Quantum Report (4)

# International Cooperation Essential for the Development of Quantum Technology and Japan's Initiatives

Quantum technology is an emerging field that is still in the process of being established. The associated market remains in its infancy, with potential applications extending into largely uncharted territory. Consequently, it is difficult for any single country to achieve practical implementation on its own, making collaboration with other nations essential. Governments and industries have a strong awareness of this need, as evidenced by the numerous agreements and policy documents concerning international cooperation.

This report reviews the status of Japan's international partnerships in the field of quantum technology and introduces its initiatives related to international standards, which are regarded as one of the key enablers of practical deployment.

## ■ Collaboration with Leading Western Countries

To advance the research, development, and practical application of unprecedented technologies, remaining confined within national borders is insufficient, and collaboration with overseas partners is indispensable. Quantum computing is a prime example of this, and the Japanese government has concluded memoranda of cooperation and letters of intent with multiple countries and regions, strengthening cooperative relationships, primarily with Europe and North America (Table 1).

In addition to bilateral partnerships, multilateral cooperation is also of critical importance. At the G7 Kananaskis Summit held in Canada in June 2025, the G7 released the "Kananaskis Common Vision for the Future of Quantum Technologies (146KB)" as one of its several statements. To maximize the potential of quantum technology, it is necessary to promote public and private investment, develop and apply use cases involving a wide range of stakeholders, share best practices, develop human resources, establish fair and open market environments, and build reliable ecosystems. Toward these goals, the necessity of international collaboration among the governments, industries, and research communities of the G7 countries—nations that share common values and interests—was widely recognized.

**Table 1: Frameworks for Cooperation on Quantum Technologies Between Japan and Other Countries and Regions (as of March 2026)**

| Date | Country | Memorandum of Cooperation/ Letter of Intent/Statement | Outline |
|---|---|---|---|
| December 2019 | U.S. | Tokyo Statement on Quantum Cooperation | In recognition of the promising future of quantum science and technology and the understanding that international partnerships can accelerate the realization of new technologies, cooperation will be continued and strengthened. |
| January 2025 | Denmark | Memorandum of Cooperation on the Area of Quantum Science and Technology | Promoting broad cooperation among academia, industry, and government in the field of quantum technology. |
| April 2025 | U.K. | Memorandum of Cooperation on Quantum Science and Technology | Promoting broad cooperation across quantum academia, industry, and government in the quantum field. |
| May 2025 | EU | Letter of Intent on Quantum Technology Cooperation | Strengthening the cooperative relationship between Japan and the EU on quantum technology on a broad scale, and accelerating personnel exchanges, joint research, and information sharing. |
| June 2025 | Germany | Letter of Intent on Strengthening Cooperation in Science, Technology and Innovation | Strengthening cooperative relations further, taking the 50th anniversary of the science and technology cooperation agreement between the two countries as an opportunity, and exploring cooperation in fields such as quantum technology, fusion, AI, and robotics. |
| October 2025 | Switzerland | Memorandum of Cooperation in Quantum Science and Technology | Based on past cooperation agreements, strengthening collaboration in a wide range of fields and promoting the development of the quantum ecosystem. |
| October 2025 | U.S. | Memorandum of Cooperation Regarding the Technology Prosperity Deal | Strengthening bilateral cooperation further in strategic science and technology fields such as AI, quantum, fusion, and space. |

| Date | Country | Memorandum of Cooperation/ Letter of Intent/Statement | Outline |
|---|---|---|---|
| January 2026 | Singapore | Memorandum of Cooperation on Quantum Science, Technology, and Innovation | Strengthening cooperation based on the "Japan-Singapore Economic Partnership Agreement" and cooperating in eight fields including quantum research, academic and private sector exchanges, human resource development, and standardization. |
| May 2026 | India | Letter of Intent on Quantum Science, Technology, and Innovation | Promoting collaboration in a wide range of fields from research and development to social implementation, industrial cooperation, and human resource development. Expected to be implemented primarily by universities, research institutions, and related organizations of both countries under the Cabinet Office and the Indian Ministry of Science. |

Source: Prepared by JETRO based on official announcements by the Cabinet Office

Connections are important not only between governments but also with the world's leading companies, startups, and research institutions that are competing to achieve breakthroughs in new technologies. Against this backdrop, various companies and research institutions are independently expanding their domestic and international collaborations.

