as the most strategic convergence point. In the near term, many practical use cases are expected to rely on combined classical and quantum computation, in which algorithm development, error mitigation, and benchmarking are undertaken within environments that depend on mature classical computing stacks. This makes the interface between quantum platforms and high-performance computing systems increasingly strategic, both for research productivity and for broadening access to hands-on learning. The 'South African Quantum Technology Initiative' promoted in recent years can be seen as an example. Its national framework centres on quantum computing, quantum communication, and quantum metrology, sensing and imaging, rather than engaging directly in a hardware race[1]. Cloud-based access models, when paired with structured training and shared resources, can also lower participation barriers by enabling institutions to develop skills and conduct experiments without the immediate requirement to build and maintain costly domestic infrastructure.

A second convergence point lies in the enabling layer of standards, metrology and interoperability (European Commission, 2023; European Commission, 2025). As quantum devices and services move beyond research laboratories, progress increasingly depends on reliable measurement, agreed terminology, common performance benchmarks, and compatible interfaces across systems. Emerging international efforts to harmonize measurement standards reflect a shift towards a more mature phase of quantum technology development, in which trust in performance claims and comparability across platforms become essential. From an inclusion perspective, such standardization work is consequential because it can reduce fragmentation, support knowledge transfer, and make it



One of Microsoft's quantum computing laboratories
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easier for new entrants to participate in internationally connected research and innovation networks.

For the next phase, three priorities follow from these convergence points: strengthening institutional capacity to operate hybrid quantum–classical workflows, particularly through partnerships that link emerging research communities with established HPC and cloud infrastructure providers; supporting access to cloud-based platforms paired with structured training, especially for institutions in resource-constrained contexts; and engaging actively in international standards and metrology processes, so that countries currently outside these processes can shape the frameworks that will govern the field.

7.2. Education, capacity building and talent development

As quantum technology enters phases of engineering, platform development and application exploration, the associated talent demands extend well beyond research roles. They include software developers, systems engineers, laboratory technicians, educators, and multidisciplinary professionals capable of bridging technology, industry and practical applications. Education, capacity-building and talent development must therefore be organized across multiple layers — spanning learning stages, balancing interdisciplinary training with practical orientation, and connecting foundational knowledge, specialized study, skills training and career development.

This direction is already emerging in practice. Universities are incorporating quantum computing, quantum information and quantum mechanics into physics, computer science and engineering curricula, and interdisciplinary degree programmes and minor courses are increasingly available. Some courses integrate linear algebra, quantum algorithms and programming using platforms such as Qiskit[2] and Cirq[3], supporting foundational skills for both academic research and industrial applications. Opportunities for experiential learning are also expanding: undergraduate research experiences, internships and summer schools have become standard components of quantum education, while industry and non-profit organizations contribute course resources, cloud access and mentorship.

A range of initiatives now demonstrates how quantum education is evolving towards greater inclusiveness, flexibility and application orientation. The Q-12 Education Partnership[4],QuSTEAM[5],DigiQ[6], QTIndu[7] and the IBM Asia Quantum Education Network span K-12 outreach, undergraduate curriculum development, vocational training and industry-focused skills enhancement, signaling that quantum education is no longer confined to a single educational stage or discipline (Quantum Flagship, 2023; IBM Quantum, 2025). For resource-constrained regions, decentralized learning networks are equally important. QWorld[8] and the Unitary Foundation[9] have lowered geographic and financial barriers through micro-grants, global online workshops and code-contribution-based learning models. MOOC course platforms such as OpenHPI[10],meanwhile, provide learners across different regions with opportunities to access course content and industry certifications. These approaches share a common feature: they all seek to open learning pathways to a wider audience and link capacity building with real-world application scenarios.

Despite this progress, practical implementation faces persistent obstacles. A disconnect remains between learning stages: the transition from intuitive conceptual learning at secondary school to highly mathematised quantum mechanics at undergraduate level represents a substantial increase in difficulty and is a frequent point of learner attrition. Teaching capacity is also a constraint — most primary and secondary teachers lack a background in quantum information science, which directly limits the expansion of quantum content into earlier educational stages. Many existing learning opportunities also remain oriented towards learners with strong mathematics or physics backgrounds, leaving young students, educators and non-STEM learners without accessible entry points.

Quantum talent development is shaped by four systemic requirements (UNESCO, 2025; UNESCO, 2021). First, it is highly interdisciplinary: effective participation typically requires expertise across physics, mathematics, computer science, engineering, materials science, electronics and information science. Second, it depends heavily on practical experience — hands-on experimentation, platform operation, project-based training and mentorship, all directly shape skills development. Third, the job market is expanding beyond research positions to include technical support, system operations and maintenance, curriculum development, application integration and industrial transformation roles. Fourth, retention depends on conditions beyond

Sebastian Blatt and Isabell Fritsche at Planqc laboratory work, Ulm Germany
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training: stable employment, growth opportunities and mobility pathways determine whether trained individuals remain in the field over time.

The priorities for the next phase follow directly from these requirements. Competency frameworks, curriculum mapping and clearer job-role definitions can align educational provision with future demand. Practical learning opportunities — shared facilities, virtual laboratories, internships, mentorship programmes, short-term boot camps, and cross-institutional collaborative projects — should be expanded systematically. Teacher training, technical staff development, interdisciplinary retraining and industry-oriented continuing education should be integrated into the same framework. Education policy must also be aligned with talent retention mechanisms: clearer career pathways, stable development opportunities, and support for early-career researchers, women in science, and other under-represented groups can reduce the risk that training is followed by outflow. Education and talent development remain among the most suitable areas for international cooperation through public goods and replicable mechanisms; the priority for the next phase is to bring these scattered initiatives within a more coordinated framework.

7.3. Accessibility of infrastructure and sharing mechanisms

Quantum research depends on physical infrastructure that is expensive, complex and maintenance intensive. As a result, capability has long been concentrated in a small number of well-funded universities, national laboratories and large corporations. Where this infrastructure remains closed, the broader uptake of quantum technology is constrained, and the quantum divide is reinforced. The priority for the next phase is to widen accessibility and establish cross-regional sharing arrangements through policy design, technological innovation and cooperation mechanisms.

An important approach to lowering the barriers to physical infrastructure is to appropriately separate the manufacturing, deployment and usage phases. Regarding quantum devices and related hardware capabilities, foundry models and open-source hardware solutions are attracting increasing attention. By providing high-quality devices or reusable technical modules in bulk through regional manufacturing centres or centralized platforms, more research teams can focus their resources on control methods, error mitigation, software development and experimental design, without having to bear the costs and risks associated with the entire hardware manufacturing chain. For resource-constrained nations and small-to-medium-sized research institutions, such arrangements can shift the entry barrier from capital-intensive hardware construction to the more accessible levels of R&D and application.

At a broader level, shared networks and regional clusters also offer another important pathway. The EuroQCI, promoted by the European Union, embodies a high-level approach to transnational infrastructure coordination, building a regional quantum communication network through the integration of terrestrial fibre-optic and space-based communication segments (European Commission, 2026). China's quantum secure communication backbone network has already been extended to over 12,000 kilometres, covering approximately 80 cities across 17 provinces and municipalities (Chen et al., 2025). For countries with relatively limited resources, cluster-based and shared innovation centres offers a more realistic option. Brazil's planned Rio Quântica network seeks to create a resource-pooling effect by connecting multiple research institutions (Revista Pesquisa FAPESP, 2024). India's National Quantum Mission has also adopted a relatively centralized thematic hub model, providing equipment and technical support to universities and start-ups nationwide (Department of Science & Technology, Government of India, 2025). A common feature of these approaches is the sharing of high costs through networked or clustered arrangements, thereby reducing the pressure on individual institutions to proceed independently.

At the same time, cloud access and quantum computing as a service are transforming how infrastructure is utilized. Users can access quantum processors or high-precision simulators via cloud platforms without needing to build expensive cryogenic and vacuum systems locally. This model significantly broadens access to experimentation and learning, enabling more countries and institutions to participate in quantum computing-related activities more rapidly. Further approaches based on service-oriented and abstracted management facilitate the seamless integration of quantum nodes into existing software systems, enterprise applications and public digital platforms. However, such pathways also have clear limitations. Reliance on a small number of multinational service platforms raises concerns regarding data sovereignty, national security, latency, service availability and supply chain concentration. Cloud access can lower entry barriers but cannot substitute for local capability development, and its equity depends on supporting conditions, such as edge computing, high-bandwidth networks and data exchange infrastructure, that remain unevenly distributed.

From a policy perspective, infrastructure access requires a more comprehensive framework. The objective is not only to build more equipment, but to design sustainable access pathways, support regional sharing and cross-institutional collaboration, promote the wider adoption of educational and training platforms, and balance cloud access with the development of local capability. For many countries, particularly across the Global South, a realistic objective is to enter the quantum field through shared facilities, cluster arrangements, educational hardware, cloud services and regional cooperation, and to build domestic capability on this foundation. Democratized infrastructure access and cross-regional sharing remain among the most critical conditions for closing the quantum divide.

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7.4. Policy preparedness and multi-level cooperation

At the national level, the priority is to strengthen policy preparedness — both within governments and across departments. A pragmatic starting point is to build basic understanding of quantum issues, support cross-departmental communication, and gradually develop the capacity to identify problems, set priorities and allocate resources. Policymakers themselves require capacity building. Quantum policy discussions cover technical assessment, industrial expectations, risk governance and the evolution of international rules; without a baseline of understanding and mechanisms for continuous learning, policy debate tends to remain at a theoretical level. Training for policymakers and public sector staff, cross-departmental learning arrangements, support for interpreting international agreements, and accumulation of knowledge on standards, ethics and governance issues should all be central to the next phase (UNESCO, 2025).

Regional cooperation is equally important, particularly for countries still in the early stages. Advancing quantum policy, capacity building and international engagement alone is costly; regional platforms can play a practical role through policy exchange, experience sharing, talent mobility, joint training and the coordination of priorities. Areas worth pursuing include regional policy networks, shared knowledge platforms, joint capacity-building projects, and integration with existing frameworks for scientific cooperation, digitalisation and open science (UNESCO, 2021; African Union Commission, 2025). North–South cooperation remains essential, but South–South and regional cooperation also require greater attention — these arrangements are often better suited to building sustainable cooperation among countries with similar development conditions and policy needs.

International engagement must focus more explicitly on capacity to participate. International discussions on standards, metrology, interoperability, ethics and responsible governance are expanding, yet the number of countries able to follow these issues consistently, formulate national positions and contribute to rule-making remains limited (OECD, 2025a). The next phase of international cooperation should support more countries in building this participation capacity — including

understanding the issues, tracking progress, organising domestic coordination, formulating policy judgements, and integrating scientific, industrial and diplomatic considerations into their engagement.

In a broader sense, policy readiness is a long-term capacity-building process involving awareness-raising, knowledge accumulation, institutional coordination, international engagement and subsequent implementation. Some countries and regions have begun to move in this direction, but the overall scope of participation remains limited, and disparities in capacity remain significant. Closing the gap requires action at the national, regional and international levels in parallel, so that more countries can engage with quantum issues substantively and over time.

7.5. Ethics, public value, inclusive innovation and sustainable development

Quantum science and technology are entering a phase in which research outcomes are increasingly expected to translate into applications, services, and innovation activities. This transition remains uneven, with investment, industry platforms, talent, and venture ecosystems concentrated in a limited number of regions. Many countries therefore risk being positioned primarily as adopters of externally developed technologies rather than contributors shaping problem definitions, standards, and market formation. In this context, strengthening innovation ecosystems has direct implications for capability-building and inclusion, and is closely linked to the quantum divide.

Innovation readiness is shaped by many of the same constraints that structure access to digital infrastructure and advanced skills — uneven funding streams, fragmented research communities, limited translational institutions, and narrow talent pathways favouring a small set of elite universities and firms (Jure, 2025). Survey data presented in Chapter 5 underline these patterns: 43 per cent of respondents identify shortages of skilled researchers and technical experts as a key bottleneck, while 37.8 per cent report limited collaboration channels, 30.7 per cent insufficient training support, and 28.6 per cent inadequate maintenance and operational expertise. These conditions inhibit technology transfer, joint development and proof-of-concept work, and constrain the entrepreneurship and industry engagement on which innovation pathways depend.

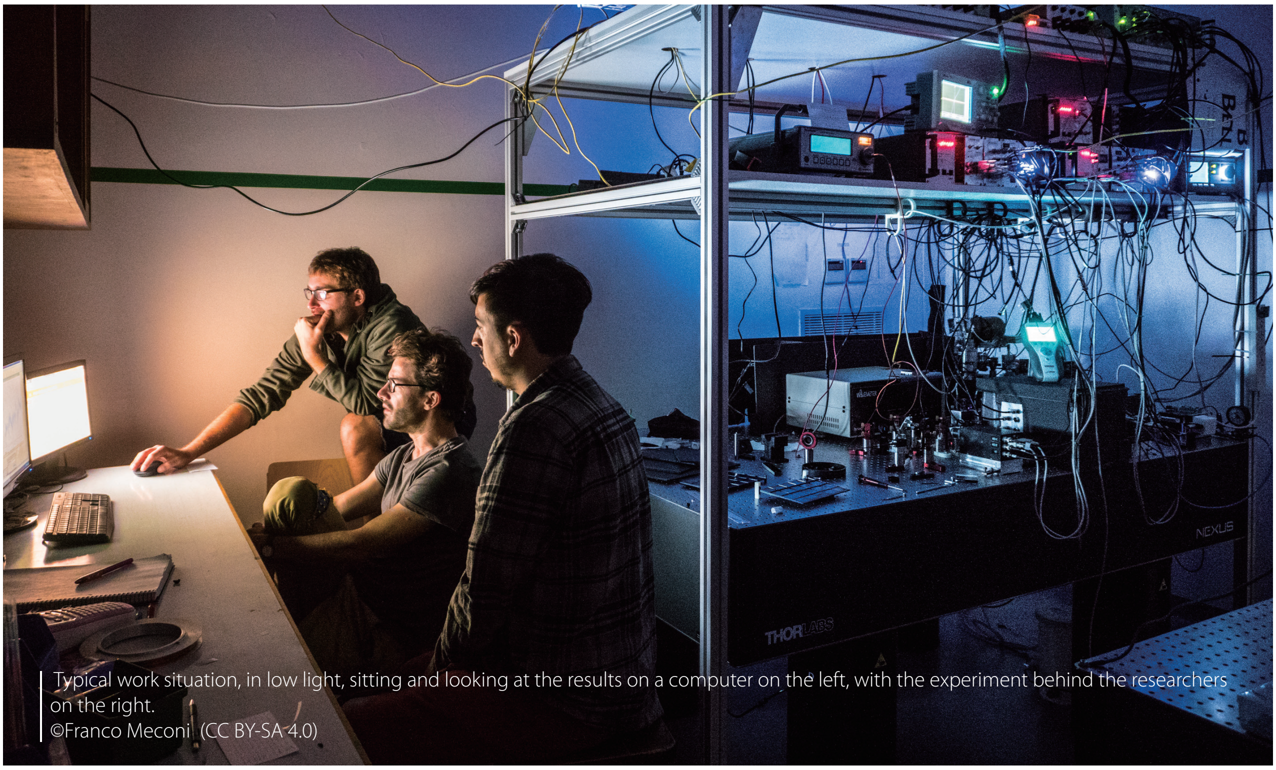
Government and public policy have a clearer role to play. Public sector support should extend beyond technical funding to setting strategic direction, establishing evaluation criteria and creating institutional incentives. Public R&D funding, tax incentives and infrastructure access can be paired with conditional arrangements linked to public value — for example, encouraging enterprises to develop applications addressing societal challenges, supporting the sharing of foundational technological capabilities within appropriate limits, and prioritising public-service applications.

Linking quantum research priorities to the Sustainable Development Goals provides one of the most direct entry points for quantum science to enter broader policy and social discourse. Application directions anchored in the SDGs are more easily connected to public needs and international cooperation objectives, and tend to attract more diverse research capabilities, funding and partnerships. They also offer scope for regional and national adaptation: applications oriented towards specific local needs can deliver localised solutions while drawing on internationally available resources (UNESCO, 2025).

