



Australia's National
Science Agency

Quantum shift: How are Australian organisations navigating the quantum frontier?

Results from the 2025 Quantum Readiness Survey



Citation

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Executive summary

Quantum technologies are rapidly transitioning from theoretical concepts to real-world applications, with the potential to transform industries and reshape societies. Recognised as one of Australia's critical technologies [1], they have the potential to significantly enhance or pose risks to Australia's national interests, particularly in areas expected to drive economic growth, strengthen national security, and support social cohesion. The *National Quantum Strategy* [2] envisions Australia as a global leader in quantum technologies by 2030, with these innovations deeply embedded in society to help build a fairer, more inclusive, and more prosperous nation. Conservative estimates project that quantum technologies could contribute \$6.1 billion to Australia's GDP by 2045 and create tens of thousands of jobs [3]. However, realising this potential depends not only on how quickly we develop these technologies, but also on their responsible adoption across industries. Given their wide-ranging applications and disruptive potential, quantum technologies must be implemented in ways that maximise benefits, minimise harm, and support long-term societal and environmental wellbeing.

In this context, assessing the quantum readiness of organisations across Australia's diverse industry sectors is critical. Even more urgent is the need for assessing quantum cyber readiness, i.e., the preparedness to defend against the cybersecurity threats posed by quantum computing. This urgency has been underscored by the Australian Signals Directorate's (ASD) recent directive to migrate to post-quantum cryptography (PQC) by 2030 [4]. This directive provides a clear signal for organisations to begin preparing for a post-quantum future, particularly by transitioning to cryptographic standards resilient to quantum threats.

This report presents findings from a quantum readiness study that draws on survey data and interviews with key decision-makers and strategic influencers within organisations across key sectors. To assess this readiness, the study evaluates four critical dimensions:

- **Quantum awareness:** Understanding and familiarity with quantum technologies.
- **Quantum readiness:** Preparedness for adoption, including strategic planning, workforce development, and collaboration within the broader quantum ecosystem.
- **Quantum cyber readiness:** Awareness of, and preparation for, cybersecurity risks posed by quantum computing, particularly threats to current encryption standards.
- **Responsible quantum adoption:** Consideration of ethical, social, and environmental impacts of quantum technologies.

This report aims to inform policymakers, industry leaders, and researchers by providing a snapshot of Australia's current quantum readiness. It identifies key areas for strategic action to support a secure, inclusive, and future-focused approach to quantum technology adoption.

Key findings

Quantum awareness and understanding

Quantum awareness remains siloed within organisations, often concentrated in specific teams or individuals. While over 80% of participating organisations report some familiarity with quantum technologies, this limited distribution of knowledge constrains broader organisational engagement and strategic integration. Although organisations are exploring all three core quantum technologies: quantum computing, communications, and sensing, momentum is slowed by uncertainty, low prioritisation, and a lack of internal expertise. Engagement is mostly informal and driven by individual initiative rather than structured programs, underscoring the need for coordinated, cross-functional efforts to build sustained, organisation-wide awareness.

Quantum readiness

Quantum readiness is emerging, with over 60% of participating organisations indicating some level of engagement with quantum technologies, though this engagement remains largely at a preliminary stage. Only 21.2% have dedicated budgets, and just 26.9% have launched pilot projects, suggesting that few are progressing from awareness to concrete strategy and action. Internal barriers such as siloed expertise and strategic ambiguity, combined with external barriers like high costs, talent shortages, and immature solutions, continue to hinder progress. Advancing quantum readiness will require organisation-wide alignment, targeted investment, and strong leadership commitment to move from aspiration to implementation.

Quantum cyber readiness

Despite growing awareness of quantum threats, most organisations lack concrete plans, dedicated budgets, or training to ensure cyber resilience. While 50% of participating organisations are aware of the ASD's recommendation to adopt PQC by 2030 [4], 65.4% remain unsure or uncommitted to migration plans. Only 3.8% have allocated a budget to address quantum threats, and 67.3% offer no cybersecurity training specific to quantum risks. This disconnect between awareness and preparedness highlights an urgent need for clearer national guidance, targeted industry outreach, and accelerated planning to ensure secure and timely adoption of quantum-safe technologies.

Responsible quantum adoption

Ethical considerations are largely absent from current organisational quantum strategies, with most participating organisations lacking frameworks or guiding principles to support responsible adoption. A significant 71.2% have not assessed the broader social or environmental impacts of quantum technologies, and 36.5% are unsure about the values guiding their approach. While some organisations are beginning to engage with principles such as transparency and the common good, these efforts remain informal and unstructured. To ensure responsible and sustainable adoption, relevant stakeholders across the quantum ecosystem, including industry leaders, government agencies, academia, and civil society, must develop robust ethical frameworks, strengthen ethical literacy, and foster coordinated, sector-wide dialogue.