The Global Research and Development Center for Business by Quantum-AI Technology (G-QuAT) of the National Institute of Advanced Industrial Science and Technology (AIST) has concluded cooperation agreements, including Memoranda of Understanding (MOUs), with government-affiliated organizations, research institutes, and private companies in 14 countries (Table 2). AIST's partnership policy is designed to satisfy at least one of the following criteria: (1) being a like-minded country that can also contribute to opportunities for Japanese companies to expand overseas, (2) contributing to the development of quantum computer supply chains and use cases, (3) serving as an opportunity for promoting cross-border talent development and personnel exchanges, and (4) contributing to international cooperation in areas such as standardization. These represent important steps to take in the development of G-QuAT's international network.

G-QuAT consolidates three key services in one location: a quantum-classical hybrid computing platform, an evaluation testbed, and a superconducting quantum circuit prototyping facility. This integrated environment has been highly valued, and concrete discussions on collaboration are now

underway, beginning with the agreement. In this way, G-QuAT serves as one of Japan's leading quantum hubs, and by connecting with corresponding hubs in other countries and regions, it accelerates the mobility and exchange of talent across borders. Furthermore, aiming to promote access to global markets for Japanese companies, it widely provides academia and private companies with opportunities for research and development as well as demonstrations toward commercialization (Note 1).

**Table 2: Organizations with Which AIST/G-QuAT Has Concluded Quantum-Related Collaboration Agreements (as of March 2026)**

| No. | Country/Region | Organization Name | Cooperation Details |
|---|---|---|---|
| 1 | U.S. | National Institute of Standards and Technology (NIST) | Cooperation in quantum technology |
| 2 | Canada | National Research Council Canada (NRC) | Cooperation in quantum technology |
| 3 | South Korea | Korea Research Institute of Standards and Science (KRISS) | Cooperation in quantum information science |
| 4 | U.S. | Keysight Technologies | Quantum control and cryogenic electronics, modeling and simulation, and standardization |
| 5 | U.S. | IBM | Development of next-generation quantum computers, supply chains, and practical business use cases |
| 6 | U.S. | QuEra Computing | Collaboration toward the commercial application of quantum computing |
| 7 | Finland | Bluefors | Development of next-generation dilution refrigerators |
| 8 | Finland | IQM | Promotion of the practical application of quantum computing across industries |
| 9 | U.S. | Intel | Industrialization of silicon quantum computers |
| 10 | U.K. | ORCA Computing | Industrialization of scalable photonic quantum computing |
| 11 | U.K. | Universal Quantum | Development of ion-trap quantum computers and related technologies |

| No. | Country/Region | Organization Name | Cooperation Details |
|---|---|---|---|
| 12 | Singapore | Agency for Science, Technology and Research (A*STAR) | Research on impactful quantum computing use cases |
| 13 | U.S. | IonQ | Development of scalable ion-trap quantum computers |
| 14 | Netherlands | Quantum Delta NL | Personnel exchange, testbeds, and test protocols |
| 15 | Ireland | Equal1 | Use cases, computing system development, and supply chains |
| 16 | Germany | German Aerospace Center (DLR) | Use cases and algorithms, and quantum-HPC hybrid computing |
| 17 | U.S. | NVIDIA | Quantum-AI hybrid computing |
| 18 | Thailand | QTFT | Creation and demonstration of real use cases |
| 19 | Denmark | Quantum Denmark | Bilateral exchange of quantum systems |
| 20 | U.K. | National Physical Laboratory (NPL) | Collaboration in standardization activities and personnel exchange |
| 21 | U.K. | National Quantum Computing Centre (NQCC) | Promotion of the fusion of quantum computing and AI technology |
| 22 | Malaysia | National University of Malaysia (UKM) | Personnel exchange and use case development |
| 23 | Taiwan | NCHC (National Center for High-Performance Computing) | Quantum-HPC hybrid computing |
| 24 | Australia | Pawsey Supercomputing Research Centre | Quantum-HPC hybrid computing |
| 25 | Finland | VTT | Use cases and algorithms, and quantum-HPC hybrid computing |