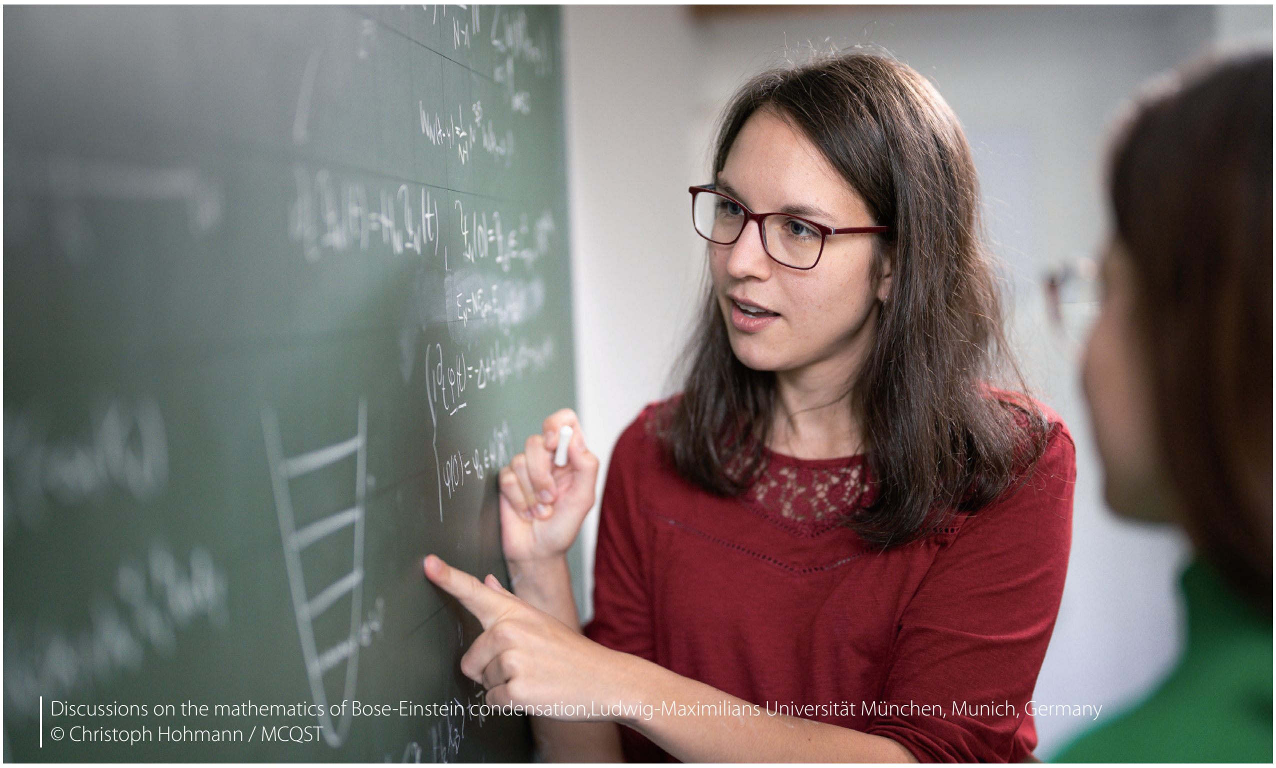
Three practical directions follow. First, innovation support should include capacity-building for translation and implementation — project design, proposal development, partnership-building — alongside technical skills. Second, shared infrastructure models, cloud and HPC access, and structured experimentation opportunities can provide lower-barrier environments for prototyping and joint testing, particularly where domestic infrastructure is limited. Third, application-anchored innovation platforms aligned with public-interest priorities can connect capability development with local demand and policy uptake. Taken together, these measures can strengthen the prospects that innovation contributes to closing the quantum divide rather than reinforcing existing concentration dynamics.

7.6. Open science and knowledge sharing

In a field characterized by high barriers to entry and concentrated resources, open science is a foundational mechanism for expanding participation, supporting knowledge-sharing and enabling international cooperation. Its scope extends beyond open access to research findings — it includes open-source code and tools, open hardware design specifications, and platforms for researchers to collaborate across institutions and regions. For countries and institutions with limited infrastructure and funding, these arrangements lower the costs of accessing knowledge and participating in innovation, while providing a more



Typical work situation, in low light, sitting and looking at the results on a computer on the left, with the experiment behind the researchers on the right.



Discussions on the mathematics of Bose-Einstein condensation,Ludwig-Maximilians Universität München, Munich, Germany

stable foundation of public resources for learning, collaboration and capacity-building (UNESCO, 2021).

Open science lowers barriers in research and education through several specific mechanisms. Open-access publications, open-source software libraries, algorithm development environments, benchmarking practices, and reproducible work-flows enable research teams lacking advanced hardware to participate in relevant work through simulation, algorithm design, and validation. When shared platforms are combined with remote access, cloud-based access, and structured training, indirect access pathways become more robust and are more likely to alleviate long-standing gaps in facility access. At the level of education and capacity-building, open educational resources, modular curricula, teacher support networks, and train-the-trainer models also help provide more continuous learning pathways for learners from diverse backgrounds.

However, open science in the quantum field also faces increasingly evident practical pressures. As the strategic importance of quantum technology rises, research openness, data sharing, and cross-border collaboration are being influenced by more security and geopolitical factors. Export controls, research security reviews, and collaboration arrangements based on “trusted networks” are altering the traditional open collaboration models of some nations. The result may be a fragmentation of international cooperation networks, along with a contraction in the space for knowledge flows and joint research. For countries in the Global South, the impact of this trend is particularly pronounced, as a shrinking pool of shared knowledge will further increase the costs of technological catch-up and make the quantum divide more likely to become entrenched.

Open science in the quantum domain faces increasing practical pressures. As the strategic importance of quantum technology rises, research openness, data sharing and cross-border collaboration are increasingly shaped by security and geopolitical considerations. Export controls, research security reviews and cooperation arrangements based on "trusted networks" are altering traditional models of open collaboration. The result risks fragmentation of international cooperation networks and a contraction in the space available for knowledge flows and joint research. For countries in the Global South, the impact is particularly acute: a smaller pool of shared knowledge raises the costs of technological catch-up and entrenches the quantum divide.

Open science must therefore be grounded in realism and shared responsibility. Openness does not imply the absence of boundaries; it requires a renewed balance between open access, scientific collaboration and knowledge flows on one side, and security, privacy, research integrity and proper governance on the other. The priority for international cooperation is to develop more trustworthy and sustainable frameworks for openness — ensuring that basic research, educational resources, and selected data and tools of public value can continue to circulate internationally, while leaving space for compliant research collaboration and capacity-building.

Cultural perspectives complement formal research, technology development and education. Philosophy, the arts, storytelling, and alternative educational formats can help deepen understanding of quantum ideas while also building connections across scientific and industrial communities, geographic contexts, and wider society. These approaches are not a substitute for technical training or infrastructure, but they can widen participation, strengthen relevance, and support more inclusive pathways for cooperation and engagement.

Open science, knowledge sharing and public understanding form a single enabling framework. Open resources, shared platforms, research and educational communities of practice, teacher support networks, and communication approaches integrating art, culture and storytelling all contribute to broadening engagement in the field. They cannot replace research investment and infrastructure development, but they provide the knowledge, social and institutional foundations on which broader and more sustainable international cooperation can be built.

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Part III:
Charting the quantum future

Chapter 8:

From legacy to the next phase of global quantum cooperation

8.1. Sustaining the legacy of IYQ 2025

The impact of IYQ 2025 has begun to extend beyond the Year itself, through outcomes and mechanisms designed to sustain its momentum. This continuity is reflected in legacy initiatives that have already received explicit support at the international level. It is also evident in the knowledge products, capacity-building efforts and policy dialogues advanced by the partners, and in the networks and collaborations that are being carried forward more broadly by governments, private sectors, research institutions, academic societies, grassroots communities and other partners across the wider ecosystem.

The IYQ Steering Committee established a dedicated Legacy Initiatives mechanism to support concrete projects that had been seeded during IYQ and showed the potential to expand their impact in the years ahead. Such legacy initiatives are expected to have an international orientation, to adhere to the guiding principles of IYQ, and to contribute to raising public awareness, promoting access to quantum education for all, expanding

IYQ 2025 Opening Ceremony at UNESCO headquarters, Paris France
© UNESCO / Marie ETCHEGOYEN

opportunities for career development, strengthening international and interdisciplinary scientific cooperation, or supporting the application of quantum science and technology for sustainable development. The Steering Committee's support for legacy initiatives is subject to judgement in relation to international relevance, project maturity, implementation feasibility and potential impact.

To date, the Steering Committee has decided to support two new legacy initiatives and to continue one existing mechanism. First, World Quantum Day has received continued support. As a global annual initiative that has been observed since 2021, World Quantum Day collaborated closely with IYQ in 2025 under the slogan "World Quantum Day, every day in 2025", helping to sustain public understanding of and engagement with quantum science and technology worldwide. Continued support for this initiative helps to carry forward the momentum in global public outreach generated during IYQ and to maintain a recognizable and open platform for public engagement.

The second is the ICFO–Wits Frontiers School, supported as an initiative for broadening inclusion in quantum education across Africa1. The school will convene master's and PhD students from across the continent on an annual basis, providing teaching, exchange and research presentation opportunities on both foundational and frontier topics, with particular attention to students from under-represented backgrounds, regions and groups. The initiative builds on ICFO's previous experience in Mexico, India and Ghana, and is linked to its existing collaborations with institutions such as the African Institute for Mathematical Sciences (AIMS) and Kwame Nkrumah University of Science and Technology (KNUST).

The third is the continuation of the IYQ Inclusive Travel Grant as an ongoing mechanism. This decision reflects the continuing importance attached by IYQ to the principle of inclusive participation, particularly in supporting participants from resource-constrained backgrounds to access international academic and collaborative spaces. It also indicates that support mechanisms centred on equitable participation and opportunity are regarded as part of the important legacy that IYQ should preserve.

At the UNESCO level, several work streams developed during IYQ have shown clear potential for continuity. The UNESCO surveys, consultations and reporting activities undertaken on the state of quantum science and technology, infrastructure and global disparities have already provided a basic evidence base for future policy discussion and capacity-building. The Quantum Computing Course and Mentorship Programme for African Women Scientists has shown that targeted training, open resources and community support can be combined into a sustained mechanism. At the same time, the IUPAP/UNESCO International Colloquia serve as an ongoing international space for dialogue linking science, policy and societal issues. Member States have already begun to seek UNESCO's support on quantum policy, capacity-building and partnership facilitation — an early indication that the impact of the International Year is translating into longer-term demand for cooperation.

Beyond formal legacy mechanisms, partnerships, regional dialogues, academic connections and public engagement networks formed during IYQ are being sustained by a wider community of actors — universities, research institutions, academic societies, the private sector and regional stakeholders. Some initiatives are evolving into annual events; some collaborations are developing into more stable educational and research ties. Although the maturity of these continuation pathways varies, they indicate that the legacy of IYQ has begun to generate follow-up effects at multiple levels.

8.2. A successful year calls for a longer-term global imperative

Quantum science and technology is increasingly becoming a key issue of global public significance for science, development and policy. In 2025, the international community demonstrated unprecedented levels of attention and mobilization, political commitment and cross-sectoral engagement on quantum issues. IYQ raised global awareness of quantum issues and laid a vital foundation for broader international dialogue, collaborative networks and public awareness.

The momentum generated in 2025 indicates that QST is entering a new phase requiring longer-term international cooperation, institutional support and strategic guidance. Translating global attention into

The precise frequency calibration of a laser beam, involving extensive macroscopic adjustments to achieve optimal microscopic control of a neutral atom, Ludwig-Maximilians Universität München, Munich, Germany.
© Christoph Hohmann / MCQST

sustained cooperation, broad interest into long-term capacity, and dispersed participation into a more inclusive and coordinated global process will be among the central tasks of the post-IYQ period.

This urgency stems from two converging realities. First, QST is rapidly advancing from basic research towards applications and deployment, with far-reaching potential in computing, communications, sensing and materials, and growing strategic attention from major economies (OECD, 2025). The quantum technology market remains nascent but is expanding rapidly: the combined markets for quantum computing and sensing reached an estimated US$ 1.45 billion in 2024 (Quantum Economic Development Consortium, 2025). Major economies have committed substantial multi-year resources to quantum research, development and deployment. The European Union's Quantum Flagship is a ten-year initiative backed by €1 billion in EU funding (European Commission, 2025; Yun Chee and Strahm, 2025). In the United States, the National Quantum Initiative Act authorised US$ 1.275 billion over its first five years (United States Congress, 2018). Widely cited estimates suggest that China's public investment may exceed US$ 15 billion, although precise figures are not consistently disclosed (QURECA, 2025). As of July 2025, an estimated US$ 55.7 billion had been committed to quantum science and technology by governments worldwide since 2013 (QURECA, 2025).

On the other hand, this rapid progress is unfolding alongside pronounced inequalities in capabilities, resources, policy preparedness and the ability to shape emerging rules and standards. Policy readiness is highly uneven(McKinsey & Company, 2025). At present, the benefits of quantum development, as well as access to knowledge, infrastructure and institutional preparedness, remain concentrated in a limited number of countries and institutions, while many others still lack the policy frameworks, talent pipelines, experimental conditions and international cooperation channels required to enter the field meaningfully. The OECD notes that only 30 countries have adopted tailored quantum policies, including 18 OECD countries with comprehensive national quantum strategies, meaning that most countries are still at an early stage of formal strategy development (European Patent Office and OECD, 2025).

This emerging "quantum divide" poses profound implications for global equity, sustainable development, and international cooperation (Malekos

Smith and Persi Paoli, 2024). Unlike previous technological revolutions that evolved gradually, quantum technologies combine high knowledge barriers, dependence on specialized infrastructure, limited penetration in foundational education, and potentially far- reaching societal and security impacts, making exclusion particularly problematic (UNESCO, 2025). They may also contribute to the concentration of technological power, potentially weakening the technological and digital sovereignty of less-resourced countries and reinforcing geopolitical imbalances (Hmaidi and Groenewegen-Lau, 2024). Another dimension of the quantum divide is knowledge asymmetry. At both national and global levels, this may exclude large parts of the public from meaningful participation in decisions on the governance of quantum technologies, despite their potentially wide societal consequences (UNESCO, 2025).

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Closing the quantum divide faces several structural challenges. Coordination remains inadequate, and existing initiatives across regions, institutions and thematic areas lack coherence (Roberson, 2021). Access to training opportunities, experimental facilities and infrastructure is fragmented, with many countries and institutions still lacking the basic prerequisites for sustained engagement (Fox et al., 2020). A significant number of countries remain at an early stage of quantum policy and national strategy development, with a clear need for external support (UNU-CPR, 2025). South–South cooperation mechanisms also have considerable scope for expansion, while long-term financing channels and sustainable resource arrangements remain underdeveloped (Equitech Futures, 2024). The international community still lacks a common framework capable of guiding inclusive quantum development and connecting capacity-building, cooperation channels, governance discussions and public-interest objectives within a more coherent structure (UNESCO, 2025).

Future efforts must be guided by stronger commitments to inclusion, coordination, enablement, responsibility and development. This entails broadening participation in capacity-building, knowledge-sharing, standards discussions and governance processes, and ensuring that quantum science and technology serve wider public goods and the Sustainable Development Goals. Recent UNESCO policy work explicitly links quantum science with inclusion, sustainability and human-rights-centred governance, underscoring the importance of orienting quantum development towards wider human welfare and public objectives (UNESCO, 2025).

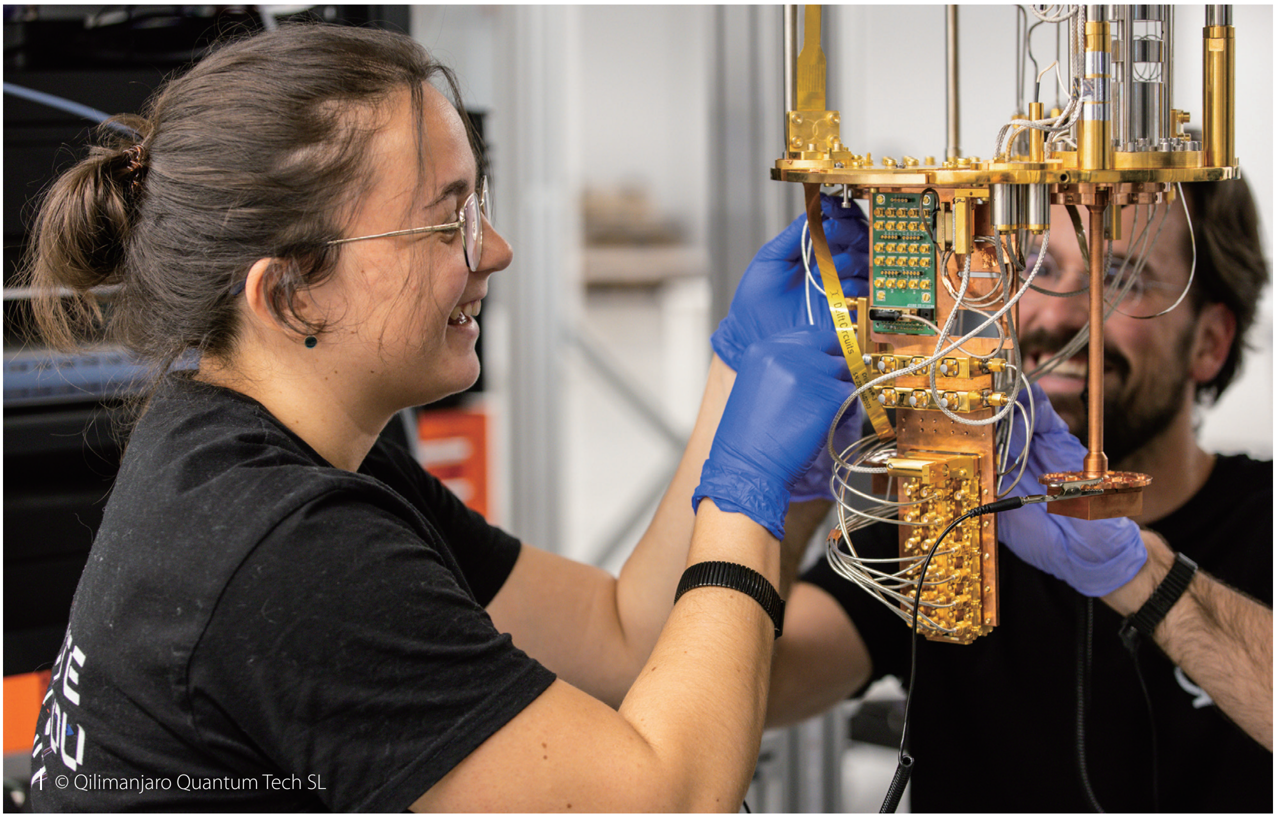
This direction is increasingly reflected in regional and continental policy frameworks. In 2025, the European Union adopted the Quantum Europe Strategy, bringing research and innovation, quantum infrastructures, partners coordination, skills development and implementation coordination into a single framework, while also calling for progress from laboratory strength towards deployment capacity and industrial uptake (European Commission, 2025). Africa is advancing along a distinct policy pathway, but one that similarly emphasizes capacity, infrastructure and institutional preparedness. The African Union's STISA 2034 identifies quantum science among frontier and emerging technologies, while the African Digital Compact situates quantum computing and other emerging technologies within a broader framework of digital transformation and ethical governance (African Union Commission, 2025; African Union, 2024).

A comparable shift is also visible in parts of Asia. Japan's Strategy of Quantum Future Industry Development gives prominence to practical application and industrialization (Cabinet Office of Japan, 2023). India's National Quantum Mission seeks to seed, nurture and scale up scientific and industrial research and development in quantum technologies (Government of India, 2024). Singapore's National Quantum Strategy is organized around scientific excellence, engineering capabilities, talent development and innovation partnerships (National Quantum Office Singapore, 2024).