Introduction

Quantum technologies are emerging as a powerful force with the potential to reshape Australia's economy, national security, and social systems. Recognised in the Australian Government's **List of Critical Technologies in the National Interest** [1], these innovations are expected to drive transformative advances across a wide range of sectors including secure communications, data analytics, drug development, and energy optimisation. Their growing strategic importance has elevated quantum technology development to a matter of national interest.

Australia's ambition to lead in quantum innovation is formalised in the **National Quantum Strategy** [2], which outlines a seven-year roadmap to position the country for success by 2030. The strategy is built around five central themes:

- Creating a thriving research and development environment, with investment in and use of quantum technologies
- Securing access to essential quantum infrastructure and materials
- Building a skilled and growing quantum workforce
- Ensuring our standards and frameworks support national interests
- Building a trusted, ethical, and inclusive quantum ecosystem

Each theme is supported by targeted actions designed to foster innovation, safeguard national interests, and ensure responsible development.

Australia is well positioned to lead in this field. With more than two decades of government-supported research and a globally respected quantum science community, the country has built a strong foundation for innovation. According to CSIRO, quantum computing, communications, and sensing could contribute approximately \$6.1 billion to Australia's GDP by 2045. These technologies are also expected to directly employ 19,400 people and create over 35,000 additional jobs across the broader economy [3].

While all five themes of the Strategy are interconnected, industry stakeholders have a particularly critical role in advancing the first, third and fifth themes. These include driving commercial

adoption and investment, supporting workforce development through training and recruitment, and embedding trusted, ethical and inclusive practices into quantum technology deployment. The success of the Strategy depends on coordinated efforts across government, industry and research sectors to translate quantum potential into real-world outcomes that benefit all Australians.

The concept of *quantum readiness* provides a useful framework for understanding how organisations can prepare for this transition. It includes four key dimensions. *Quantum awareness* refers to the level of understanding and familiarity with quantum technologies across an organisation. *Quantum readiness* reflects the organisation's capacity to adopt and integrate quantum solutions through strategic planning, workforce development, and ecosystem engagement. *Quantum cyber readiness* focuses on the ability to address cybersecurity risks, especially those related to the future threat quantum computing poses to current encryption systems. In alignment with the **2023-2030 Australian Cyber Security Strategy** [5], this includes proactive measures such as the adoption of post-quantum cryptographic standards. Finally, *responsible quantum adoption* considers how organisations are addressing the ethical, social, and environmental implications of quantum technologies.

This report presents the second phase of a project assessing quantum readiness across key Australian industry sectors. The first report provided a comprehensive literature review, drawing on government reports, market analyses, academic research, and insights from the quantum industry to identify 383 potential quantum technology use cases across 15 Australian industry sectors [6]. This second report builds on that foundation, offering new insights into the readiness of key Australian industries to adopt and benefit from quantum technologies. This research also builds on earlier work by CSIRO's Responsible Innovation Future Science Platform and CSIRO Data61, which examined the technical and ethical risks of quantum computing for cybersecurity from the perspectives of cybersecurity experts and professionals [7]. That research revealed a low level of awareness among participants about quantum-related

cyber risks, which remains a major barrier to effective preparation for quantum adoption. In contrast, the current study explores quantum readiness from the viewpoint of decision-makers within Australian organisations, which represent the primary end-users of quantum technologies. It investigates how organisations across diverse industry sectors are preparing for quantum integration by developing strategic plans, initiating pilot projects, investing in workforce training, engaging with the broader quantum ecosystem, and beginning to consider ethical and cybersecurity implications. This broader organisational perspective offers a more comprehensive understanding of Australia's readiness to adopt quantum technologies in ways that are both responsible and effective.

The project adopts a responsible innovation approach, emphasising the importance of shaping scientific and

technological progress in ways that deliver broad societal benefits [8]. Two areas are particularly relevant to this work. The first is navigating societal transitions, which involves ensuring that quantum technologies are introduced in ways that support the public good. The second is social and ethical risk management, which focuses on identifying and addressing potential harms while promoting positive outcomes.

For decision-makers in government and industry, quantum readiness is both a strategic priority and a responsibility. It enables organisations to harness the benefits of quantum technologies while managing the risks. As Australia moves toward its goal of global leadership in quantum innovation, this report provides timely insights to support informed policy, investment, and collaboration.