Note: Listed in chronological order. This table includes only those related to quantum. Some of the organizations and companies listed may have mentioned cooperation in areas other than quantum in their memoranda.

Source: Prepared by JETRO based on various websites.

Several research and development institutions are located in the vicinity of Tsukuba City, Ibaraki

Prefecture, where G-QuAT is based, including the University of Tsukuba, the Japan Aerospace Exploration Agency (JAXA), the National Institute for Materials Science (NIMS), and the National Research Institute for Earth Science and Disaster Resilience (NIED). These organizations are engaged in fields that are considered promising application areas for quantum computing, making the area a favorable environment for the development of practical use cases. Masahiro Horibe, Deputy Director of G-QuAT, says, "We welcome outstanding companies—not only from Japan but also from overseas—to locate operations in our incubation facility, and we hope they will drive innovation by taking advantage of the location environment of this facility."

The Quantum STrategic industry Alliance for Revolution (Q-STAR) is a council established with the aim of "fostering quantum-related industries and businesses," with 158 organizations listed as members as of May 2026, including more than 10 Japanese subsidiaries of foreign companies. More than half of its membership consists of end-user organizations. Q-STAR has seven subcommittees, including the "Quantum Cryptography and Quantum Communication Subcommittee" and the "Quantum Materials, Devices, and Sensing Subcommittee," and in each subcommittee, companies collaborate across organizational boundaries to explore use cases and develop, formulate, and validate hypotheses on a wide range of themes.

In addition to the subcommittees, there are nine cross-subcommittee working groups (WGs) responsible for policy recommendations and human resource development, among which is the Overseas Industry Collaboration WG. This WG has been building partnerships with overseas quantum-related organizations, and in January 2023, four industry associations—the Quantum Economic Development Consortium (QED-C) of the United States, Quantum Industry Canada (QIC), the European Quantum Industry Consortium (QuIC), and Q-STAR—established the International Council of Quantum Industry Associations (ICQIA).

Furthermore, in conjunction with the intergovernmental MOU with the United Kingdom, Q-STAR signed Memoranda of Cooperation with UKQuantum, the UK's quantum industry consortium, in April 2025, and with the Novo Nordisk Foundation Quantum Computing Programme (NQCP), a quantum computer research and development organization in Denmark, in October 2025. In May 2026, UKQuantum and the Korea Quantum Industry Association (KQIA) newly joined the ICQIA alliance, further expanding the network. Together, these developments represent significant milestones in building an international cooperation framework for quantum technology. Hirofumi Mori, the head of the WG, says, "We are working to obtain information on global trends in the quantum industry and the latest developments in various countries, enhance our presence by actively communicating Japan's initiatives overseas, and promote recognition that Japan is a key component of the global quantum supply chain." While individual organizations have been deepening their international ties independently, G-QuAT, Q-STAR, and JETRO signed a Memorandum of Cooperation for promoting international collaboration in the quantum technology field in March 2026 (see linked-in post). The three parties aim to jointly

strengthen international competitiveness by promoting collaboration with domestic and overseas companies, research institutions, universities, and government agencies, and by fostering innovation in Japan's quantum field, accelerating industrialization, and advancing the ecosystem, with synergistic effects expected.