In Latin America, formal regional coordination remains limited, but national and regional policy exploration is advancing. Chile formally issued its National Quantum Technologies Strategy 2025–2035 at the end of 2025, setting out a longer-term framework around governance and institutional arrangements, enabling conditions, and technological development and application (Ministerio de Ciencia, Tecnología, Conocimiento e Innovación de Chile, 2025). The Inter-American Development Bank has incorporated quantum technologies into wider policy discussions on digital transformation, social impact and cross-sectoral change.

International discussion on these issues is also expanding. The Open Quantum Institute, hosted by CERN, places inclusive access, capacity-building, multilateral cooperation and contributions to the Sustainable Development Goals at the centre of its mission (Open Quantum Institute, 2024). Since 2019, the International Telecommunication Union (ITU) has provided an international collaborative platform on quantum networking and pre-standardization through its Focus Group on Quantum Information Technology for Networks (International Telecommunication Union, 2021). These initiatives indicate that the next phase of global quantum cooperation is moving towards more open-access arrangements, more stable coordination mechanisms, clearer pathways for capacity-building, and deeper governance preparedness.

IYQ has laid a valuable foundation and revealed a broad need for continued cooperation. What is now required is an enabling framework that connects, extends and integrates existing efforts — sustaining fragmented achievements through institutionalized channels, allowing capacity-building and policy support to reinforce one another, broadening the range of countries and communities that benefit from cooperation, and keeping global quantum development on a more inclusive and coordinated path. The central task is to translate the mobilization generated by IYQ into a long-term, institutionalized and multi-stakeholder process, reducing the risk that the quantum divide becomes further entrenched and laying the foundation for a more inclusive global quantum future.



8.3. Lessons from IYQ 2025 and implications for the next phase

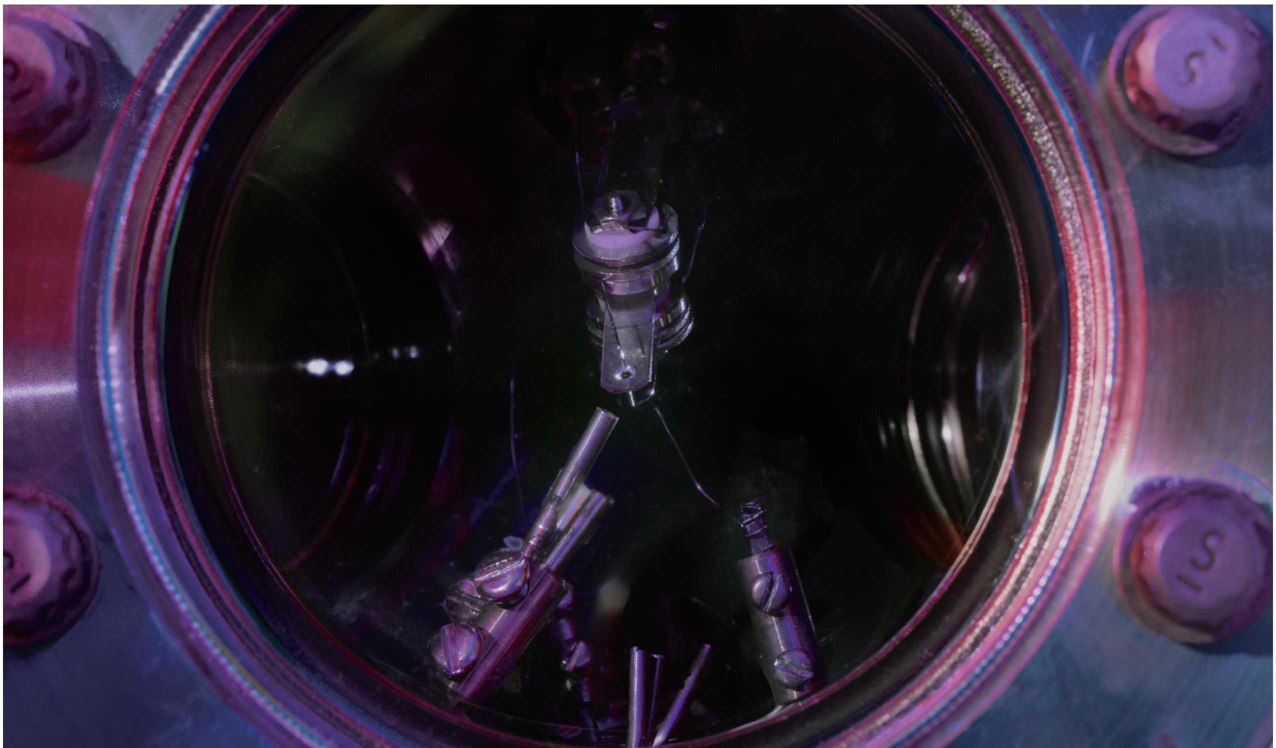
IYQ 2025 has offered the international community a structured view of what forms of engagement produce meaningful results across diverse national contexts, institutional capacities and starting points. It has also highlighted which design features support sustained engagement, and which constraints require more systematic attention in future collaborative efforts.

Several success factors emerge from IYQ's implementation. A significant part of IYQ's appeal stemmed from a cohesive public narrative. The centenary lent historical significance to the Year, but the expansion of participation was largely attributable to consistently positioning quantum science as part of a shared agenda — linked to education, sustainable development, social benefit and international cooperation. This framing enabled quantum issues to move beyond professional silos and engage the education sector, cultural institutions, youth networks, development actors, the policy community and responsible industry partners.

Governance arrangements that combined legitimacy with operational clarity proved essential for global coordination. Clear roles, defined responsibilities, and mutually reinforcing coordination and oversight arrangements helped reduce two common risks in global initiatives: excessive centralization, which can weaken local ownership, and excessive fragmentation, which can dilute objectives and weaken accountability.

Distributed delivery proved effective when supported by a common identity, shared standards and light coordination mechanisms. The global scale of IYQ was achieved largely through locally led initiatives, while common platforms, basic guidance and a shared communications framework helped maintain alignment with broader goals across highly diverse contexts. Inclusion also proved most effective when delivered through practical modalities, including education, training, remote participation and shared learning formats, rather than through declaratory commitments alone. Cultural and creative channels also played an important role by lowering barriers to entry, strengthening public understanding and fostering trust.

The implementation of IYQ also revealed a series of constraints with broader implications for international cooperation. Expanding the scope of global



An ion trap seen at a distance, with 6 trapped ions in the middle, whose fluorescence is captured by the camera as a faint spot.
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participation does not in itself close structural capacity gaps, nor does it automatically build stable education systems, research capability, policy readiness or access to infrastructure. Disparities in research facilities, talent pools, institutional environments and policy support continue to limit the capacity of many countries and institutions to participate substantively. One-off events can spark interest and foster partnerships, but their effects are unlikely to be sustained in the absence of follow-up pathways, institutional anchoring and resource support; enthusiasm at the local level needs to be consolidated through national policies, regional cooperation and institutional arrangements.

Distributed implementation also presents its own challenges. While it provides broad coverage and local flexibility, it places higher demands on quality assurance, consistency in dissemination, and the evaluation of outcomes. As quantum topics increasingly enter the policy arena, translating scientific engagement into national strategies, educational reforms, workforce planning and investment decisions raises new challenges. In an environment increasingly sensitive to security, competitiveness, standards and governance, international cooperation itself must be transparent, credible and explicitly oriented towards the public interest. The period after IYQ carries inherent risks of discontinuity: without follow-up mechanisms, resources and governance support, the momentum generated by the International Year may rapidly diminish as attention fades.

These lessons hold direct implications for the next phase of international cooperation. A clear and cohesive narrative of public purpose is essential — enabling Member States, research institutions, the education sector, the private sector and civil society to understand their respective roles within a shared framework, and linking quantum science more closely with education, development and public values. Science literacy and public engagement will play a vital role in broadening societal understanding, cultivating a talent base and strengthening long-term support. Government participation, policy support and international coordination must also be strengthened, with the integration of quantum issues into national strategies, educational reforms, talent planning and international cooperation agendas advanced more systematically. Science diplomacy will serve as a key pillar, linking research collaboration, policy dialogue and the building of international trust.

Future cooperation must also centre on a continuous capacity-building pathway — linking awareness-raising, learning resources, training, mentorship, collaborative projects and policy dialogue into a more comprehensive development chain. Anchored in open and inclusive international cooperation platforms, such a framework can combine flexibility with strategic direction and provide a common reference point. Alongside this, a set of landmark and replicable demonstration projects can showcase a more inclusive path for quantum development, incorporating best practices and approaches from across regions. As quantum technology enters broader policy and social spheres, ethics must be embedded at an earlier stage, helping all parties to address issues of fairness, accountability and the public interest.

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Chapter 9:

The UNESCO Global Quantum Initiative

9.1. The case for the Global Quantum Initiative

IAs the United Nations lead agency for the International Year of Quantum Science and Technology, UNESCO is launching the Global Quantum Initiative (GQI) for the period 2026 to 2028 to carry forward the work begun under IYQ. GQI is conceived as an open, multilateral platform for dialogue, cooperation and capacity-building, designed to translate he momentum generated by IYQ into a sustained, structured and internationally connected process.Its overarching purpose is to ensure that the development of quantum science and technology proceeds in ways that are inclusive, ethically grounded and aligned with the public interest.

The case for GQI rests on two converging realities. First, IYQ 2025 demonstrated the scale of international engagement that quantum science and technology can mobilize: more than 1,300 events across 83 countries, an estimated 1.2 million people directly engaged, and follow-up plans reported by 92 per cent of event organizers. Second, the same year made visible the structural unevenness of the global quantum landscape, such as disparities in access to research infrastructure, fragmented education and skills pathways, limited policy preparedness in most countries, and a concentration of investment, talent and rule-shaping capacity in a small number of contexts. GQI is positioned to extend and organize what IYQ helped to catalyze, while building the continuity, credibility and coherence required for the next phase of international action.

GQI has been designed to combine ambition with operational realism. Its 2026–2028 phase places particular emphasis on evidence generation, policy consultation, partnership development and pilot implementation. This approach allows policy-relevant outputs and practical cooperation pathways

Poster of the Global Quantum Initiative
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to be developed progressively, concepts to be tested before being scaled, priorities to be refined through Member State and partner consultation, and resources to be mobilized in proportion to demonstrated need. In this sense, GQI serves as an enabling platform through which inclusive global quantum cooperation can be shaped on the basis of consultation, experience and demonstrable results.

GQI links policy, capacity and cooperation through a single multilateral framework. It addresses quantum education and human capacity, sustainable infrastructure and resource sharing, public awareness and societal engagement, international cooperation through science diplomacy, and the ethical and anticipatory governance of quantum innovation. Together, these areas give GQI a broader scope than a conventional scientific cooperation programme, placing equal weight on policy consultation, Member State engagement, infrastructure access, public engagement and the wider conditions required for equitable participation in the quantum transition. Section 9.3 sets out the strategic objectives and flagship programmes through which this scope will be advanced.

GQI has been structured from the outset as a multi-stakeholder platform. Its partnership architecture distinguishes founding partners, programme partners and contributors, allowing different levels and forms of engagement. Founding partners include the United Nations University (UNU), the Geneva Science and Diplomacy Anticipator (GESDA), the Open Quantum Institute (OQI), the International Union of Pure and Applied Physics (IUPAP), the African Academy of Sciences (AAS), the Institut quantique de l'Université de Sherbrooke, and the Portuguese Quantum Institute (PQI). Beyond this core, GQI is designed to engage governments, academia, industry and civil society, with explicit attention to Member State participation, particularly from the Global South, and to partnerships supporting open educational resources, training opportunities and infrastructure access. This combination provides GQI with both a multilateral foundation and a practical means of widening participation across regions and sectors.

GQI is UNESCO's principal post-IYQ platform for sustained international quantum cooperation. It is designed to connect and reinforce existing efforts, support more coherent policy and capacity pathways, and provide a credible foundation for the next phase of collective action. Between 2026 and 2028, its value will lie in consolidating partnerships, strengthening the evidence base, supporting Member States, and advancing a more inclusive, coordinated and development-oriented approach to global quantum cooperation.

Global Quantum Initiative's Founding Partners:

unesco · gesda · OQI Open Quantum Institute · UNU · IUPAP · The African Academy of Sciences · Institut Quantique UdS · Portuguese Quantum Institute

9.2. Vision, mission and strategic objectives

Vision

A world in which quantum technologies are developed ethically and responsibly, shared equitably, and contribute to sustainable development for all nations and communities.

This vision places inclusion, responsibility and development at the centre of global quantum cooperation. It concerns not only progress in quantum science and technology itself, but also the opportunities available to different countries and communities to participate in quantum development, to benefit from its potential applications, and to shape its future in ways aligned with wider public interests. It also underscores the importance of ensuring that quantum technologies contribute to education, health, the environment, infrastructure and broader societal development.

Mission

To provide an international platform for dialogue, cooperation and capacity-building that advances a more inclusive, coordinated and sustainable process of global quantum development.

Building on the momentum generated by IYQ 2025, the Initiative supports structured consultation, collaborative implementation, pilot activities and knowledge sharing, helping the international community develop stronger cooperation pathways, policy-relevant outputs and practical foundations for future action. The Initiative's purpose is to move global quantum cooperation from dispersed activity towards a more organised and sustained international process. It also aims to advance multidisciplinary and multicultural approaches to quantum technologies, recognising that the implications of these technologies for society are best understood through engagement across multiple knowledge traditions and communities. The experience generated through GQI is intended to inform broader forms of international cooperation in the years ahead.

9.3. Strategic objectives and flagship programmes

GQI advances five strategic objectives, each supported by flagship programmes designed to translate the objective into specific, deliverable activities. These objectives and flagship programmes respond both to the urgent challenges posed by the widening quantum divide and to the enabling conditions required for a more inclusive and development-oriented global quantum future.

Objective 1
Advancing Quantum Education and Strengthening Institutional and Human Capacity

GQI will support the long-term development of quantum education, research training and capacity-building, helping a wider range of countries and institutions develop the foundations required to enter the field.

1. Advising on the integration of quantum science into national development strategies, research agendas and innovation frameworks, while fostering interdisciplinary research capacity and strengthening links between academia, industry and policy institutions.
2. Supporting the development of advanced research programmes, specialized training and peer learning platforms to build institutional capacity for quantum research, innovation and technology transfer, including through international cooperation and regional research hubs.
3. Promoting the development of inclusive, multilingual and open-access learning and training resources tailored to researchers, educators and public sector professionals across diverse contexts.

Flagship programmes under this objective include:

Quantum Education Initiatives: Capacity-building and education will constitute GQI's most central flagship focus. Activities include the development of quantum education curricula and online courses, teacher training programmes in collaboration with educational institutions in Africa, Latin America and Asia, the production of educational tools and resources, and pilot implementations in selected countries.

Policy-Maker Training: GQI will deliver regional training programmes for government officials and policymakers, including thematic workshops, study visits and the development of policy toolkits. The aim is to support countries in building practical understanding of quantum governance, policy preparedness and international cooperation.

Research Capacity-Building: GQI will support research capacity-building through fellowships, exchange programmes and remote access to quantum facilities, with a particular focus on enabling young researchers from developing countries to participate in quantum research. This includes establishing collaborative arrangements with leading quantum research institutions to expand research access and exchange opportunities.

Objective 2
Building sustainable quantum infrastructure and enabling resource sharing

GQI will work to strengthen access to platforms, facilities and shared resources through international cooperation and regional collaboration arrangements.

1. Supporting enabling national environments and institutional frameworks that can sustain long-term investment in quantum research, innovation and infrastructure.
2. Promoting more equitable access to shared facilities, experimental platforms and quantum cloud services through international cooperation, regional platforms and open-access initiatives.
3. Strengthening downstream innovation ecosystems and application pathways through incubators, testbeds and collaborative hubs that support responsible deployment.

Flagship programme under this objective:

Regional Hub Development: GQI will support the development of regional quantum cooperation hubs serving as focal points for training, dialogue, partner engagement, knowledge exchange and the organization of cooperation across regions. Particular attention will be given to under-represented regions and the Global South, with co-financing, hosting arrangements and partner support exploring how regional hubs can strengthen the participation base in more contexts.

Objective 3
Advancing public awareness and societal engagement

GQI will treat public engagement and societal participation as integral components of international quantum cooperation. This objective includes:

1. Promoting inclusive communication and educational efforts to strengthen quantum literacy at different levels, using accessible and culturally relevant content.
2. Encouraging science communicators and trusted information channels to promote accurate, engaging and widely accessible narratives about quantum science and technology.
3. Supporting participatory public platforms and initiatives that involve youth, women and girls, educators and communities in shaping the quantum future.

Flagship programme under this objective:

Communication and Outreach: GQI will support systematic communication and outreach efforts, including the design and implementation of communication strategies to engage Member States, partners and the wider public. Activities include website development, social media engagement, and participation in relevant international conferences and events.

Implementation of the BIPM quantum Hall resistance for the realization of the electrical resistance unit (ohm) based on the Planck constant and the elementary charge, two foundational constants of the International System of Units (SI).
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Objective 4
Strengthening international cooperation through science diplomacy

GQI will approach quantum cooperation as an emerging field of science diplomacy and multilateral engagement. This objective includes:

1. Supporting more inclusive participation by countries of the Global South in international quantum dialogues, agenda-setting processes and cooperation platforms through policy support and capacity-building.
2. Promoting inclusive, multi-stakeholder platforms that enable sustained dialogue and knowledge exchange among researchers, policy makers, industry actors and civil society across regions and sectors.
3. Fostering the development of cooperation frameworks and mechanisms to advance responsible quantum technology cooperation, joint research and regional collaboration in support of more equitable innovation and sustainable development.

