



Recommendation of the Council on Quantum Technologies

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Background Information

The Recommendation on Quantum Technologies was adopted by the OECD Council on 28 May 2026 on the proposal of the Digital Policy Committee (DPC) and the Committee for Scientific and Technological Policy (CSTP). The Recommendation is the first intergovernmental standard establishing shared principles and policy guidance for the responsible development and use of trusted quantum technologies. It aims to strengthen quantum innovation, security, interoperability and international co-operation while managing risks, including those related to cybersecurity, privacy and other forms of misuse.

The OECD's work on quantum technologies

The OECD is a leading international forum for policy dialogue on quantum technologies based on a multi-disciplinary approach and strong analytical work. In December 2023, an OECD Global Forum on Technology (GFTech) focus group brought together government officials, industry experts, academics, and other stakeholders from Member countries and partners, to advance international dialogue on quantum technologies. The evidence and insights gathered through this multistakeholder engagement informed the development of the OECD's [Quantum Technologies Policy Primer](#), published in January 2025, which highlighted the need for internationally agreed principles to support the responsible development and use of quantum technologies. The Recommendation builds on this work and complements existing OECD standards on digital policy, emerging technologies and transformative science and technology policy.

The Recommendation was developed in response to the significant opportunities and risks posed by quantum technologies: while these technologies could drive breakthroughs across sectors such as healthcare, energy, finance and transportation, they also raise significant policy challenges related to digital security, privacy and national security. The Recommendation responds to the need for early international co-ordination to support interoperability, reduce barriers to collaboration and help ensure that the development of quantum technologies aligns with shared democratic values, human rights and fundamental freedoms.

A broad, multistakeholder and participatory process for developing the Recommendation

The Recommendation was developed through an extensive and iterative multistakeholder process involving OECD Members, partners and external experts, including from government, businesses, academia, labour and civil society. Following the publication of the OECD's Quantum Technologies Policy Primer, the DPC and CSTP discussed scoping principles for quantum technologies developed with support from the GFTech focus group on quantum technologies. Overall, 47 experts from 26 nationalities participated in four meetings between February and May 2025 to scope values-based principles and policy guidance for the Recommendation. Building on this work, successive drafts of the Recommendation were refined within the DPC and the CSTP from September 2025 to May 2026. The OECD Council adopted the Recommendation on 28 May 2026.

Scope of the Recommendation

Complementing existing OECD standards relevant to digital policy, emerging technologies and transformative science and technology policy, the Recommendation focuses on policy issues specific to quantum technologies, particularly quantum information technologies spanning quantum computing, communication and sensing. It seeks to establish shared international principles that are sufficiently flexible to respond to the rapid evolution of the field while supporting responsible approaches to trusted quantum technologies across all stages of their lifecycle. It provides definitions for key terms, including "quantum technologies", "Actors" and "Stakeholders", for the purposes of the Recommendation. The Recommendation sets out four high-level principles for Adherents, and to be followed by other Actors, as well as five policy recommendations directed specifically at Adherents:

1. Shared principles for the responsible development and use of trusted quantum technologies: the first section sets out four complementary principles relevant to governments and other public and private Actors:

- (i) promote innovation in quantum ecosystems that respect democratic values, human rights and fundamental freedoms to ensure public safety and benefits to humanity;
- (ii) promote secure technology access to expand the reach of the benefits of quantum technologies;
- (iii) facilitate collaboration for innovation and economic prosperity to benefit societies; and
- (iv) foster accountability and trustworthiness. Across these principles, the section encourages Actors to adopt agile and forward-looking approaches to risk management throughout the technology lifecycle

2. Leveraging national policies and fostering international co-operation: consistent with these principles, the second section provides five policy recommendations for Adherents to implement in their national policies and international co-operation:

- (i) anticipate opportunities and risks in the use and development of quantum technologies;
- (ii) create an enabling ecosystem for quantum technologies;
- (iii) cultivate a skilled, multidisciplinary quantum workforce with varied backgrounds;
- (iv) support competitive and resilient supply chains that reinforce research and technology security; and
- (v) foster international co-operation by cultivating transparent, open and value-aligned partnerships that advance the principles set out in the Recommendation.

