Vision for the Future of Quantum Technologies Survey Results

Tracey Forrest and Michael P. A. Murphy



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Executive Summary

The Centre for International Governance Innovation (CIGI) has initiated a Vision for the Future of Quantum Technologies ("Quantum Vision") project. To inform this Quantum Vision, CIGI undertook a survey of key stakeholders from industry, academic and non-governmental organization communities to analyze attitudes around current international quantum initiatives and opportunities to develop a vision that could help chart a path toward a secure, responsible and competitive future for quantum technology.

The survey found strong support for the development of a vision for the future of quantum technologies within stakeholder communities. In addition, specific trends within survey responses reveal priorities shared by stakeholders. Respondents placed a strong emphasis on the development of cryptographic resilience (including through acceleration of transitions to post-quantum cryptography protocols). They also highlighted the importance of a quantum vision facilitating international and public/private collaboration, including cooperation on research initiatives, access to markets and strengthening of talent and supply chains. Finally, respondents called for better leveraging of multilateral institutions to foster dialogue between international partners around threats and opportunities. Full results of the survey are summarized in aggregate anonymized form in the sections that follow.

Survey Questions

1. Is there a need for a Vision for the Future of Quantum Technologies for consideration by G7 ministers at this time?

- Yes
- 🗌 No

2. In support of long-term cryptographic resilience, which principles and/or actions do you agree should form part of a Vision for the Future of Quantum Technologies (select all that apply)?

 Develop national quantum risk assessments and risk mitigation plans, further to the G7 Cyber Expert Group Statement on Planning for the Opportunities and Risks of Quantum Computing and the joint statement from 18 EU member states, "Securing Tomorrow, Today: Transitioning to Post-Quantum Cryptography"

Accelerate the transition to post-quantum cryptography (PQC) standards and norms (see NIST IR 8547 (Initial Public Draft) Transition to Post-Quantum Cryptography Standards)

Promote the international harmonization and interoperability of PQC standards

Collaborate on quantum-resiliency with like-minded nations in research and development

Advance global quantum-resiliency by creating a pathway for developing nations to strengthen their cybersecurity protocols

Explore complementary quantum-safe strategies such as Quantum Key Distribution

	Invest in	cryntogranł	hic resilient	infrastructure
	mvest m	cryptograpi	inc resilient	mmastructure

No actions are required at this time

Other (please specify)

I'm not sure

3. To responsibly develop and use quantum technologies, which principles and/or actions do you agree should form part of a Vision for the Future of Quantum Technologies (select all that apply)?

- Build on national quantum strategies, NATO's Quantum Technologies Strategy and collaborate internationally in the development of quantum technology based on shared values
- Embed shared principles and values into policy and practice in a direction that contributes to addressing society's most pressing needs and goals (see "Ten principles for responsible quantum innovation" and "A Quantum Technologies Policy Primer")
- Develop standards and regulations to ensure the safe and responsible development, deployment and adoption of quantum technologies

Cooperate internationally to promote inclusive and equitable development, deployment and adoption of quantum technologies

- Engage diverse communities to advance human-centric quantum research and development
- Develop a governance framework for managing the dual-use nature of quantum technologies
- Proactively anticipate the malicious use of quantum technology
- □ No action is required at this time
- Other (please specify)
- I'm not sure

4. To strengthen the quantum ecosystem, which principles and/or actions do you agree should form part of a Vision for the Future of Quantum Technologies (select all that apply)?

- Endorse the set of Draft Guiding Principles established by the Multilateral Dialogue on Quantum in Copenhagen & Amsterdam
- Leverage existing multilateral fora to further explore the potential economic, societal and security impacts of quantum technologies
- Establish a global coalition for quantum governance (including its mission, collaboration and enforcement)
- Create an International Panel on Quantum that can become a global point of reference for increased situational awareness, sharing best practices, as well as convening international quantum initiatives

Bolster quantum technology cooperation in key areas such as defence and security, the economy and the environment

Promote capacity building through increased researcher access to quantum as a cloud- based service (including researchers from like-minded nations and the Global South)
Ensure equitable access to quantum technologies and inclusive supply chains
Diversify quantum technology supply chains and increase their resilience
Enhance the international framework for intellectual property and norms to promote quantum innovation and mitigate risks
Implement visa, immigration and export control policies that allow firms to recruit highly skilled quantum talent
Invest in workforce training to prepare for the benefits and risks of quantum technologies
No action is required at this time
Other (please specify)
I'm not sure

5. (Optional) As part of a Vision for the Future of Quantum Technologies, how might the G7 collaborate to advance pathways for open quantum science and innovation, while considering commercial and geopolitical interests?

6. (Optional) Is there anything further you would like to add?

7. (Optional) Do you wish to send this survey to another key expert/stakeholder? If yes, share their email address below.

Methodological Note

The survey was distributed online through Survey Monkey. An initial population of key actors (domain experts and/or influential leaders) in the quantum sector was identified, including representation from industry, academic and non-governmental organizations primarily across G7 nations. Referrals through expert networks facilitated further sharing of results through snowball sampling. The survey was opened on February 5, 2025, and remained open until February 25, 2025. In total, 112 key actors were invited to participate and 37 responded (30 respondents completed the entire survey); many respondents offered thoughtful commentary to open response questions in addition to their engagement with survey questions.