Flagship programme under this objective:

Partnership Development: International cooperation and partnerships will form a key pillar of GQI, with a focus on developing strategic partnerships that establish the foundation for a broader future cooperation framework. Activities include partner outreach, cooperation consultations, legal and institutional arrangements, and day-to-day coordination across partner types.

Regional Consultations and Dialogues: GQI will organize regional consultation meetings, thematic dialogues and expert workshops to build consensus around cooperation priorities. These dialogues will provide platforms for different regions, institutions and stakeholders to exchange experiences, identify needs and explore common pathways, while supporting the calibration of GQI priorities over time.

Global Quantum Observatory: GQI will establish a Global Quantum Observatory to track quantum development trends and capacity-building needs across regions, test funding mechanisms for quantum cooperation projects, and develop recognition programmes for quantum champions and innovators. The Observatory will serve as a continuous evidence base for international cooperation and provide a visible mechanism through which Member States, partners and the wider quantum community can engage with GQI's work over time.

Objective 5
Fostering responsible quantum innovation and anticipatory governance

The GQI will integrate ethical, legal, social and governance considerations at an early stage of quantum development, in order to strengthen the credibility, legitimacy and long-term resilience of future cooperation. This objective includes:

1. Promoting inclusive and anticipatory governance frameworks that embed ethical, legal and societal considerations into quantum research and innovation processes.
2. Encouraging shared accountability among governments, scientists and private actors through global dialogue on responsibility, transparency and equity in quantum development.
3. Advising on mechanisms for engagement in established international standardization processes, so as to facilitate contributions to the development of international norms and technical standards that support safety, interoperability and public trust in emerging quantum technologies.

Flagship programme under this objective:

Research and Analysis: GQI will support research and analysis on quantum governance challenges, global quantum trends and policy recommendations. This includes commissioning thematic studies, data collection and analysis, and other activities providing evidence base for policy support and knowledge product development.
Publication and Dissemination: Building research, consultation and programme activities, GQI will develop and disseminate a range of knowledge products including policy briefs, technical reports, educational materials and other outputs. These products will translate experiences and policy insights into outputs of broader public value and international relevance.

9.4. Phased implementation (2026–2028)

9.4.1. GQI Steering Committee and Working Groups

To ensure that the Global Quantum Initiative maintains the necessary strategic direction, coordination capacity and implementing foundation while upholding openness and multi-stakeholder participation, the Initiative establishes a streamlined yet clear governance and working mechanism. At its core are two tiers: a Steering Committee and Working Groups. The Steering Committee provides overall strategic guidance and coordination support; the Working Groups serve as the primary platform for driving implementation, organizing consultations, collaborative design, knowledge production and partner mobilization around key priorities.

The Steering Committee will serve as the Global Quantum Initiative's primary strategic guidance mechanism, comprising representatives from UNESCO and the founding partners. The Steering Committee maintains a balance between regional representation and multi-stakeholder participation. Its main responsibilities are to guide GQI's overall direction and annual priorities, set key outputs and collaborative arrangements, coordinate partner building and resource mobilizations, and provide overall oversight for the GQI's phased progress.

GQI establishes six working groups. Of these, five thematic working groups will correspond to the initiative's five strategic objectives, with an additional specialized working group responsible for partnership building and resource mobilization. The first five working groups will focus on key areas such as quantum education and capacity building, infrastructure and resource sharing, public awareness and societal engagement, science diplomacy and international cooperation, and responsible innovation and forward-looking governance. The sixth working group will focus on supporting the development of partner networks, designing cooperation models, matching resources, and coordinating external engagement, with a view to enhancing the GQI's openness, scalability and sustainability.

Founding partners are expected to participate in one or more working groups and, where appropriate, serve as lead or co-lead organizations. Each

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founding partner will not only participate in the overall process as a supporter of the initiative but will also play a more substantive organizational and leading role in relevant fields. This includes convening thematic discussions, engaging additional institutions and experts, assisting in defining key issues, driving the development of deliverables, annual priorities and work plans aligned with the strategic objectives, and providing support for the design of pilot activities, policy outputs, training resources or cooperation mechanisms.

Each working group will further define its scope of work, key tasks and phased deliverables within the framework of its corresponding strategic objective, and will invite representatives from relevant Member States, research institutions, educational institutions, international organizations, industry partners and other stakeholders to participate as required. The specific annual outputs of the working groups may vary according to theme and phase, and may include policy briefs, needs assessments, training and knowledge resources, pilot activity designs, cooperation proposals, lessons learnt, and recommendations for future international cooperation. Through this mechanism, the Global Quantum Initiative will be able to gradually establish a clearer division of responsibilities, cooperation pathways and implementation support, while maintaining flexibility and inclusivity.

Overall, the Steering Committee and Working Groups aim to provide the GQI with a framework for advancement that is strategic, participatory and operational. It helps to organize the broad and diverse network of partners into a collaborative process with greater direction and synergy. It lays the groundwork for the initiative's subsequent phased implementation, annual planning, the generation of outcomes and the expansion of partnerships, enabling the GQI to continuously enhance its credibility, visibility and practical impact through ongoing consultation and progressive implementation.

Partnership Modalities at a Glance

Role	Main Focus	Forms of Engagement	Participation & Visibility
1. GQI Founding Partners	Shape global strategy and governance	Strategic co-investment (financial or in-kind), senior liaison, leadership of one priority area	Permanent founding recognition, high-level influence, global visibility
2. Programme Partners	Co-lead and deliver priority areas	Lead at least one concrete project, contribute expertise/resources, mobilize funding	Co-lead recognition, co-authorship, international partnerships
3. GQI Contributors	Provide targeted inputs	One or more concrete contributions (content, tools, training, access)	Acknowledgement, global exposure, network access

9.4.2. Phases of Implementation

GQI adopts a deliberately phased approach to implementation, recognizing the complexity of quantum governance challenges and the importance of building sustainable foundations before scaling up. This approach strengthens delivery credibility by ensuring that each phase produces concrete and measurable outputs that inform and enable the next.

The three-year Global Quantum Initiative (2026–2028) serves multiple strategic purposes. It allows UNESCO and partners to test and validate key concepts and approaches through carefully scoped pilot projects before considering larger-scale implementation. It provides time to build contribution-based partnerships and secure sustainable and transparent resource commitments. It provides opportunities to explore the potential development a Global Quantum Agenda

Global Quantum Initiative — Phased Implementation

2026 Year 1

Phase 1 — Foundation Building
Launch · Organizational structures · Initial partnerships · Pilot activities

- **Consensus & Framework**
  Steering Committee, Working Groups & Secretariat established; stakeholder consultations launched
- **Framework Refinement & Outreach**
  Concept note and proposal refined; partners engage in advocacy to broaden participation.
- **Partnership Development**
  Founding partner endorsements secured; financial & in-kind contributions mobilised
- **Pilot Project Launch**
  Representative pilot activities launched, building on IYQ 2025 foundations
- **Institutional Capacity Building**
  Basic organizational and support systems established to lay the foundation for subsequent implementation

2027 Year 2

Phase 2 — Expansion & Validation
Scale cooperation · Operationalize mechanisms · Validate outcomes

- **Pilot Expansion**
  Phase 1 pilots scaled to more regions, institutions and beneficiary groups; replicability tested
- **Outcomes & High-Level Dissemination**
  GQI progress presented at international conferences and policy platforms.
- **Partner Network Broadening**
  Network broadened beyond founding partners; coordination of resources strengthened.
- **Interim Evaluation**
  Working Groups in substantive operation; monitoring and evaluation arrangements activated.

2028 Year 3

Phase 3 — Consolidation, Evaluation & Future Directions
Comprehensive review · Strategic assessment · Exploration of longer-term arrangements

- **Deepening Consultations & Updating Priorities**
  In-depth consultations to assess whether priorities remain aligned with the evolving landscape.
- **Exploration of Future Cooperation**
  Potential pathways for sustained global cooperation explored; Potential to have Global Quantum Agenda.
- **Outcomes and High-Level Exchange**
  Centralized presentation and exchange of GQI's interim outcomes through appropriate channels
- **Comprehensive Report**
  Three-year review of GQI's progress and key findings compiled.

framework based on practical experience and stakeholder feedback. It also strengthens UNESCO's and partners' credibility in quantum cooperation and governance through demonstrated results, rather than aspirational promises.

This phased approach is also intended to provide the international community with a process of exploration. While advancing cooperation, capacity-building and policy dialogue, the GQI also aims to further test, through practical application, whether there is a need to gradually establish a more consensus-based global framework for cooperation and coordination at the international level, to better support international cooperation, science diplomacy and broader global efforts. If, in the later stages, Member States and partners consider that there are sufficient practical foundations, shared needs and political will to support further institutionalized cooperation, the period from 2029 to 2030 could serve as a consolidation and evaluation phase. The focus would be on summarizing experiences, identifying common priorities, refining shared approaches to cooperation, and proposing a shared vision for QST. This would ensure that the subsequent progress is built upon actual needs, partner consensus and proven implementation capacity.

Phase 1: Foundation building (2026)

The first phase of the GQI will focus on launching the initiative, raising awareness and establishing organizational structures, promoting greater international communication and understanding of its principles, vision and objectives, and laying the groundwork for cooperation, mechanisms and resources for subsequent implementation. This phase will centre on further refining the initiative's framework, international communication and outreach, expanding partnerships, establishing working mechanisms, and launching the first round of collaborative and demonstration activities. Concurrently, the GQI will draw upon the existing experience of the IYQ and related preliminary work to build further consensus on the existing foundation, gradually forming a collaborative process with greater visibility and capacity for action.

Key activities:

Consensus building and framework development:

During this phase, priority will be given to establishing the GQI Steering Committee, various Working Groups, and the Secretariat supported by UNESCO, while engaging in extensive communication with Member States, the scientific community, and other stakeholders. Through the organization of information sessions, consultation meetings, thematic events and other communication mechanisms, the initiative will promote a deeper understanding within the international community of the GQI's vision, objectives and cooperation priorities, while fostering preliminary consensus on areas such as quantum capacity building, policy readiness, infrastructure accessibility, governance issues and regional cooperation.

Refinement of framework documents and promotion of GQI:

During this phase, the GQI's concept note, proposal and related external communication materials will be further refined to more clearly articulate the initiative's positioning, vision, objectives and expected value. On this basis, GQI partners will actively engage in external promotion and advocacy to enhance the GQI's visibility and recognition, and create conditions to attract more Member States, institutions and partners to participate.

Partnership development:

The first phase will focus on securing clear endorsement of the GQI's vision and direction from founding partners, while encouraging them to make substantive contributions through financial or in-kind support. Concurrently, the GQI will actively engage with potential partners, sponsors and other stakeholders to explore more concrete arrangements for programmes, projects, events and activities based on different cooperation models, and will actively pursue resource mobilization.

Pilot project launch:

As a new initiative, the first phase of GQI will build upon the foundations established by UNESCO and its partners during IYQ and related preparatory work to launch a series of representative and exemplary collaborative activities, thereby enhancing the initiative's visibility, cohesion and practical foundation.

Institutional Capacity Building:

Phase 1 will also focus on establishing the basic organizational and support systems required to advance the GQI, including a Steering Committee, Working Groups and a Secretariat supported by UNESCO, progressively clarifying relevant work arrangements, collaboration methods and preliminary work plans to lay the foundation for subsequent phased implementation.

Phase 2: Expansion and validation (2027)

Phase Two of the GQI will shift its focus from the launch of the initiative and the establishment of its initial organizational framework to the expansion of the scale of cooperation, the substantive operation of working mechanisms, and the systematic validation of outcomes and pathways. The objective of this phase is to build upon the partnerships, initial outcomes and work established in Phase 1 to gradually expand the initiative's scope, enhance the continuity and visibility of cooperation, and, through more systematic knowledge generation, policy dialogue, partner collaboration and outcome evaluation, identify which cooperation pathways, working methods and coordination mechanisms are worthy of further consolidation and promotion.

Key activities:

Pilot project expansion:

The priority collaborations and demonstrative arrangements launched in Phase 1 will be progressively scaled up and expanded in scope during this phase. This expansion will manifest in several ways, including extending cooperation to more regions and countries, engaging a wider range of participating institutions and beneficiary groups, introducing additional courses, activities and forms of collaboration, and involving more Member States, research institutions, the private sector and other partners. Through this process, the GQI will transform the initial cooperation models into programme lines with greater continuity, visibility and catalytic impact, and testing their replicability and potential for wider adoption.

Publication of outcomes and high-level platform presentations:

This phase will also place greater emphasis on the centralized presentation and dissemination of GQI's outcomes and interim progress. By showcasing GQI's progress and achievements at higher-level international conferences, policy platforms and collaborative forums, the initiative aims to enhance its international visibility and policy influence. When conditions are ripe, GQI may also organize its own thematic conferences, outcomes dissemination events or joint initiatives to further consolidate partner consensus, broaden international attention, and create conditions for subsequent cooperation at a higher level.

Expansion of the partner network and resource mobilization:

As the scope of cooperation and the range of activities expand, Phase 2 will further broaden the partner network beyond the founding partners, welcoming more stakeholders from different regions, institutional types and sectors to join the GQI, thereby further enriching the partner structure and the profile of the collaboration. At the same time, the GQI will explore the establishment of more effective coordination mechanisms to better mobilize and align financial and in-kind resources from all parties, enhance synergy and resource allocation efficiency amongst partners, and provide a more solid foundation of support for the initiative's sustained implementation.

Operational mechanisms and interim evaluation:

Phase 2 will drive the Steering Committee

Rare-Earth Ions are the perfect candidates for the qubits we need to scale up quantum networks. This is the core focus of Sophie Hermans, principal investigator at quantum research institute QuTech in Delft, The Netherlands
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and the various Working Groups into a more substantive operational phase. Under the framework of their respective strategic objectives, each working group will further clarify priority areas, annual work plans, deliverables and interim targets. Through thematic consultations, collaborative design, event organization and the production of outcomes, they will gradually establish a clear working rhythm and collaborative model. Concurrently, the GQI will establish more targeted interim monitoring and evaluation arrangements to regularly assess whether the various initiatives are effectively supporting its strategic objectives, whether relevant deliverables are progressing as planned, and whether different cooperation pathways and working methods hold value for continued deepening and expansion.

Phase 3: Consolidation, evaluation and exploration of future directions (2028)

Phase 3 of the GQI will focus on systematically consolidating and summarizing the outcomes, experiences, networks and cooperation mechanisms established during the preceding phases. Building on this foundation, consultations will be deepened to evaluate the initiative's overall progress and explore potential directions for its future development. This phase serves both as a review of the work undertaken over the past three years and as a critical assessment of whether, and how, to further advance longer-term international cooperation arrangements.

Key activities:

Summary of overall outcomes and preparation of a comprehensive report:

This phase will involve a systematic review and summary of the main work carried out by the GQI over the past three years, reviewing the initiative's key progress in capacity building, knowledge exchange, policy support, partnership cooperation, international dialogue and resource mobilization, and summarizing the experience gained, issues identified and preliminary insights formed through these activities. On this basis,

Graduate students Yanhao Wang working on a dilution refrigerator hosting his quantum superconducting qubits, in the research group of Robert Schoelkopf. – Yale Quantum Institute, New Haven, CT, USA
© Andrew Hurley for Yale News - December 2025

the GQI may compile a comprehensive summary report providing an overall review of the three-year implementation, key findings, the value of the collaboration, and the roles played by partners and sponsors, thereby providing foundational material for subsequent discussions.

Deepening consultations and updating priorities:

With the support of the Steering Committee and various working groups, this phase will involve more in-depth and targeted consultations to further assess whether the key issues and strategic directions identified by the GQI remain aligned with the evolving landscape of quantum science and technology and the needs of international cooperation. These consultations will focus on whether existing priorities require adjustment, deepening or expansion, and whether any new, significant issues closely related to the GQI but not previously adequately addressed have emerged during the three-year implementation process. Through this process, the GQI will continuously update and refine its understanding of key areas for global quantum cooperation.

Presentation of outcomes and high-level exchange:

This phase will also involve the centralized presentation and exchange of GQI's interim outcomes through appropriate channels, including the release of relevant results at high-level meetings, international platforms or thematic events. This aims to foster further exchange and consensus-building amongst partners, sponsors, member states and other stakeholders, while creating conditions for potential cooperation in the next phase.

Exploration of future cooperation and arrangements:

Building on the summary of achievements and in-depth consultations, this phase will also further explore potential pathways for future cooperation, including whether it is necessary to build upon the GQI's existing achievements and networks to continue promoting more sustained and coordinated global cooperation arrangements. Relevant discussions will be grounded in the outcomes established in the earlier phase, partner feedback and the results of consultations, with a focus on whether future work requires new organizational approaches, joint mechanisms or a continuously updated cooperation framework to address the new challenges and demands arising from the ongoing development of the quantum field.

9.5. Expected outcomes by 2028

By 2028, GQI aims to deliver concrete and measurable outcomes across five dimensions: scope of cooperation, capacity-building, resource mobilization, policy support, and broader strategic impact. The targets set out below are deliberately calibrated to reflect a programme grounded in partnership-based delivery, rather than scaled to abstract ambition.

Outcome 1: Scope of Cooperation

By 2028, GQI aims to engage at least 50 Member States in substantive cooperation activities and to establish more than 25 active partnerships across Member States, scientific institutions, industry and civil society. This level of engagement extends the IYQ Steering Committee's coalition into longer-term, programme-based commitments, concentrating cooperation around continuity rather than time-bounded events. Particular attention will be given to broadening Member State participation from Global South, where GQI's contribution to closing the quantum divide will be most directly tested.

Outcome 2: Capacity-Building

By 2028, GQI aims to deliver capacity-building activities to more than 1,000 individuals across regions, supported by structured education programmes, fellowships, remote-access modalities and research exchanges. Priority will be given to participants from countries currently under-represented in international quantum cooperation — including women scientists, early-career researchers and policymakers from the Global South. The 1,000-participant target builds directly on the experience of UNESCO's Empowering African Women in Quantum Science programme and the IYQ Remote Access Initiative and is calibrated to ensure that capacity-building activities reach the depth required for sustained engagement, rather than the breadth of a one-off awareness initiative.