Across these policy recommendations, the section encourages Adherents to strengthen strategic preparedness through agile, evidence-based and forward-looking policy approaches that are responsive to technology developments while balancing openness, collaboration, competitiveness, resilience and security.

Next steps

The Recommendation encourages all relevant stakeholders to support its objectives and invites both OECD Members and non-Members to adhere to and promote its principles and policy guidance. To support implementation and continued policy dialogue, the Recommendation tasks the DPC, in co-operation with the CSTP, to:

- (i) serve as a forum for exchanging information on policies and experiences related to the implementation of the Recommendation, including through the GFTech and its quantum technologies focus group;
- (ii) develop and iterate further practical guidance to support the implementation of this Recommendation; and,
- (iii) report to Council on the implementation, dissemination and continued relevance of this Recommendation no later than five years following its adoption and at least every ten years thereafter. The Recommendation will be disseminated through OECD communication channels, international events and the OECD Compendium of Legal Instruments.

For further information, please consult: <https://www.oecd.org/en/topics/sub-issues/quantum-technologies.html>.

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THE COUNCIL,

HAVING REGARD to Article 5 b) of the Convention on the Organisation for Economic Co-operation and Development (OECD) of 14 December 1960;

HAVING REGARD to the standards developed by the OECD in the areas of digital policy, emerging technologies and transformative scientific and technological policies to anticipate technology trends and their potential impacts;

HAVING REGARD to efforts by other international governmental and non-governmental fora towards responsible development and use of trusted quantum technologies;

RECOGNISING that quantum information technologies have the potential to redefine the frontiers of information technologies in computing, as well as sensing and communications, impacting science and research capabilities, potentially bringing a wide range of innovative commercial applications that can help address global challenges and benefit societies and economies but also posing digital security, privacy and national economic security risks, among other societal concerns;

CONSIDERING that differences in technological maturity and ecosystem readiness, including investment, infrastructure and capacity, may affect the pace of development and deployment of quantum technologies;

CONSIDERING that quantum technologies bring benefits and risks that transcend national boundaries and, consequently, achieving their full potential necessitates international collaboration among Stakeholders that promotes trust, fosters risk management, and encourages innovative quantum ecosystems;

RECOGNISING that certain existing national and international legal, policy, and regulatory frameworks concerned with democratic values, human rights and fundamental freedoms are relevant to the development and use of quantum information technologies, including those related to digital transformation, such as data governance, digital security and infrastructure;

CONSIDERING that harnessing the benefits of responsible development and use of trusted quantum technologies necessitates concerted action across all levels of government and across the public and private sectors and that the principles set out in this Recommendation may accordingly be relevant to Actors in all of these settings;

RECOGNISING that the fast-moving and sometimes uncertain pathways of quantum technologies, like other emerging technologies, necessitate agile policy and implementation approaches based on forward-looking evidence gathering, analysis and stakeholder engagement to promote responsible innovation and commercialisation;

RECOGNISING that Members and non-Members having adhered to this Recommendation (hereafter the “Adherents”) have different legal and institutional frameworks through which they will implement this Recommendation;

RECOGNISING that the principles set out in this Recommendation are complementary and should be considered as a whole.

On the proposal of the Digital Policy Committee and the Committee for Scientific and Technological Policy:

I. **AGREES** that the purpose of this Recommendation is to guide the responsible development and use of trusted quantum technologies across all stages of development, in line with democratic values, human rights and fundamental freedoms, and to strengthen cross-border collaboration, taking

into account the new opportunities and challenges that quantum information technologies could represent for all.