## ■ Toward the Formation of International Rules That Leverage Japan's Strengths

Research and development on quantum computing is progressing globally, and its applications are expected to expand further in the years ahead. Consequently, discussions on international standardization are becoming increasingly important. In Japan, the Basic Policy Subcommittee of the Japanese Industrial Standards Committee under the Ministry of Economy, Trade and Industry (METI) published "Development of a New Standards and Conformity Assessment Policy - Japan's Standardization Acceleration Model 2025" (June 2025) (Note 2), in which five pilot fields, including quantum technology, were designated. Since quantum technology and its market are still in their early stages, Japan intends to promote market creation by taking the lead in shaping the rules for international standardization.

International standardization in the quantum field is being advanced both for quantum technologies as a whole and for specific application areas, such as quantum key distribution (QKD), an encryption key-sharing technology regarded as enabling virtually eavesdropping-proof key sharing. The former is led by JTC 3, the joint technical committee of the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO), while the latter is led by the Telecommunication Standardization Sector of the International Telecommunication Union (ITU-T). As of June 2026, ISO/IEC JTC 3, which covers quantum technologies in general, comprises 44 participating countries (Note 3), and eight working groups (WGs) have been established. Japan seeks to promote both the social implementation and research and development of quantum technologies by presenting not only the technical aspects of actual systems but also industrial use cases. As a means of achieving these objectives, Japan has proposed leveraging international standards within the committee framework. Q-STAR, the industry association responsible for domestic review of ISO/IEC JTC 3, is compiling opinions from its member organizations and other stakeholders toward the establishment of international standards that ensure Japan's competitive advantages and benefits for industry. Additionally, in WG12, "Benchmarking of Quantum Computing," Dr. Horibe, Deputy Director of G-QuAT, was appointed from Japan as the Convener, the person responsible for coordinating the technical content. By leading the international standardization efforts, such as metrics for evaluating quantum computer performance, Japan is enhancing its presence and influence in the global quantum technology community.

In specific application areas, Japan has been actively engaged in the development of Quantum Key Distribution (QKD) and has developed the world's highest-performance QKD systems. Proposals submitted by Japan based on these technologies formed the framework for ITU-T's first international standard on QKD. It is expected that the acceleration of relevant standardization efforts will make it

easier for companies to invest in QKD-related product development and service creation, thereby encouraging wider adoption by users.

In this way, Japan has been working in close collaboration with leading countries through coordinated efforts among the government, research institutions, and industry on technology development and use case creation. At the same time, it has been actively participating in international standardization frameworks, with the aim of shaping rules that leverage Japan's strengths. In the quantum-related market, which is expected to expand significantly in the coming years, the ability to lead market formation through international standards as well as technology will be a critical factor in determining Japan's global competitiveness.

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Note 1: G-QuAT has started providing services for "ABCI-Q," a quantum-classical hybrid computing platform that offers cloud-based environment connecting a GPU-equipped supercomputer with three types of quantum computers (superconducting, neutral atom, and photonic quantum). Furthermore, by providing "Qubed," an evaluation testbed for assessing components and other materials, and "Qufab," a superconducting quantum circuit prototyping facility that provides contract fabrication services for superconducting devices and other products, G-QuAT has established an integrated environment covering the entire process from research and development to prototyping, evaluation, and practical utilization, thereby promoting the social implementation of next-generation computing infrastructure.

Note 2: This was compiled in response to changes in the environment following the formulation of the "Japan's Standardization Acceleration Model" by the Basic Policy Subcommittee of the Japanese Industrial Standards Committee in June 2023. In addition to quantum technology, the four other pilot areas are hydrogen and ammonia, biomanufacturing, data sharing platforms, and perovskite solar cells.

Note 3: Of the 44 countries participating in JTC 3, 34 are project member countries with voting rights (including the United States, Israel, the United Kingdom, Germany, France, and Japan), while the remaining 10 are observer countries without voting rights (including Singapore, Thailand, Belgium, South Africa, and Mexico). For details on all participating countries, please refer to the IEC website.

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