Gemini Gate-Based Neutral-Atom Machine at the AIST G-QuAT Facility in Japan
© QuEra

Outcome 3: Resource Mobilization

By 2028, GQI aims to mobilize cumulative partner contributions of at least US$ 2 million. This is a deliberately lean operating envelope, designed to ensure that resources are concentrated on partnership-led delivery rather than central administration. Funding will support flagship programme development, regional dialogues, knowledge products and Member State engagement, with founding partners providing core contributions and additional partners encouraged to join through specific programme support, in-kind contributions, hosting arrangements and co-financing of regional activities. The funding model is designed to remain open to expansion as partner engagement broadens — including through the addition of major sponsors, foundations, and Member State contributions during the implementation period.

Outcome 4: Policy Support

By 2028, GQI aims to support the development of at least 15 policy frameworks, policy documents or collaborative policy outputs at national, regional and international levels. These outputs include policy briefs, analytical reports, consultation outcomes and other knowledge products designed to provide Member States and partners with targeted guidance on quantum-related policy issues. The 15-output target reflects the diversity of policy contexts at which GQI engages — from national strategies to regional cooperation frameworks to international standard-setting processes — and is calibrated to ensure substantive engagement at each level rather than surface-level dissemination.

Outcome 5: Strategic Impact

Beyond these specific targets, GQI is expected to deliver four areas of broader strategic impact: raising policymakers' awareness of quantum technologies and their governance implications; strengthening international cooperation and mutual trust in an increasingly differentiated environment; advancing ethical frameworks and responsible governance practices through multilateral dialogue; and consolidating UNESCO's role as a credible convener for emerging technology cooperation in the United Nations system. These outcomes are intrinsic to the longer-term value of GQI as a platform — and will determine whether the work undertaken between 2026 and 2028 provides a credible foundation for international quantum cooperation in the decade that follows. quantum technologies and related governance issues, strengthen international cooperation and mutual trust, promote further discussion and development of ethical frameworks and responsible governance practices, and further consolidate UNESCO's convening role, leadership and credibility in the field of emerging technology governance.

Endnotes

1. See: https://www.unesco.org/en/articles/global-ministerial-dialogue-science-diplomacy
2. See: https://www.unesco.org/en/open-science/implementation

Chapter 10:
Call to action

10.1. Immediate next steps

The next step in advancing the Global Quantum Initiative depends on the active engagement of Member States, partners and the wider quantum community. As set out in Chapter 9, GQI's institutional architecture, programme structure and phased approach are now ready to enter implementation. What is required now is the substantive engagement of those who can shape its direction and contribute to its delivery. Member States are invited to support GQI through participation in its governance and consultation mechanisms, designation of national focal points where appropriate, hosting and co-financing of regional activities, and integration of GQI priorities into national quantum strategies and capacity-building efforts.

Founding partners and other potential contributors are invited to engage with GQI in ways that match their respective comparative advantages and capacities. Forms of contribution include strategic guidance through Steering Committee or Working Group participation; co-design and delivery of capacity-building activities; financial and in-kind support for flagship programmes; co-financing of regional dialogues and pilot activities; and contribution of expertise, platforms, training resources

The Quantum Diplomacy Game, one of OQI's capacity building activities, played during QISTCon.ph in the Philippines
© Bobby Corpus / Courtesy of the Quantum Computing Society of the Philippines (QCSP)

and access arrangements. The partnership architecture is designed to remain open and flexible, accommodating different levels and forms of engagement, and to evolve as the Initiative develops and as new partners join.

10.2. Collective development of the Global Quantum Initiative

The advancement of GQI relies on broad and diverse participation. The development of quantum science and technology concerns not only the frontiers of research and industry, but also education, capacity-building, policy preparedness, international cooperation and public interest. GQI is therefore designed to be participated in, built and shaped jointly by different stakeholders, drawing on their respective strengths and capacities.

Member States have a central role. Their engagement will determine whether quantum science and technology become meaningfully connected to national education systems, research agendas, innovation strategies and public policy priorities. Through active participation in the Glcbal Quantum Initiative, Member States can help define priorities, strengthen governance arrangements, designate national focal points and cross-sector coordination structures, and contribute to cooperation pathways that extend beyond single events. They can also advance regional collaboration through hosting, co-financing, mobility support and investment in national institutions that serve as multipliers for education, research and outreach. Member State engagement will be decisive in turning international visibility into durable national and regional capacity.

Scientific communities and research institutions also have a major responsibility. They can open pathways for meaningful participation by offering structured training, mentorship and exchange opportunities, by co-developing open educational resources, and by supporting collaborative research platforms that include institutions operating under more constrained conditions. They can widen the reach of the global quantum field by establishing predictable access arrangements, repeatable mentorship pathways and cooperative structures that lower entry barriers for learners and researchers. Their contribution is especially important in ensuring that excellence in quantum science is accompanied by openness, reciprocity and long-term commitment.

Education systems and educator networks will shape the depth and sustainability of inclusion over time. Their contribution lies in bringing quantum literacy into curricula at appropriate levels, strengthening teacher capacity, and building modular learning pathways that connect foundational understanding to advanced skills and workforce relevance. Their participation will influence how widely the next generation can engage with quantum science, and how early that engagement begins. Teacher support, localization guidance and train-the-trainer models will be especially important in enabling scales across diverse contexts.

Private sector partners have an equally important role to play in expanding opportunity and building capability in ways aligned with the public interest. Their contribution can include multi-year support for training and mentorship, in-kind support through access to platforms and tools, and collaboration that strengthens innovation pathways and entrepreneurship in under-resourced regions. Industry engagement can make a particular difference when it lowers barriers to entry, broadens practical access and strengthens responsible innovation. Transparent partnership modalities, measurable contribution pathways and a clear orientation towards public purpose will be essential to ensuring that private sector engagement strengthens the credibility and reach of the Initiative.

The wider United Nations system, international organizations, foundations and development partners can bring greater coherence to the global landscape. Through co-financing, coordinated support and jointly designed programmes, they can strengthen education, capacity-building and policy support while reducing fragmentation and duplication. They can also connect quantum inclusion to broader development agendas and support cooperation models that reinforce South–South exchange, regional learning and cross-sector partnership. Their engagement can significantly improve efficiency, reach and strategic alignment of international quantum cooperation.

Civil society and public engagement platforms also have a vital contribution to make. They build science literacy, strengthen public dialogue and widen participation among young people and communities that are often excluded from emerging technology agendas. When combined with educational integrity and credible communication, these efforts strengthen the social foundations for sustained cooperation.

Civil society actors can also help ensure that inclusion remains rooted in community needs, and that communication about quantum technologies remains evidence-based, accessible and responsible.

GQI welcomes stakeholders of all kinds to contribute in flexible and practical ways, drawing on their respective strengths, capacities and resources. Forms of participation may include providing strategic support; jointly designing and implementing specific projects and activities; or offering targeted support in areas such as knowledge resources, technical expertise, event platforms, access to facilities, translation and localization support, communication resources and other in-kind contributions. The significance of participating in GQI lies not merely in joining a collaborative network, but in jointly advancing a public process of long-term global significance. Through GQI, partners can establish more substantive links with Member States, international organizations, research institutions, educational networks, industry and civil society, and play an active role in shaping quantum education, capacity-building, cooperation mechanisms and responsible governance.

At the same time, GQI requires broader resource support and a sustained commitment to cooperation. Future progress will depend on multiple forms of support, including funding, in-kind contributions, platforms, technology, expertise, joint activities, co-financing, and hosting arrangements at regional and institutional levels. No single entity can sustain a global initiative of this scope on its own.

10.3. An invitation to shape the quantum future

The transformation beyond 2025 will depend on the choices made today. The momentum generated during the International Year of Quantum Science and Technology has created a rare opportunity to broaden participation, strengthen cooperation and better reflect public objectives in the development of quantum science and technology. Whether this opportunity will give rise to a more inclusive global capacity base or lead to a further widening of the quantum divide will depend largely on the international community's willingness to act with foresight, commitment and a shared sense of responsibility.

What is needed now is not merely sustained interest, but clearer engagement, a firmer commitment to cooperation, and more forward-looking joint investment. IYQ has demonstrated that quantum science and technology are not only a new frontier in technological and industrial competition, but also a global issue involving education, governance, equity, cooperation and the public interest. Without timely and organised action, the disparities already evident today are likely to widen further, while future rules, resources and opportunities may become even more concentrated in the hands of a select few.
GQI serves as a platform to translate shared commitments into collective action. Its success will depend on the willingness of all stakeholders to contribute according to their respective capabilities, to build consensus around common goals, and to jointly create the conditions that enable broader and fairer participation in the quantum transformation.

GQI therefore extends an invitation to the international community. It looks forward to the participation of Member States, research institutions, the education sector, industry, international organizations, foundations and civil society in this process, transforming their respective strengths into tangible forces driving inclusive quantum development. Whether through policy support, capacity-building, educational cooperation, open-access to resources, the establishment of partnership networks, or through contributions of technology, funding, facilities and knowledge, all parties can play a vital role in this shared endeavor.

The quantum future should not be defined by a select few, nor should it serve only a select few. It must be a developmental process that is continually expanded through international cooperation, continuously shaped through collective efforts, and capable of delivering public value to society at large. The invitation has been extended, and the platform has been established. The next step depends on whether the international community is willing to move forward together.

Now is the time for action.

In cottidianus, surreal everyday moments intertwine with Our Universal Glow: like infrared imagery, the painting reveals the hidden radiance of human presence—a glowing echo of warmth and being, subtly illuminating the foundational role of our existence within the fabric of quantum reality. Shortlisted artwork of the visual contest, Quantum Light: A Visual Odyssey.
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Annexes 1:

UNGA Resolutions and Statements

General Assembly

Distr.: General
19 June 2024

Seventy-eighth session
Agenda item 18
Sustainable development

Resolution adopted by the General Assembly on 7 June 2024

[*without reference to a Main Committee (A/78/L.70)*]

78/287. International Year of Quantum Science and Technology, 2025

The General Assembly,

Recalling its resolutions 53/199 of 15 December 1998 and 61/185 of 20 December 2006 on the proclamation of international years, and Economic and Social Council resolution 1980/67 of 25 July 1980 on international years and anniversaries,

Stressing that increased global cooperation, awareness and education in quantum science and technology could help to address the challenges of achieving sustainable development and the Sustainable Development Goals and improving the quality of life in countries around the world,

Recalling the need to mobilize and scale up the means of implementation, including financing, for science, technology and innovation, including the field of quantum science and technology, especially in developing countries, in support of the Sustainable Development Goals,

Emphasizing that quantum science and technology is vital for economic advancement and that its potential applications could address basic needs such as food, health, sustainable cities and communities, communications, clean water and energy, and support climate action,

Acknowledging the need to collectively address the challenges posed by quantum science and technology,

Recognizing that the year 2025 coincides with the 100th anniversary of the development of the methods of quantum mechanics that have led to its prominence in both science and technology today,

Stressing that the celebration of scientific discoveries provides an opportunity to promote science, technology, engineering and mathematics education and research for all, including youth, girls and women, especially in developing countries, in emerging technologies, and to encourage their greater participation in science, including opportunities for career development, and recognizing the achievements of women in science,

Emphasizing that, at the heart of the International Decade of Sciences for Sustainable Development, 2024–2033, lies the advancement of basic sciences and recognizing that quantum science offers unparalleled insights into the behaviour of matter and energy at the atomic and subatomic levels,

Acknowledging the recommendation made by the General Conference of the United Nations Educational, Scientific and Cultural Organization at its forty-second session for the United Nations General Assembly to proclaim 2025 the International Year of Quantum Science and Technology,[1]

1. *Decides* to proclaim 2025 as the International Year of Quantum Science and Technology;

2. *Invites* the United Nations Educational, Scientific and Cultural Organization to act as the lead agency and focal point for the International Year of Quantum Science and Technology, and invites all Member States of the United Nations, members of the specialized agencies, observers of the General Assembly, as well as organizations within the United Nations system and other international and regional organizations, academia, civil society, the private sector and other relevant stakeholders to observe 2025 as the International Year of Quantum Science and Technology;

3. *Recommends* that the International Year of Quantum Science and Technology should be observed through activities at all levels aimed at increasing public awareness of the importance of quantum science and applications; enhancing international, multilateral and interdisciplinary scientific cooperation among research institutions, researchers and innovators in quantum science and technology; and ensuring a focus on the application of quantum science and technology for sustainable development;

4. *Welcomes* initiatives aimed at harnessing quantum science and technology for sustainable development;

5. *Stresses* that the costs of all activities that may arise from the implementation of the present resolution should be met from voluntary contributions;

6. *Requests* the Secretary-General to bring the present resolution to the attention of all Member States, organizations of the United Nations system and other relevant stakeholders, including intergovernmental and non-governmental organizations, to promote the observance of 2025 as the International Year of Quantum Science and Technology.

88th plenary meeting
7 June 2024

[1] United Nations Educational, Scientific and Cultural Organization, *Records of the General Conference, Forty-second Session, Paris, 7–22 November 2023*, vol. 1, *Resolutions*, resolution 23.

Annexes 2:

UNESCO Executive Board document

216 EX/37

United Nations
Educational, Scientific
and Cultural Organization

Executive Board
Two hundred and sixteenth session

PARIS, 14 April 2023
Original: English

Item **37** of the provisional agenda

PROPOSAL FOR THE PROCLAMATION BY THE UNITED NATIONS OF 2025 AS AN INTERNATIONAL YEAR OF QUANTUM SCIENCE AND TECHNOLOGY

SUMMARY

The item has been included in the provisional agenda of the 216th session of the Executive Board at the request of Brazil, Egypt, Ghana, Japan, Jordan, Kuwait, Mexico, Paraguay, Republic of Korea, Senegal, Serbia, South Africa and Spain.

The corresponding explanatory note is included in this document.

Financial implications: none.

Decision required: paragraph 16.

Job: 202300897

I. Introduction and motivation

1. Quantum science and technology is the key cross-cutting scientific discipline of the twenty-first century, underpinning a wide variety of science and technology domains ranging from physics, chemistry, material science, biology, information science, among others. On the most fundamental level, it provides the basis for an understanding of the physical world, from the elementary constituents of matter to the origin and structure of our universe.

2. Quantum science and technology has enormous potential to impact on critical societal challenges such as climate, energy, food production, healthcare, and clean water as reflected in the Sustainable Development Goals (the "SDGs") of the United Nations Agenda 2030.

3. Applications foreseen in the next decades will see transformative advances in environmental sensing, the development of new materials, medicines, better batteries, more efficient solar cells, ultra-secure communications, and the ability of quantum computers to more precisely and accurately model complex physical systems critical to our existence, such as climate and extreme weather.

4. Support for the initiative comes from a wide representative group of over 30 major national scientific societies and academies from Africa, Asia, Europe, the Middle East, the American Continent and Oceania (https://quantum2025.org/). It has received the strong endorsement of the International Union of Pure and Applied Physics (IUPAP) at its 30th General Assembly on 21 October 2021 and from a number of important regional bodies, including the World Academy of Science (TWAS), the African Academy of Sciences (AAS) and the African Physical Society (AfPS); the Federación Iberoamericana de Sociedades de Física (FEIASOFI) and the Academia de Ciencias de America Latina (ACAL); the European Physical Society (EPS); The Network of African Science Academies (NASAC); and the International Commission for Optics (ICO).

II. Importance of Quantum Science and Technology

5. A yearlong programme will raise awareness of the central role that quantum science plays in human activities and of the potential for emerging technologies that are moving from devices that exploit our knowledge of quantum science, such as lasers and transistors, to the actual engineering of quantum systems at a basic level.

6. Applications of quantum technologies are responding to basic needs of humankind by providing better access to information and promoting sustainable solutions to global challenges. They have the potential to improve the quality of life in the developing world, and are key enablers to achieving the SDGs.

7. The industries based on quantum science and technology have become major economic drivers. Continuously emerging quantum technologies are bringing about revolutions in medicine, communications, information processing, energy production, and climate forecasting. It is therefore essential that the importance of quantum science and technology for global development is fully appreciated by the citizens of the world and by leaders and decision-makers. It is equally vital that the brightest young minds continue to be attracted to scientific and engineering careers in this field and acquire the capacity to contribute to the further development of quantum science and its applications for the benefit of humankind.

8. There is currently intense global effort and investment, particularly in industrialized countries, to harness the power of quantum science and technology. However, the importance of quantum science and technology for the global community is such that all nations need to develop educational, research, and industrial capacity in this central field. The key objective of an International Year of Quantum Science and Technology is to directly address this issue and to raise awareness within all sectors of society and in all countries of its potential to improve the quality of life of citizens worldwide. Through education and outreach we will focus on encouraging young people, and especially women from developing countries, to pursue studies and careers in quantum science and technology, and

to actively contribute to extending its frontiers and applying it to address humanity's most urgent and critical challenges.

III. Outcomes of an International Year of Quantum Science and Technology

9. An International Year of Quantum Science and Technology will enable coordinated awareness raising, educational, and outreach activities to take place worldwide with the following expected outcomes:

- Improved appreciation by the general public of the importance of quantum science and technology in research and development in scientific areas relevant to achieving the SDGs.
- Improved awareness amongst decision makers and leaders worldwide of the need to support educational and research activities in quantum science and technology on national levels, particularly to avoid detrimental South-to-North brain drain.
- The sharing of best practice initiatives in education and research between countries with different economies, particularly with regard to supporting technology transfer and entrepreneurship for the benefit of development.
- The development of new international networks linking researchers from different countries, focused on expanding research in quantum science, especially amongst young researchers with a special emphasis on gender equity and Africa.
- An improved appreciation by all citizens of the world of the achievements of science in shaping the modern world, particularly the nature of the scientific method which is an essential tool against scientific misinformation.
- Improved engagement by the public in the international scientific enterprise through participation in science communication, outreach and citizen science initiatives throughout the year.