II. AGREES that, for the purposes of the present Recommendation, the following definitions are used:

- **‘Quantum technologies’** refers to technologies that leverage the quantum mechanical properties of particles to achieve specific goals and includes quantum information technologies that read, process or transmit information by controlling the quantum mechanical properties of particles.
- **‘Actors’** refers to all public and private organisations and individuals that play an active role in the development and deployment of quantum technologies.
- **‘Stakeholders’** refers to all organisations and individuals involved in, or affected by, quantum technologies, directly or indirectly. Actors are a subset of Stakeholders.

Section 1: Shared principles for the responsible development and use of trusted quantum technologies

III. RECOMMENDS that Adherents promote and implement the following principles for the responsible development and use of trusted quantum technologies and **CALLS ON** all other Actors, according to their respective roles, to promote and implement them:

1.1 Promote innovation in quantum ecosystems that respect democratic values, human rights and fundamental freedoms to ensure public safety and benefits to humanity. In particular, Actors should:

- a) facilitate, support, or pursue quantum technology research, development, use, and applications that:
 - i. provide tangible benefits to humanity, such as improving health care, or facilitating access to vital resources;
 - ii. advance economic growth and public interests such as transportation, urban planning, disaster forecasting, and sustainable resource management.
- b) take steps to prevent and mitigate potential harms, including through appropriate risk-management, which entails applying agile approaches and prevention measures at all stages of the technology lifecycle, including by:
 - i. anticipating the risks that malicious use of quantum technologies - including misuse for arbitrary and unlawful surveillance or censorship - poses to democratic principles and processes, national security, privacy and the openness, security, interoperability, trust and reliability of the Internet;
 - ii. promoting quantum-resilient critical infrastructure to safeguard security and privacy, including by adopting post-quantum cryptography standards; and
 - iii. assessing the potential implications of dual-use applications.

1.2 Promote secure technology access to expand the reach of the benefits of quantum technologies. In particular, Actors should promote, facilitate, or pursue:

- a. development, deployment, and use of quantum technologies for all economies and societies, aimed at fostering broad participation in and wide sharing of economic and societal benefits.
- b. access to quantum technology capabilities, that is consistent with economic and national security considerations.

1.3 Facilitate collaboration for innovation and economic prosperity to benefit societies. In particular, Actors should promote, facilitate or pursue:

- a. co-operation among Stakeholders on research and commercialisation;
- b. scientific exchange, interdisciplinary collaborations and science-industry partnerships, that take place on voluntary and mutually agreed terms;
- c. ways to leverage quantum technologies to solve previously unsolvable problems to benefit societies and increase economic prosperity; and
- d. the development of common terminology, benchmarks, and technical standards, based on science and including through industry-led processes, in consultation with relevant Stakeholders, appropriate to the stage of technological maturity.

1.4 Foster accountability and trustworthiness. In particular, Actors should:

- a. develop and use quantum technologies through practices that are transparent, comprehensive, and accountable, improve well-being and encourage economic prosperity for all;
- b. assess the risks of specific quantum technology applications, including personal and sensitive data implications, and implement tailored safeguards and monitoring mechanisms;
- c. take steps to ensure that all Stakeholders can access clear and reliable information about the capabilities, limitations, potential risks, risk management and mitigation measures and development timelines of these technologies; and
- d. take steps to empower Stakeholders to understand this information and to participate in, and contribute to decision-making processes throughout the lifecycle of the technologies.

Section 2: Leveraging national policies and fostering international co-operation

IV. RECOMMENDS that Adherents implement the following recommendations, consistent with the principles above, in their national policies and international co-operation. To this effect, Adherents should:

2.1 Anticipate opportunities and risks in the use and development of quantum technologies by:

- a. leveraging rigorous and forward-looking assessments of opportunities and risks of quantum technologies at national and international levels, where feasible, including measurable indicators and evidence-based benchmarks appropriate to the stage of technological maturity;
- b. taking steps to ensure such assessments and their scientific underpinnings are used to inform governance strategies and policies at national and international levels; and
- c. taking all appropriate steps to ensure that national security interests are factored into the use and development of quantum technologies.