Quantum Vision Survey Data: Quantitative Data Summary

Percentages are calculated based on complete responses per question. Thirty-seven respondents completed question 1. Thirty respondents completed the entire survey, meaning that the percentages of questions 2–4 are calculated out of the 30 complete surveys. Points of high consensus (two-thirds agreement or higher) are indicated in red highlight. Points of agreement (one-half to two-thirds) are indicated in grey highlight. Responses are rounded to the nearest percentage.

1. Is there a need for a Vision for the Future of Quantum Technologies for consideration by G7 ministers at this time?						
Yes	89 %					
No	11%					
2. In support of long-term cryptographic resilience, which principles and/or actions do you agree should form part of a Vision for the Future of Quantum Technologies (select all that apply)?						
Accelerate the transition to post-quantum cryptography (PQC) standards and norms (see NIST IR 8547 (Initial Public Draft) Transition to Post-Quantum Cryptography Standards)	80%					
Develop national quantum risk assessments and risk mitigation plans, further to the G7 Cyber Expert Group Statement on Planning for the Opportunities and Risks of Quantum Computing and the joint statement from 18 EU member states, "Securing Tomorrow, Today: Transitioning to Post- Quantum Cryptography"	77%					
Collaborate on quantum-resiliency with like-minded nations in research and development	73%					
Advance global quantum-resiliency by creating a pathway for developing nations to strengthen their cybersecurity protocols	70%					
Explore complementary quantum-safe strategies such as Quantum Key Distribution	63%					
Promote the international harmonization and interoperability of PQC standards	60%					
Invest in cryptographic resilient infrastructure	50%					
Other (please specify)	7%					
l'm not sure	3%					
No actions are required at this time	0%					

3. To responsibly develop and use quantum technologies, which principles and/or actions do you agree should form part of a Vision for the Future of Quantum Technologies (select all that apply)?				
Build on national quantum strategies, NATO's Quantum Technologies Strategy and collaborate internationally in the development of quantum technology based on shared values	73%			
Embed shared principles and values into policy and practice in a direction that contributes to addressing society's most pressing needs and goals (see "Ten principles for responsible quantum innovation" and "A Quantum Technologies Policy Primer")	67%			
Cooperate internationally to promote inclusive and equitable development, deployment and adoption of quantum technologies	63%			
Develop a governance framework for managing the dual-use nature of quantum technologies	63%			
Engage diverse communities to advance human-centric quantum research and development	47%			
Proactively anticipate the malicious use of quantum technology	47%			
Develop standards and regulations to ensure the safe and responsible development, deployment and adoption of quantum technologies	43%			
Other (please specify)	13%			
I'm not sure	0%			
No action is required at this time	0%			
4. To strengthen the quantum ecosystem, which principles and/or actions do you agree should for of a Vision for the Future of Quantum Technologies (select all that apply)?	m part			
Leverage existing multilateral fora to further explore the potential economic, societal and security impacts of quantum technologies	80%			
Diversify quantum technology supply chains and increase their resilience	67%			
Bolster quantum technology cooperation in key areas such as defence and security, the economy and the environment	60%			
Invest in workforce training to prepare for the benefits and risks of quantum technologies	60%			
Promote capacity-building through increased researcher access to quantum as a cloud-based service (including researchers from like-minded nations and the Global South)	57%			
Implement visa, immigration and export control policies that allow firms to recruit highly skilled quantum talent	53%			
Establish a global coalition for quantum governance (including its mission, collaboration and enforcement)	50%			
Create an International Panel on Quantum that can become a global point of reference for increased situational awareness, sharing best practices, as well as convening international quantum initiatives	47%			
Ensure equitable access to quantum technologies and inclusive supply chains	47%			
Enhance the international framework for intellectual property and norms to promote quantum innovation and mitigate risks	47%			
Endorse the set of Draft Guiding Principles established by the Multilateral Dialogue on Quantum in Copenhagen & Amsterdam	43%			
l'm not sure	0%			
No action is required at this time	0%			

Quantum Vision Survey Data: Open-Ended Response

To preserve the anonymity of respondents and identify common threads across survey feedback, comments have been synthesized under shared themes.

- → Fostering international and multi-stakeholder cooperation:
 - Focus on creating a rigorous and competitive ecosystem first, bridging gaps between industry (including SMEs/start-ups), government and academia.
 - Cooperation has been key to the development of prior technological breakthroughs such as semiconductors. Learning lessons of the past can help propel innovation in quantum science and technology.
- → Leveraging multilateral fora for their prior work and platform to promote collaboration and dialogue:
 - Multilateral organizations offer like-minded countries an opportunity to set the terms for ongoing collaboration.
 - Multilateral fora also create space for ongoing dialogue around threats and opportunities, including discourse with like-minded and non-like-minded countries.
 - Multilateral fora may support principles of equitable access for Global South nations.
- → Promoting cryptographic resilience:
 - Migration to PQC must be accelerated and accompanied by frameworks for sharing intelligence about novel breaks and quantum-enabled threats.
- → Ensuring flexibility in the vision:
 - Guiding principles to inform action should be prioritized over prescriptions that limit innovation.
 - Harmonizing guiding principles is more helpful than fragmenting into groups.
- → Market and talent access:
 - Mutual market access between like-minded countries and clear principles for governments to be "good customers" of commercialized technologies can support industrial development.
 - Support for talent development through industry, academia and government partnerships, as well as international talent mobility, can help meet the needs for highly qualified personnel.



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