IV. Importance of an International Year of Quantum Science and Technology

10. An International Year of Quantum Science and Technology will contribute to UNESCO and Member States to meet their obligations in the overall context of the 2030 Agenda for Sustainable Development and the Medium-Term Strategy for 2022-2029 (41 C/4) and leverage its convening power and the latest advances in scientific research and technological solutions in support of the least developed countries.

11. An International Year of Quantum Science and Technology will contribute to UNESCO to achieve two of its two global priorities – Africa and gender equality-- and facilitate UNESCO's role as a laboratory of ideas for generating innovative proposals and policy advice.

12. An International Year of Quantum Science and Technology will help realize the United Nations System-wide Action Plan on Gender Equality and the Empowerment of Women especially emphasizing the *equitable participation of women in scientific and technological developments, including frontier technologies*.

13. UNESCO has played a crucial role in many areas of science and technology including the designation and planning of, among others, the International Year of Physics (2005), the International Year of Astronomy (2009), the International Year of Chemistry (2011), the International Year of Crystallography (2014), the International Year of Light (2015) and the International Year of the Periodic Table (2019) and most recently the International Year of Basic sciences for Sustainable Development (2022). An International Year of Quantum Science and Technology will support the achievements of these previous observances and ensure that these gains are effectively followed

up and strengthened. Importantly, an International Year of Quantum Science and Technology will help UNESCO in its aim to build capacity in the important field of quantum physics in countries across the world, especially in Africa.

V. Conclusion

14. International Years may only be proclaimed by the United Nations during their annual General Assembly meetings, and only at the request of one (or more) of the United Nations Member States. Mexico, Brazil, the Arab Republic of Egypt, Ghana, Japan, the Hashemite Kingdom of Jordan, the State of Kuwait, the Republic of Korea, the Republic of Paraguay, the Republic of Serbia, the Kingdom of Spain, Senegal, and the Republic of South Africa, are taking the lead role in bringing this request forward, understanding that a significant number of other United Nations Member States will support this initiative.

15. An International Year of Quantum Science and Technology will support and raise the profile of UNESCO in pursuing its global leadership in building capacity in science and technology for sustainable development.

Proposed draft decision

16. In light of the above, the Executive Board may wish to adopt a decision along the following lines:

The Executive Board,

1. Having examined document 216 EX/37;

2. Considering that greater global awareness and understanding of the role of quantum science and technology in modern life is vital in addressing challenges in areas such as sustainable development, energy and community health, and for improving the quality of life across the world,

3. Stressing that quantum science and technology is vital for economic advancement and for the application of science and the implementation of new technology, including for the basic needs of food, health, sustainable cities and communities, communications, clean water, energy and the mitigation of risks from extreme weather and climate change,

4. Noting the broad and significant impact of recent initiatives of UNESCO's capacity-building programmes in science and technology and the enthusiastic commitment of the scientific community to continue to work with UNESCO on international coordinated capacity-building programmes in quantum science,

5. Also noting that this initiative does not have financial implications for UNESCO's regular budget, and encouraging UNESCO Member States, non-governmental organizations (NGOs) and other partners to provide funds that enhance the activities related to an international year of quantum science and technology,

6. Recognizing that it is vital to ensure that existing gains from previous UNESCO initiatives in science and education are effectively followed up and strengthened,

7. Also recognizing the commitment of UNESCO and its Member States to the 2030 Agenda for Sustainable Development,

8. Further recognizing the need to address the issue of gender inequalities in science by showcasing important quantum science role models and developing programmes to

encourage more women and girls to consider research in quantum science as a career, and to engage more girls through outreach actions in schools,

9. Decides to:

(a) welcome and endorse the recommendation to proclaim 2025 international year of quantum science and technology;

(b) include this item in the agenda of the 42nd session of the General Conference;

(c) recommend that the General Conference at its 42nd session adopts a resolution in this regard;

(d) invite the Director-General to support all efforts leading the United Nations General Assembly to proclaim 2025 international year of quantum science and technology.

Annexes 3:

Founding members' activities

American physical Society

General overview of IYQ 2025 activities supported by APS

As a leading nonprofit with a mission to advance physics by fostering a vibrant, inclusive, and global community dedicated to science and society, the American Physical Society (APS) played a critical dual role in IYQ 2025. APS served as a key organizational pillar—acting as part of the Secretariat and the fiduciary entity for the International Year—while executing a global strategy to advance public understanding, education, and engagement in quantum science and technology. Its activities ranged from organizing expert-led scientific symposia to widespread K-12 classroom engagement, helping ensure that quantum science is accessible to students, scientists, educators, and the public.

Contribution to IYQ 2025

Coordinating the global efforts of IYQ 2025 was a natural fit for APS. The Society sought to leverage the excitement of the International Year to increase young people's interest in quantum and science more broadly, improve quantum literacy globally, and lay the foundation for the next-generation workforce. APS worked to foster cross-sector partnerships with philanthropies, private companies, and science and education organizations as part of an effort to build a sustainable foundation for the future of the field.

APS's contribution was structured around three strategic pillars:

High-Impact Visibility: The Society anchored the

APS President John Doyle on stage at the IYQ Opening Ceremony in Paris. © APS.

year's public profile by participating in the IYQ Opening Ceremony and organizing major events like QuantumFest and the Kavli Foundation Special Symposium at the Global Physics Summit 2025. These events served as focal points for the global scientific community.

Education & Workforce: To address the talent gap, APS launched a robust suite of educational tools. The PhysicsQuest 2025 Toolkit brought quantum concepts into K-12 classrooms, while the Quantum-To-Go program connected scientists directly with over 130 classrooms in six languages. Additionally, the Quantum Career Fair and Teachers' Days at national meetings provided practical support for the next generation of innovators.

Global Connection: The Quantum Connect Webinar Series was a standout success, reaching nearly 2,000 participants across 30+ countries. This digital initiative effectively lowered geographical barriers, allowing researchers and students from the Global South to engage directly with leading experts.

APS's reflection on the year is clear: The momentum is real, and sustaining it is essential. IYQ's success has reinforced APS's capacity for high-impact engagement. APS is committed to continuing its role as a welcoming global hub, facilitating international collaboration and supporting the physics community's continued growth.

Deutsche Physikalische Gesellschaft (German Physical Society)

General overview of IYQ 2025 activities supported by the German Physical Society

The German Physical Society (Deutsche Physikalische Gesellschaft e. V.; DPG), which was founded way back in 1845, is the oldest national and, with more than 50,000 members, also the largest physical society in the world. The DPG was taking the lead in implementing the International Year of Quantum Science and Technology in Germany. Under the motto 'Quantum2025 - 100 years is just the beginning...', a wide variety of events and activities were organized.

The DPG's activities were aimed at those interested in quantum phenomena, including pupils, scientists, engineers, artists, art enthusiasts, and those interested in physics in general.

Contribution to IYQ 2025

DPG hosted special events, such as the Opening Ceremony in Germany with the participation of representatives from 15

physical societies and the Closing Ceremony with 3,000 participants from the public. DPG also organized a major international fall conference at the historic location of Göttingen. In addition, in 2025 DPG placed its recurring events within the Quantum Year, such as its annual Spring Meetings with about 8,000 participants. At one of these Ghana was "country of honor", with a delegation of 5 faculty members and 9 students to acknowledge Ghana's role in securing the IYQ with UNESCO and UN.

New projects carried knowledge into the public sphere, such as a quantum light source travelling

A suitcase with single-photon emitting artificial atom passes from one researcher to another in Rome during a tour of quantum dot labs – and sights – across Europe. © Fabrizio Mercoli.

across Europe or an online-map highlighting quantum locations in Germany. Tools like an experimental kit and a card game were created to enrich physics in schools. Interdisciplinary events combined physics and the arts, such as readings, poetry labs, art exhibits and museum tours. Projects looking at the history of quantum physics included an interactive website and initiatives promoting female quantum scientists.

The DPG provided a central calendar on www.quantum2025.de where more than 400 quantum events in Germany with a total of more than ten thousand participants were registered. An exhibition as well as the national closing event were under the umbrella of the DPG and partnerships with cities were made. Also, DPG reached international audiences via streamed events and international partnerships, e. g. working together with the European Physical Society towards the EPS Declaration "Europe and the Future of Quantum Science" and with the Physical Society of Japan towards the "Declaration for the future".

Key Reflection of the Year:

The DPG structured its activities into five thematic areas in an early stage to reach a broad audience. This structure helped to link complementary projects, to gain cooperations, and to advise external stakeholders. Also, it was useful to structure the website with its event calendar, so that everyone could filter according to their interests. Overall, an exceptionally successful project family. The financial support of the Wilhelm and Else Heraeus Foundation made many of the projects mentioned possible.

Institute of Physics

IOP Institute of Physics

General overview of IYQ 2025 activities

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland, with an active role in promoting co-operation in physics around the world. We strive to make physics accessible to people from all backgrounds.

Contribution to IYQ 2025

The IOP coordinated the UK and Ireland's contribution to the IYQ with the aim of celebrating the milestone for the community, exciting more people from a range of backgrounds to join us, and maintaining political momentum. The IOP represented the UK and Ireland on the IYQ International Steering Group and sub-committees, developed a calendar that aggregated UK and Ireland-wide quantum events on a dedicated webpage, and engaged with stakeholders across the UK and Ireland to ensure joined up awareness of relevant events and encourage participation in confirmed events; developed a set of core messages to raise public awareness of the urgent opportunity quantum represents; and ran three headline events for the quantum community, schools, and the public.

IOP's work during IYQ 2025 enabled and supported the NPL global metrology event, with 47 events listed on IOP's IYQ calendar and 957 participants in IOP events during 'quantum week' (including 40 speakers and 335 participants at the 4–5 November conference, 100 participants at the 7 November schools event, and 522 participants at the 7 November public discourse). Mimi's Tiny Adventure events attracted 2,177 visitors; 6 MPs attended the IYQ parliamentary drop-in; 13 'Quantum in 60 seconds' videos received 18,509 views; the Physics World Quantum Briefing received over 20,000 views; Physics World's top IYQ article received over 37,000 views; and Physics World's top 10 IYQ articles received over 150,000 views.

Optica

General overview of IYQ 2025 activities supported by Optica

Optica (formerly OSA), Advancing Optics and Photonics Worldwide, is the society dedicated to promoting the generation, application, archiving and dissemination of knowledge in the field. Founded in 1916, it is the leading organization for scientists, engineers, business professionals, students and others interested in the science of light. Optica's renowned publications, meetings, online resources and in-person activities fuel discoveries, shape real-life applications and accelerate scientific, technical and educational achievement.

Contribution to IYQ 2025

rptica organized several different types of celebratory activities for 2025.

Distinguished Lecturer Series: The Distinguished Lecturer Series was held at five different Optica meetings. Esteemed speakers talked about the past, present and future of the field.

Demystifying Quantum courses: Three Demystifying Quantum one-day courses were held. These courses were meant to enable researchers in adjacent fields to gain a level of fluency and familiarity in quantum science and to facilitate discussions and collaborations with quantum researchers developing transformative technologies that could be applied in other fields.

Annual Meeting Quantum Theme: Our annual meeting featured a Quantum theme as a vehicle to showcase early career research in quantum science and technology.

Corporate Engagement Executive Forum: Our Corporate Engagement team organized a special executive forum focused on quantum technologies.

Optica Publishing Group: Optica Publishing Group compiled and prompted a list of the most-cited papers in quantum optics from all of our journals that have been vetted by Editor representative from several journals.

Annexes 4:

Sponsors' activities

Microsoft

General overview of IYQ 2025 activities supported by Microsoft

Microsoft's mission is to empower every person and every organization on the planet to achieve more. The Microsoft Quantum team is dedicated to making research in chemistry and materials science faster, more accessible, and more productive with hybrid tools developed by combining the strengths of quantum, high-performance computing, and AI. At IYQ 2025, we sponsored several events, contributed to panel discussions, displayed exhibits, and led sessions and keynotes.

Contribution to IYQ 2025

Microsoft made many contributions to IYQ 2025 beyond our sponsorship of events. Having our scientists in Paris and hosting an industry panel session with Dr. Krysta Svore generated numerous discussions on quantum with event organizers and participants. We welcomed the opportunity to provide attendees with a sneak peek into the hardware that powers the quantum machine we are co-designing and building with Atom Computing. We were also able to speak directly to the scientific community about our latest advances in topological qubits, including our Majorana 1 quantum processor and we discussed our plans for future research and development of various quantum technologies.

Through these activities, we increased awareness of Microsoft's commitment to the collaborations that build and strengthen the global quantum ecosystem. Our quantum exhibit was a noteworthy addition to the displays, and it garnered a lot of positive feedback. Overall, our presence at IYQ 2025 helped to educate and engage attendees while sparking curiosity among the community.

SC Quantum

General overview of IYQ 2025 activities supported by SC Quantum

South Carolina Quantum advances quantum literacy and workforce development through statewide programs that link universities, educators, and industry partners. As a state-funded convening organization, we champion the peopleware that enables emerging technologies, preparing talent and institutions for meaningful participation in the quantum future.

Contribution to IYQ 2025

South Carolina Quantum contributed to IYQ2025 by advancing quantum literacy, workforce development, and unprecedented collaboration across education, industry, and the public. We founded the International Quantum Circuit, a global series of quantum hackathons, with our QuantathonV2 serving as the championship round. We also delivered statewide programs, including the Faculty Learning Series, the Industry Learning Series, and the Online Education Summer Sprint, which helped educators, students, and technical teams explore emerging quantum tools.

QuantathonV2: QuantathonV2 brought together nearly 100 students from eight countries and more than 20 mentors representing academia, industry, defense, and tech.

Quantum Roads working groups: As an NSF Innovation Engine finalist, we organized regional Quantum Roads working groups focused on Education, Commercialization, Industry and Innova-

Figure 11-7. Applying finishing touches to submissions at QuantathonV2 in Columbia, SC.
© SC Quantum.

tion, Economic and Workforce Development, and Outreach and Engagement. These groups helped institutions and companies understand where quantum adds value and how they can prepare for and share early adoption. More than 30 organizations joined our Regional Quantum Roads groups, many collaborating for the first time.

University curricula: We partnered with universities to build curricula that link quantum to real needs, including consultative selling programs, hardware and software training, and hands-on research.

K to 12 and public understanding: With partners, we developed K to 12 online learning and AI-enabled robotics programs that introduce quantum and STEM concepts. We also produced white papers, case studies, and economic reports to support broader public understanding. Our K to 12 robotics initiative is expected to reach hundreds of students.

Through these efforts, IYQ2025 became a pivotal timeframe in establishing South Carolina as a dynamic, globally competitive quantum destination.

Key Reflection of the Year

We learned that skepticism often comes from uncertainty, especially when quantum is compared to AI or framed by AI hype. Education and practical exposure help people see quantum more clearly and engage with it more confidently. We also saw that quantum's potential creates a powerful incentive for collaboration. Data from our programs shows that South Carolina has a unique industrial profile that stands to benefit from quantum technologies, and this shared opportunity has encouraged cooperation among groups that previously had little reason to work together.

Long Term Mechanisms

The next phase of our work involves supporting research and application projects across our university partners. These efforts will inherently include structured evaluation to track outcomes and long-term impact through the work itself. As SC Quantum shifts from convening to facilitating implementation, these projects will provide clear mechanisms for understanding progress and strengthening South Carolina's position as a competitive quantum destination.

D-Wave

D:WAVE
QUANTUM REALIZED.

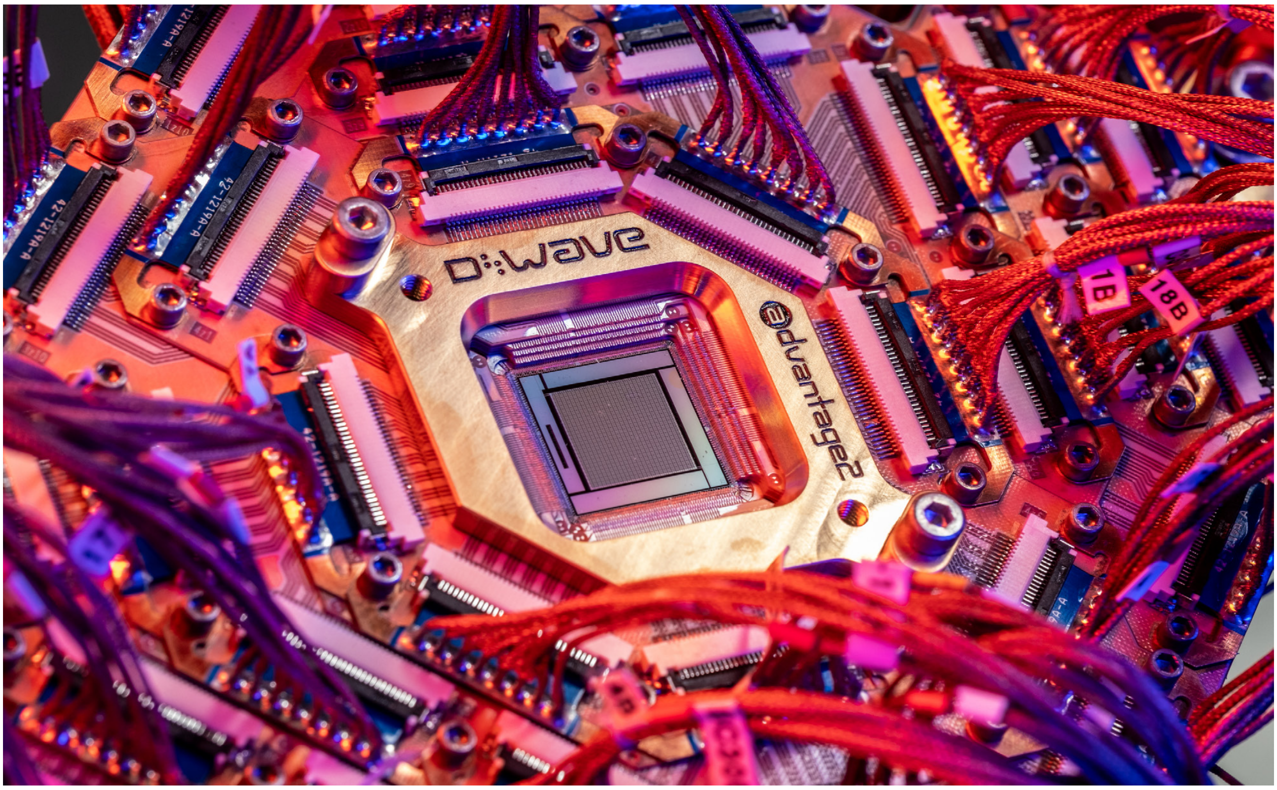
General overview of IYQ 2025 activities supported by D-Wave

D-Wave is a leader in the development and delivery of quantum computing systems, software, and services. It is the world's first commercial supplier of quantum computers, and the only company building both annealing and gate-model quantum computers. Its mission is to help customers realize the value of quantum today.