2.2 Create an enabling ecosystem for quantum technologies by:

- a. providing sustained, transparent and strategic support for research, development and commercialisation of quantum technologies, leveraging public-private partnerships as appropriate;
- b. maintaining a comprehensive awareness of their national quantum technology ecosystem to identify the wide range of Actors and Stakeholders involved and to understand their specific roles, capabilities, needs, and interdependencies;

- c. promoting stewardship of responsible development and use of trusted quantum technologies by directing funding and other support that encourages innovation, well-being and prosperity for all in line with democratic values and public interests, as well as economic and national security considerations; and
- d. encouraging and facilitating multistakeholder co-operation to develop technical standards and input into the development of agile and timely regulation, as well as to facilitate interoperability between quantum, high-performance computing, artificial intelligence, and other existing technologies, and to promote competition.

2.3 Cultivate a skilled, multidisciplinary quantum workforce with varied backgrounds by:

- a. engaging Actors and relevant educational and training institutions to anticipate and address the human capital needs for quantum technologies;
- b. addressing the needs for quantum education curricula, training and interdisciplinary skills to support quantum technologies as they progress through readiness levels to market;
- c. promoting broad and varied pipelines of researchers, engineers, developers, technicians and other adjacent professionals, and that include women and communities left behind by globalisation as well as people with differing levels of educational attainment and differing backgrounds; and
- d. facilitating talent attraction and retention alongside workforce retraining and upskilling programmes as the technology evolves, as well as international researcher mobility and collaboration, consistent with their national interests.

2.4 Support competitive and resilient supply chains that reinforce research and technology security by:

- a. taking steps, in collaboration with other Actors, to support the development of supply chains that balance competitiveness, resilience and research and technology security;
- b. monitoring supply chains to identify vulnerabilities and cross-country complementarities;
- c. mitigating the risk of supply chain disruptions, including by creating conditions that facilitate domestic and international diversification; and
- d. assessing impact and facilitating transparent implementation of measures potentially affecting international co-operation on scientific and technological progress, e.g. through export controls and research integrity and security measures.

2.5 Foster international co-operation by cultivating transparent, open and value-aligned partnerships that advance the principles set out in this Recommendation, in particular by supporting trusted and secure quantum technology information exchange on voluntary and mutually agreed terms, consistent with economic, research and national security considerations, transparent and value-aligned collaborative research, coordinated initiatives to address global challenges, capacity-building efforts to promote public interests, economic growth, prosperity, and security broadly.

V. ENCOURAGES all Stakeholders, as appropriate to their role and involvement in the development and use of quantum technologies, to support and promote the implementation of this Recommendation.

VI. INVITES the Secretary-General and Adherents to disseminate the Recommendation.

VII. INVITES non-Adherents to take account of and adhere to the Recommendation.

VIII. INSTRUCTS the Digital Policy Committee, in co-operation with the Committee for Scientific and Technological Policy, to:

- a. serve as fora for exchanging information on policies and experience with respect to the implementation of this Recommendation, through a multi-stakeholder and interdisciplinary dialogue including by leveraging the Global Forum on Technology;
- b. develop and iterate further practical guidance to support the implementation of this Recommendation; and
- c. report to Council on the implementation, dissemination and continued relevance of this Recommendation no later than five years following its adoption and at least every ten years thereafter.

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The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

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- **International Agreements** are negotiated and concluded within the framework of the Organisation. They are legally binding on the Parties.
- **Arrangement, Understanding and Others:** several other types of substantive legal instruments have been developed within the OECD framework over time, such as the Arrangement on Officially Supported Export Credits, the International Understanding on Maritime Transport Principles and the Development Assistance Committee (DAC) Recommendations.