Contribution to IYQ 2025

D-Wave's contribution to the International Year of Quantum Science and Technology (IYQ) has been helping people understand what quantum computing is, how it works, and how it can deliver value today and in the future. D-Wave is committed to increasing public awareness about quantum technology through talks, masterclasses, hands-on demonstrations, open educational resources, and collaborations with organizations around the world. These efforts support IYQ's mission to raise awareness around the importance and impact of quantum science in daily life.

A central part of D-Wave's contribution to IYQ has been offering clear, trustworthy information in a field that is often misunderstood. The company actively works to dispel inaccuracies and explain quantum concepts in approachable ways. For example, by highlighting quantum applications in logistics, manufacturing, research, and other domains, D-Wave enables audiences to move beyond abstract ideas and develop a grounded understanding of quantum's real value.



close-up look at D-Wave's Advantage2 annealing quantum processing unit (QPU). This world-class QPU delivers significant performance gains over the previous D-Wave AdvantageTM system with doubled coherence time, enabling faster time to solution, and a 40% increase in energy scale, driving better quality solutions. © D-Wave.

Berthold Leibinger Stiftung

General overview of IYQ 2025 activities supported by Berthold Leibinger Stiftung

The Berthold Leibinger Stiftung supports non-profit, charitable and church organizations as well as its own funding projects as it pursues its mission of preserving and further developing innovative science, a rich cultural landscape and a strong social commitment within society. In the field of science, the biennial international awards Berthold Leibinger Innovationspreis and Zukunftspreis promote the advancement and recognition of outstanding achievements in research and development using and relating to laser light, including quantum optics.

Contribution to IYQ 2025

The Berthold Leibinger Stiftung is proud to be a distinguished philanthropic partner of IYQ. We participated at the inauguration of the IYQ in Paris and organized our own events as well as supported other activities.

On June 20, the laser technology awards ceremony was held with more than 400 international guests, celebrating in the theme of quantum science and technology and premiering ten "Icons of Quantum Science". This special artwork depicting these icons, ranging from Albert Einstein and Erwin Schrödinger to Mary Laura Chalk Rowles and Yoshio Nishina, has been made publicly available free of charge within the scope of the IYQ.

The 'Leibinger Begegnung' on November 26 demonstrated how science, industry and art can work together to shed new light on the quantum world. The Berthold Leibinger Stiftung and the University of Stuttgart hosted an evening event that highlighted fundamental physical concepts, as well as current research and applications.

Berthold Leibinger Zukunftspreis 2025 prize winner Jun Ye with Laudator Tommaso Calarco.
© Berthold Leibinger.

Frontiers

General overview of IYQ 2025 activities supported by frontiers

Frontiers is one of the world's largest gold open access publishers, dedicated to making peer-reviewed science openly available. Guided by the mission of enabling healthy lives on a healthy planet, Frontiers supports IYQ 2025 through Frontiers Science House activities and dedicated research topic collections across its journals, amplifying community-focused and interdisciplinary research. Our open science platform helps researchers collaborate, review, and rapidly share discoveries that drive innovation and positive societal impact.

Contribution to IYQ 2025

Frontiers is advancing the goals of the International Year of Quantum Science and Technology (IYQ 2025) through a powerful combination of scientific leadership, agenda-setting dialogue, and ecosystem building.

Scientifically, Frontiers is spotlighting the breadth of quantum research via dedicated open-access collections such as:

100 Years of Quantum Science and Technology, Recent Mathematical and Theoretical Progress in Quantum Mechanics, and Quantum Biology, which together map valuable areas of the field from foundational theory to transformative applications in life sciences.

Policy and innovation dialogue aspect will be driven through the Frontiers Science House in Davos (19–23 January 2026), a hub where scientists, industry, and policymakers meet. Three dedicated quantum events will address: the future impact of quantum processing on climate, biology, and secure communications; role of quantum technologies in future of industry; and new funding architectures for high-risk, high-reward, society focused science. The policy dialogue will cover accountability, incentive structures, and new finance mechanisms that can sustain open, mission-driven research while delivering societal value and long-term impact. Through these initiatives, Frontiers provides the IYQ community with an integrated platform for research dissemination, ecosystem building, and investment avenues in quantum science.

Frontiers' IYQ 2025 contributions are already delivering global impact through widely used, open scientific resources. The 100 Years of Quantum Science and Technology collection has reached over 20,000 views and downloads, supporting education and historical insight across the community. Recent Mathematical and Theoretical Progress in Quantum Mechanics has attracted more than 12,000 views and downloads, advancing core knowledge. The Quantum Biology collection exceeds 42,000 views and downloads, evidencing strong interdisciplinary uptake. Together, these open-access resources enable equitable, worldwide access to cutting-edge quantum knowledge for researchers, students, and practitioners.

© Frontiers.

Institute of Electrical and Electronics Engineers

General overview of IYQ 2025 activities supported by IEEE

IEEE Is the Global Community for Technology Professionals dedicated to advancing technology for the benefit of humanity. From technical Societies to industry events and platforms for collaboration, IEEE brings professionals from corporations, government, and academia together to solve real-world challenges.

Contribution to IYQ 2025

IEEE played a significant role in the International Year of Quantum Science and Technology (IYQ) by integrating the celebration into its flagship quantum event, IEEE Quantum Week. The program showcased the breadth of quantum innovation and featured a distinguished panel of Nobel Laureates recognized for their groundbreaking contributions to quantum technologies. Beyond highlighting scientific excellence, the event also emphasized entrepreneurship by hosting a start-up clinic aimed at supporting individuals interested in launching and growing their quantum technology companies. To strengthen ties between academia and industry, IEEE facilitated mentorship programs that connected students with professionals, fostering career development and collaboration. The week further included exhibitions and poster sessions that spotlighted cutting-edge advancements in both research and industrial applications of quantum technologies, creating a dynamic environment for knowledge exchange. In addition to its own programming, IEEE extended its participation to other IYQ-sponsored events, notably sending representatives to the 5th International Conference on the History of Quantum Physics. Through these efforts, IEEE reinforced its commitment to nurturing innovation, supporting emerging entrepreneurs, and building bridges between the scientific community and industry leaders during the global observance of IYQ.

IEEE Quantum Week 2025 delivered an exceptional program showcasing technologies from 80+

IEEE Quantum Week 2025 Exhibit Hall. © IEEE exhibitors, sponsors, and supporters across quantum companies, start-ups, and research labs. Nearly 1,800 registrants engaged in a dynamic lineup that included a career fair, student speed mentorship, nine keynote speakers, 37 tutorials, 41 workshops, 13 panels, 261 technical papers, 68 workshop papers, 146 posters, and three Birds-of-a-Feather sessions. The event fostered workforce development, community building, and innovation, reinforcing IEEE's commitment to advancing quantum science and technology.

Key Reflection of the Year:

IEEE was honored to participate in the International Year of Quantum, reinforcing our role as a global leader advancing technology for humanity. Hosting programs and activities that connect broad communities of students, researchers, entrepreneurs, and industry leaders is critical to accelerating quantum innovation. The experience highlighted how collaboration and mentorship fuel progress, while exhibitions and dialogue showcase the transformative potential of quantum technologies. Above all, our participation reaffirmed that fostering opportunities for people to engage, share knowledge, and build the future of quantum science is central to IEEE's mission and core values.

National Quantum Science and Technology Institute

General overview of IYQ 2025 activities supported by NQSTI

The National Quantum Science and Technology Institute (NQSTI) is a consortium of 20 Italian research institutions funded under the EU NextGenerationEU program. Its mission is to advance quantum research from fundamental science to technology transfer, while training new professionals and engaging the public. NQSTI's areas of activity include quantum computing, communication, simulation, sensing, and metrology, developed through atom-, photon-, and electron-based platforms. As an IYQ distinguished partner, NQSTI is committed to raising public awareness of quantum science and technology.

Contribution to IYQ 2025

IYQ Launch: The Second NQSTI National Congress (February 5-7, 2025, Rome) served as the official opening event of IYQ in Italy, bringing together researchers from all NQSTI spokes for presentations and thematic workshops.

Public outreach, education, and training: NQSTI celebrated World Quantum Day with the Quantum Game Library and a nationwide Quantum Marathon streamed live across Italy. The QUANTUM exhibition in Camerino offered interactive experiences for high school students, while the |Quant'ARTE Festival> in Milan explored quantum concepts through visual arts, engaging artists and design students. Summer schools for students (Bari) and teachers (Volterra) introduced quantum mechanics through hands-on activities. International schools in Catania and San Benedetto del Tronto provided advanced training in solid-state and photonic quantum technologies to early-career researchers and Ph.D. students.

Industry engagement and gender balance: Italian SMEs were introduced to quantum technologies through dedicated webinars, while QDeal25 brought together academia, industry, and institutions to build a national quantum technology transfer system. NQSTI-funded startups also joined

Round table about initiatives for quantum entrepreneurship in Italy. @NQSTI

Quantum 2 Business, Europe's largest quantum tech fair. IWQT25 showcased the contributions of Italian female scientists in quantum science and created networking and mentoring opportunities between established and early-career researchers.

NQSTI organized over 15 events across 10 Italian cities: Rome, Milan, Naples, Catania, Bari, Pisa, Camerino, Volterra, San Benedetto del Tronto, and Viagrande. Audiences included high school students and teachers, PhD students, early-career researchers, SMEs, artists, the general public, and female scientists. Events ranged from single-day conferences to multi-month exhibitions and international schools with speakers from Europe and the US. The geographical scope was primarily national. International participation was enabled through invited speakers and YouTube live-streaming, making content accessible beyond Italy. Key partnerships included industry associations and cultural institutions.

Key reflection of the year:

Our IYQ activities highlighted the importance of diversifying engagement formats to reach different audiences. The combination of scientific conferences, hands-on workshops, artistic initiatives, and live-streamed events proved successful in making quantum science accessible and engaging. The intersection of art and science through |Quant'ARTE Festival> demonstrated how creative approaches can spark public interest in complex topics. Gender-focused initiatives like IWQT25 underscored the need for continued efforts to promote inclusivity in quantum research. Finally, bringing together academia and industry through events like QDeal25 reinforced the critical role of dialogue in translating fundamental research into practical applications and fostering a robust quantum ecosystem.

Long Term Mechanisms

NQSTI implemented documentation mechanisms to preserve and assess IYQ activities' impact. Major events were live-streamed and recorded on YouTube, ensuring accessibility and future reach measurement. Registration systems collected participant data for follow-up evaluations. Scientific outputs were documented through Books of Abstracts for the national congress and international schools. The |Quant'ARTE Festival> produced a digital catalog of artistic works inspired by quantum science. Media coverage was systematically tracked through press reviews. These materials provide a foundation for assessing educational and outreach impact, while supporting future quantum literacy programs and maintaining engagement with communities reached during IYQ 2025.

Quantum Design Oxford

General overview of IYQ 2025 activities

Quantum Design Oxford is a world leader in cryogenic technology and measurement systems for materials physics and quantum technologies. We design, manufacture and support cryogenic platforms that are a key element of the quantum computing supply chain, with scalable systems underpinning superconducting and spin qubit devices across the eco-system from fundamental research and new quantum materials to device development and commercial quantum computing system integration. Our systems support the customer's development and investment pathway as they scale technically and organisationally.

Contribution to IYQ 2025

During IYQ 2025 we have contributed to multiple events and IYQ activities, as speakers and sponsors.

We have engaged particularly in events and partnership discussions around quantum skills and education, advocating strongly for hands-on technical training that will support a future quantum economy. We have specifically been a key participant in and supporter of the "Our Quantum Future" documentary.

Through IYQ 2025 Quantum Design Oxford has expanded existing partnerships and created new ones. We have been particularly encouraged and excited to see the growing acknowledgement of technical skills, education and training for quantum technology as a priority area to develop a quantum workforce of the future.

Centre for Quantum Information and Quantum Biology

General overview of IYQ 2025 activities

QIQB consists of six research groups: Quantum Computing, Quantum Information Fusion, Quantum Information Devices, Quantum Communications and Security, Quantum Measurement and Sensing, and Quantum Biology. We pioneer the frontiers of "Quantum 2.0" across a wide range of fields, from information and life sciences to even broader domains, through interdisciplinary research. Our aim is to advance fundamental science and implement quantum technologies into society, contributing to solutions for pressing global challenges.

Contribution to IYQ 2025

Quantum Innovation 2025 (QI2025) was held from 29 July to 2 August, 2025, in Osaka, Japan. The symposium brought together researchers, engineers, industry leaders, policymakers, students, and media.

Key Activities: The event featured invited talks and contributed presentations, poster sessions highlighting emerging researchers, and satellite workshops on practical quantum computing. Special sessions explored ambitious research directions and the societal application of quantum technologies. Impact and Overall Focus: QI2025 provided a platform for knowledge exchange, collaboration, and networking across academia, industry, and government. By connecting science, innovation, and policy, the symposium strengthened the research ecosystem, accelerated translation of discoveries into applications, and fostered future-ready talent. The event emphasized both cutting-edge research and real-world societal impact, positioning Japan and its partners at the forefront of global quantum innovation. The symposium brought together 968 participants from 27 countries, demonstrating strong global engagement in quantum science and technology. The program featured 148 invited speakers from 15 countries, highlighting the event's role as an international platform for cutting-edge research exchange. A total of 244 posters from 5 countries showcased diverse emerging work, and the 19 poster awards helped spotlight outstanding early-career and innovative contributions. Overall, the scale and diversity of participation underscore the symposium's importance in shaping future quantum research and collaboration.

The following topics were identified as being of greatest interest to participants for inclusion in the next symposium: Generative AI × Quantum; Manufacturing (including chemistry and materials) × Quantum; Information Technology / Telecommunications × Quantum; Startups / Emerging Industries × Quantum; Medicine / Pharmaceuticals / Biotechnology × Quantum; Core hardware technologies; and Defense / Space / Aerospace × Quantum.

University of Calgary

General overview of IYQ 2025 activities

The University of Calgary is Canada's entrepreneurial university in this country's most enterprising city. A leader in startup creation and research innovation, we're transforming bold ideas into real-world impact. As a proud supporting sponsor of the 2025 International Year of Quantum Science & Technology (IYQ), UCalgary celebrates 100 years of quantum mechanics and actively engages in research, education and industry partnerships that showcase quantum science's transformative impact on health, energy, computing and society. Through initiatives like Quantum City, its qConnect Summit Series, the world's first Professional Master of Quantum Computing program, and quantum-enabling infrastructure, we aim to inspire collaboration and raise public awareness of quantum technologies' potential to shape the future.

Contribution to IYQ 2025

The University of Calgary's main contributions to the 2025 International Year of Quantum Science & Technology (IYQ) include initiatives that advance quantum research, organizing industry and public engagement events and providing expertise in quantum science and technology. Through platforms like Quantum City's qConnect Summit Series, the launch of the second series in the Quantum City Global Challenge and Consortia Funding (to promote interdisciplinary research for quantum technologies), UCalgary brings together researchers, startups, industry leaders, investors and government to explore real-world quantum applications, foster collaboration and highlight the societal and economic impact of quantum technologies. These efforts align directly with IYQ's themes of raising public awareness, promoting education and showcasing the transformative potential of quantum science.

The University of Calgary's quantum initiatives have engaged hundreds of researchers, students and industry leaders, including over 250 attendees at qConnect 2025 as well as providing access to resources like Quantum City's qHub facility and discovery workshops. By signing agreements with international quantum tech venture capital firms and other Canadian quantum hubs, these efforts have strengthened Calgary's quantum ecosystem, fostering innovation, collaboration and public awareness of quantum science's societal and economic impact. UCalgary's Professional Master of Quantum Computing program has received a total of 10 applications for Fall 2026, and the Year of Quantum helped spark increased interest in the program, with 443 leads across events and campaigns. UCalgary's Faculty of Science brought in $2,276,540 in new funding for quantum research since January 1, 2025. We've learned that a thriving quantum innovation depends on strong collaboration between academia, industry, government and investors. Early engagement, inclusive outreach and national and international partnerships are key to translating research into real-world impact and building Calgary as a global quantum hub.

CLASSIQ

Contribution to IYQ 2025

Classiq is a quantum software company enabling scalable, production-ready quantum programs through high-level modeling and automated synthesis. Our mission is to make quantum computing software that is approachable, efficient and powerful. We collaborate globally with industry leaders, universities, and cloud providers. To foster talent, we offer free access for students, researchers, and support many hackathons—empowering the next generation to explore quantum computing and contribute to real-world innovation.

Classiq contributes to IYQ 2025 by advancing scalable quantum software and democratizing access to quantum programming. We support education through free platform access for students, researchers, and academics. We sponsor and participate in global hackathons, offer technical mentorship, and publish open-access research on quantum software. Through collaborations with universities, hardware vendors, and enterprises, we accelerate real-world adoption while empowering the quantum workforce, directly aligning with IYQ's goals of innovation, education, and ecosystem development.

Classiq's educational programs have reached thousands of students and researchers worldwide, offering free platform access across 100+ universities on all continents. We've supported over 30 hackathons and academic courses across North America, Europe and Asia. We contribute open-access research and maintain an extensive open-source quantum algorithm and applications library, helping educators, developers, and researchers build scalable quantum programs.

IBM

Contribution to IYQ 2025

IBM first made quantum computers accessible via the cloud in 2016, and has been a global leader in advancing quantum computing ever since. IBM provides global access to a fleet of 100+ qubit quantum computers, high-performance software tools, and educational resources, supporting the world's largest open-source quantum community. Its mission is to accelerate scientific discovery, build global technological capacity, and foster an inclusive quantum ecosystem. For IYQ 2025, IBM engaged in initiatives spanning education, international collaboration, policy dialogue, and research partnerships. These initiatives reached participants from 100+ countries, supporting thousands of student and professional learners and contributing to global discussions on quantum strategy and ecosystem development.

During IYQ 2025, IBM focused on advancing education, international collaboration, and responsible innovation while supporting the global quantum community. IBM shared technical expertise at events like the IYQ Opening Ceremony, addressing challenges in scaling quantum technologies and promoting responsible quantum development to a global audience of thousands. At the ITU FLIQ Hackathon, IBM led a track engaging over 400 participants from more than 30 countries, with 30 teams developing quantum solutions that were later showcased at the AI for Good Summit. Through the "Voices in Quantum" series, IBM connected 600–1,000 participants per session from over 100 countries, including students, researchers, and developers. IBM also collaborated with diplomats and policymakers at the Science, Technology and Innovation Forum to advance the understanding of national strategies and ecosystem development. In partnership with UNESCO and the Unitary Foundation, IBM contributed to a global survey that collected nearly 600 responses, providing empirical insight into disparities in quantum readiness worldwide. In addition, IBM supported over 40,000 students from 130+ countries through two IBM

Quantum flagship programs: the Qiskit Global Summer School and Qiskit Fall Fest, further strengthening global capacity in quantum education and skills development. These combined efforts demonstrate IBM's continued commitment to enabling, connecting, and supporting the worldwide quantum ecosystem.

IBM engagement during IYQ 2025 reinforced the importance of globally distributed programming in addressing disparities in access to quantum education and research opportunities. Survey findings and participant feedback highlighted the need for sustained support in underrepresented regions to ensure equitable development of quantum skills and capabilities. Collaboration among academics, industry professionals, and policymakers proved essential for advancing shared understanding of national quantum strategies and fostering a connected global ecosystem. These experiences underscore IBM's ongoing commitment to supporting the worldwide quantum community beyond the International Year of Quantum, through continued education initiatives, open-access tools, research partnerships, and multi-stakeholder collaboration, ensuring long-term capacity-building and inclusive growth in the field of quantum science and technology.

IBM will continue to maintain one of the largest open-access libraries of quantum courses and resources through IBM Quantum Platform and the Qiskit YouTube Channel, supporting continuous skill development, as well as provide hands-on learning opportunities to students through annual community engagements, such as the Qiskit Global Summer School and Qiskit Fall Fest. IBM will also continue to work with grassroots and educational organizations to make quantum computing more accessible across the world. In addition, IBM will continue to provide free access to quantum computers via IBM Quantum Platform, enabling researchers, students, and developers globally to experiment, learn, and contribute to quantum research. These ongoing initiatives serve as built-in monitoring and feedback mechanisms, allowing IBM to track participation, engagement, and learning outcomes while ensuring sustained capacity-building and growth in the global quantum ecosystem.

Zurich Instruments AG

Contribution to IYQ 2025

Zurich Instruments is a Swiss company with a passion for phenomena that are often notoriously difficult to measure. We provide advanced hardware, software and services for quantum computing control systems, lock-in amplifiers, impedance analyzers, and arbitrary waveform generators. As a company of scientists for scientists, we tackle challenges of research by delivering a wide product portfolio that reduces complexity of laboratory setups, unlocks new measurement strategies and complies to Swiss quality standards. Our commitment to collaborations and real-time support is reflected in seven offices worldwide, numerous research partnerships, and thousands of publications referring to Zurich Instruments. Since 2021, Zurich Instruments is a part of the Rohde & Schwarz and continues its scale up ambitions to advance science and accelerate the second quantum revolution.

Throughout the year, our focus remains on providing high-performance instrumentation that allows scientists to turn quantum concepts into reliable and scalable technologies. From quantum computing and sensing to photonics and materials research, our measurement and control solutions help laboratories build stable experiments, accelerate calibration, and generate reproducible results. With platforms such as the Quantum Computing Control System (QCCS), lock-in amplifiers, arbitrary waveform generators, and quantum analyzers, researchers gain the signal fidelity and integration needed to explore new physics and move toward larger scale quantum systems. In 2025, we partnered in quantum computer development that increase access for the research community in Germany, Australia, Czech Republic, USA, Korea, and more. Through two industrial collaborations newly started in 2025, we drive the development of critical technologies for enabling useful quantum computing: quantum error correction and hybrid quantum-classical computing. We helped share community know-how and broaden worldwide access to quantum research methods by publishing multiple open-access webinars, blog posts, tutorial videos, and application notes. With additional publications serving the general audience in the form of podcast episodes or interviews, we further support the IYQ mission to increase access to quantum technologies and highlight their impact across science and society. As the community marks this milestone year, Zurich Instruments remains committed to empowering researchers with tools that combine Swiss precision, advanced performance, and seamless software integration. In doing so, we help transform quantum science into technologies that shape the future.

Purdue University

Contribution to IYQ 2025

The Purdue Quantum Science and Engineering Institute (PQSEI) at Purdue University brings together leading quantum researchers and leverages collaborations with industry, government and academia to drive discovery of quantum phenomena and development of chip-scale quantum systems for tomorrow's technologies. The institute fosters collaboration between scientists who discover quantum phenomena and engineers who develop quantum technologies. Purdue also provides curricula, experiential learning opportunities and outreach efforts to help develop the quantum engineers and scientists of the future.

PQSEI recognizes transformational breakthroughs do not occur in a vacuum, but through intentional, multi-disciplinary collaboration. To that end, PQSEI promotes partnership both internally and across sectors. Purdue leads the Center for Quantum Technologies (CQT), a U.S. National Science Foundation funded Industry University Cooperative Research Center. With partner institutions Indiana University and the University of Notre Dame, along with a multitude of industry and government members, the CQT supports use-inspired, industry-relevant research and training. Purdue is also members of the Chicago Quantum Exchange and Midwest Quantum Collaboratory as we strive to grow the quantum ecosystem.

Purdue hosted the Quantum Science Center's Quantum Summer School in April 2025, which brought together renowned academicians and researchers from around the world to collaborate with each other, government and industry experts, and students. Speakers taught theoretical aspects of quantum study as well as discoveries that move the theory into application. Industry scientists and representatives provided insight and hands-on applied exercises. Graduate and postdoctoral students shared their research through a juried poster session and also developed personal and business networks that will shape their careers and the future of the quantum workforce. Over 100 students attended in Purdue's efforts to grow the quantum workforce.

Open Quantum Institute

OQI
Open Quantum
Institute

Contribution to IYQ 2025

The Open Quantum Institute (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 offers a neutral platform for international collaboration between research, diplomacy, private sector and philanthropy stakeholders. The work of OQI aligns strongly with the IYQ's mission – through driving global access to quantum computing resources, fostering international collaboration and working towards bridging the quantum divide.

OQI has contributed to the IYQ through advancing key themes such as capacity building, working towards mitigating the quantum divide, and promoting open science and raising awareness of the technology. Throughout 2025, OQI has supported the IYQ objectives through organising a number of hackathons, Quantum Diplomacy Games and regional events that highlight quantum computing use cases and foster the sharing of open access resources and education. These contributions align with IYQ's goals of fostering widespread quantum awareness and capacity-building, as well as working towards mitigating the quantum divide. OQI was also represented on the IYQ Steering Committee by Enrica Porcari, Strategic Advisor to OQI and Head of CERN IT, playing a pivotal role in overseeing the global activities and initiatives aligning with the IYQ in 2025. OQI played a leading role in launching the IYQ in Geneva and Paris. Building on this momentum, the OQI and UNESCO issued a global call to action, urging all actors to champion quantum innovation centered on ethics, inclusion and the wellbeing of humanity and the planet beyond the IYQ in 2025.

OQI's educational consortium brings together domain experts, quantum experts and diplomatic stakeholders to advance capacity building initiatives: 70 global institutions and 100+ experts involved. 5 OQI-supported hackathons and 2 OQI-inspired hackathons taking place across 5 continents in 2025: 380+ participants and 320 certificates provided to participants. 15 Quantum Diplomacy Games played in 2025, with over 500 participants. Capacity building activities took place in 15 countries. To date, 19 use cases have been supported by OQI, exploring the impact of quantum computing on the SDGs, with 10 currently active along the OQI pipeline.

Multistakeholder engagement across research, diplomacy, industry and philanthropy is essential. Capacity building activities taking place around the world highlight the need for promoting open access resources and education, especially in quantum underserved regions. Proactive science diplomacy efforts, amplified by global partnerships, is critical for mitigating the quantum divide beyond 2025, ensuring the development of inclusive governance frameworks and sustained momentum from global events.

Quantum Algorithms Institute

Contribution to IYQ 2025

The Quantum Algorithms Institute (QAI) is a non-profit organization advancing quantum solutions through collaboration with government, academia, and industry. Its mission is to drive economic growth in British Columbia (BC) by fostering quantum literacy, preparing a skilled workforce, and helping organizations adopt quantum technologies. QAI builds on BC's strengths to create a thriving quantum ecosystem and position the province as a leader in innovation.

In 2025, QAI contributed to IYQ 2025 through outreach, responsible innovation activities, and participation in national and international dialogue. QAI took part in the International Year of Quantum Opening Ceremonies at UNESCO Headquarters in Paris in February 2025. As the hosting partner of the Centre for Responsible Quantum Innovation and Technology (CRQIT), QAI supported several IYQ-aligned activities. These included the CRQIT World Quantum Day panel on April 14, 2025, organized with the Perimeter Institute, which examined ethical development, equitable access, and regulatory preparedness. CRQIT also supported and participated in a virtual North American workshop on responsible quantum in preparation for the IYQ gathering in Istanbul. Input from this workshop will contribute to international documentation and the action plan emerging from the Istanbul event. QAI contributed to the BC kickoff of IYQ through the February 2025 Quantum Mixer, fostering cross-sector connections. QAI also participated in Web Summit 2025 by co-organizing sessions on Quantum & AI and delivered a keynote, helping situate regional perspectives within broader global conversations.

QAI's IYQ 2025 activities supported awareness, connection, and responsible innovation across multiple regions. The BC Quantum Mixer gathered over 70 participants locally. The CRQIT World Quantum Day panel and the virtual North American responsible quantum workshop engaged audiences across Canada and the United States, contributing input to upcoming IYQ documentation for the Istanbul event. QAI's participation in Web Summit 2025 extended quantum-related discussions to broader technology communities. These activities helped integrate BC and Canadian perspectives into global IYQ initiatives. IYQ 2025 showed the value of combining local, national, and international engagement to support responsible quantum development. A key lesson was the importance of accessible, cross-disciplinary communication when discussing ethical, regulatory, and societal considerations. QAI and CRQIT monitor the impact of IYQ 2025 activities through community roundtables, event attendance, participant feedback, and follow-up engagement with partners. These monitoring practices help ensure that themes raised during IYQ 2025, such as ethical development, regulatory readiness, and cross-sector collaboration, continue to guide future programs and partnerships.

Open Quantum Design

Contribution to IYQ 2025

Open Quantum Design (OQD) is a federally incorporated not-for-profit organization created to democratize access to quantum technologies through open-source hardware, software, and community collaboration. Our mandate is to build and maintain openly accessible, full stack trapped-ion quantum computing platforms that strengthen Canada's innovation capacity, support SMEs, and expand opportunities for researchers, students, and industry partners. Core activities include quantum computing hardware development, open-source toolchain creation, attraction, retention and mobilization of IP, training and talent programs, ecosystem convening, and support for applied R&D and commercialization across the globe.

The Founders and Physicists event, featuring keynote speaker Dr. Rajibul Islam, played a pivotal role in showcasing the extraordinary potential of quantum technologies to government, business, and community leaders. Dr. Islam—one of Canada's foremost quantum scientists and a global leader in trapped-ion systems—offered an accessible, compelling vision of how quantum innovation is rapidly moving from frontier science to real-world impact. His keynote illuminated how quantum computing, sensing, and communications will transform sectors ranging from finance and cybersecurity to energy, health, and advanced manufacturing. The event successfully bridged cutting-edge research with practical opportunity, giving leaders a rare, first-hand understanding of the breakthroughs emerging from Canada's quantum ecosystem. Conversations sparked between founders, scientists, policymakers, and industry executives underscored how collaboration is essential to unlocking quantum advantage. Ultimately, the event deepened awareness, inspired strategic interest, and strengthened the network needed to accelerate Canada's role in the global quantum economy.

With 80 leaders in attendance, the event created a rare, high-density forum where decision-makers from government, industry, and the community engaged directly with frontier quantum science. The strong turnout demonstrated a deep and growing appetite to understand how quantum technologies will shape economic competitiveness, security, and innovation. Connections formed at the event are already helping to strengthen cross-sector collaboration, accelerate partnership discussions, and expand the network of champions needed to advance quantum leadership. We learned that bringing quantum experts together with entrepreneurs and business leaders is essential, because meaningful knowledge exchange between these communities is the only way to unlock the full commercial and societal potential of quantum technologies.

International Union of Pure and Applied Physics

Contribution to IYQ 2025

The International Union of Pure and Applied Physics is the only international organization covering all physics areas. Its members are identified physics communities from all over the world. IUPAP's mission includes assisting in the worldwide development of physics, fostering international cooperation in physics, and helping in the application of physics toward solving problems humanity's concern. IUPAP was a participating partner of IYQ. Among other things, it organized the IUPAP/IYQ Photo Contest and, with UNESCO, a series of online colloquia.

IUPAP was directly involved in the organization and execution of two IYQ activities. On one hand, it organized and ran the IUPAP/IYQ2025 Photo Contest to portray the beauty of quantum processes, the presence and impact of quantum science and technology on our everyday lives and the ways in which quantum research and education is carried out all over the world. The contest had two categories: "Beyond our eyes", devoted to images obtained through scientific equipment or produced via numerical simulations of quantum processes, and "At a glance" for all other photos. Submissions were open through mid-September and the winners were publicly announced on October 24th. Three awards were given in each category. IYQ recognized the activity as a Global Event and gave moderate funding which was used to cover (partially) the monetary prizes. IUPAP also partnered up with UNESCO to organize the series of online colloquia "Physics for Society" which, in 2025, focused on QST themes. All the colloquia were recorded and are available on YouTube. The Photo Contest received thirty entries from 20 different countries: India, Italy, Spain, Venezuela, Brazil, USA, Algeria, South Africa, Netherlands, Canada, Romania, Jordan, Nigeria, Cameroon, France, Iran, Peru, Pakistan, Japan and Nepal. The winning entries came from India, South Africa, Switzerland, Canada, Italy and a Peruvian student currently studying at the ICTP in Trieste. This shows the global nature of the activity. The largest number of simultaneous participants of the online colloquia was over 300 for the inaugural one by Anne L'Huillier. The videos on YouTube have between 113 and 171 views. We need to insist more advertising the calls and announcements to remind people to participate in the activities.

The Physical Society of Taiwan

Contribution to IYQ 2025

The Physical Society of Taiwan (TPS) is a non-profit academic organization representing physicists in Taiwan. Its mission is to promote physics research, education, and international collaboration. For IYQ 2025, TPS engages in scientific outreach, educational activities, and public lectures to increase public awareness and understanding of quantum science and its societal impact.

In support of the IYQ 2025, the Physical Society of Taiwan (TPS) coordinates and supports a year-long series of public, educational, and scientific activities in Taiwan. These include the national opening ceremony for IYQ 2025, public science events linked to World Quantum Day, and large-scale exhibitions introducing quantum science, technology, and applications to the general public. TPS also contributes through education-focused initiatives, such as science camps, youth programs, and hands-on learning experiences designed for different age groups, from children to university students. Interactive exhibitions, lectures by experts, and game-based learning activities are used to communicate key quantum concepts in accessible ways. In collaboration with research institutes and science museums, TPS helps provide scientific expertise, organizational coordination, and outreach support, reaching a broad audience across Taiwan. Through these 35 activities, TPS promotes public awareness, education, and societal engagement with quantum science in alignment with the goals of IYQ 2025.

Nature Photonics

Contribution to IYQ 2025

Nature Photonics is a monthly journal dedicated to this exciting field and publishes top-quality, peer-reviewed research in all areas of light generation, manipulation and detection.

In the February 2025 issue of Nature Photonics, the journal features an Editorial of "A year full of quantum celebrations" with quotes from Amal Kasry from UNESCO, and an Interview on "It's big quantum time" with Sir Peter Knight, the co-chair of the IYQ 2025 Steering Committee.

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The Quantum Moment

A Global Report

Outcomes of the International Year of Quantum Science and Technology

This Global Report captures the International Year of Quantum Science and Technology as a landmark moment of global momentum around one of the most transformative scientific frontiers of our time. Driven by the efforts of partners across science, education, policy, industry and civil society, IYQ 2025 brought quantum science into wider public awareness and international dialogue. Drawing on evidence gathered throughout the Year, including UNESCO's Global Quantum Research and Infrastructure Survey, the Report presents key achievements, maps the evolving global landscape, and highlights the structural gaps that continue to shape participation and readiness worldwide.

With 83 participating countries, more than 1,300 events and an estimated 1.2 million participants, IYQ 2025 showed both the scale of global interest in quantum science and the urgency of ensuring that its future is more inclusive, responsible and broadly shared. More than a record of a remarkable international year, this Report is an invitation to carry its momentum forward through sustained cooperation, wider participation and renewed commitment to shaping a quantum future that benefits all.

INTERNATIONAL YEAR OF
Quantum Science
and Technology

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