Research aim and process

This study investigates how organisations across diverse sectors perceive and prepare for the integration of quantum technologies into their operations. It aims to generate actionable insights for decision-makers in industry, government and research on the practical, strategic, and ethical dimensions of quantum technology adoption, with a particular focus on cybersecurity preparedness and responsible innovation.

Building on the conceptual framework introduced earlier, this study explores four dimensions of quantum readiness in greater depth:

- **Quantum awareness:** The extent of organisational familiarity with quantum technologies and their potential impact.
- **Strategic readiness:** Organisational planning for quantum adoption, including workforce development, pilot initiatives, and ecosystem engagement.
- **Cybersecurity risks:** Preparedness for quantum-enabled cyber threats, with a focus on post-quantum cryptography and compliance with emerging directives.
- **Responsible innovation:** Approaches to ensure ethical, transparent, and socially aligned adoption of quantum technologies.

Research Process

Step 1: Qualitative Interviews

Semi-structured interviews were conducted with 25 decision-makers representing nine sectors between April and June 2024. Participants were recruited through professional networks and the snowball sampling technique to ensure sectoral diversity in the responses. Ethics approval was granted by CSIRO's

Human Research Ethics Committee. Interviews were conducted via Microsoft Teams, with informed consent and privacy protocols in place.

Step 2: Quantitative Survey

An online survey was administered between April and June 2025 to validate and extend the interview findings across a broader sample. Of the 125 responses received, 52 complete responses representing 12 sectors were included in the analysis. Recruitment was conducted through targeted email lists and professional networks. The survey mirrored the interview themes and included additional questions related to the ASD's directive on PQC migration by 2030 [4]. All participants provided informed consent, and the surveys were conducted with appropriate privacy safeguards.

Step 3: Integrated Analysis

Qualitative and quantitative data were synthesised to build a comprehensive view of organisational engagement with quantum technologies. Survey items were mapped to interview themes to identify areas of alignment and divergence. A multidisciplinary team guided the analysis to ensure methodological rigour and incorporate diverse perspectives.

As this study draws on a non-probability sampling approach where participants were invited to take part, the findings offer valuable perspectives from professionals with an interest or stake in quantum technologies. However, they may not fully capture the views of the broader industry sectors. The sample was structured to include participants across a range of sectors, with a particular focus on capturing organisational-level insights into readiness, capability, and potential application.

Study participant demographics

INDUSTRY SECTOR	SURVEY	INTERVIEWS
Education and Training	25.0%	-
Professional, Scientific and Technical Services	23.1%	28.0%
Manufacturing	7.7%	4.0%
Information Media and Telecommunications	9.6%	12.0%
Financial and Insurance Services	7.7%	12.0%
Public Administration and Safety	7.7%	20.0%
Mining	3.8%	8.0%
Transport, Postal and Warehousing	5.8%	-
Health Care and Social Assistance	1.9%	4.0%
Agriculture, Forestry and Fishing	1.9%	4.0%
Retail Trade	1.9%	4.0%
Electricity, Gas, Water and Waste	1.9%	-
PARTICIPANT ROLE		
Executive	44.2%	44.4%
Manager	25.0%	11.1%
Researcher	15.4%	22.2%
Consultant	5.8%	11.1%
Engineer/Technologist	3.8%	11.1%
Other	5.8%	0.0%
ORGANISATION SIZE		
Large (Annual Turnover > \$250 Million)	59.6%	NC
Medium (Annual turnover > \$10 million ≤ \$250 million)	26.9%	NC
Small (Annual turnover < \$10 million)	9.6%	NC
Prefer not to answer	3.8%	NC
PRESENCE OF EMERGING TECHNOLOGY TEAM		
Yes	61.54%	NC
No	21.15%	NC
Team being formed	7.69%	NC
Other/Unsure	9.62%	NC

NC – Not Collected

Theme 1: General knowledge and awareness

Organisational knowledge and awareness of quantum technologies form a foundational component of quantum readiness. This theme examines how organisations, and their leadership, engage with quantum concepts, which is essential for informed strategic planning, risk management, and innovation. Establishing a baseline level of quantum literacy provides critical context for assessing preparedness and the capacity to respond to quantum advancements.

Interview discussions focused on participants' personal understanding of quantum technologies, as well as their perceptions of organisational awareness and engagement. These discussions provided qualitative insights into how quantum concepts are being interpreted, communicated, and prioritised within different organisational contexts. The survey extended this analysis by assessing organisational awareness across several dimensions, including familiarity with specific quantum technologies, perceived sectoral impacts, anticipated timelines for commercial viability, recent efforts to stay informed, and barriers to deeper engagement.

- **Organisational quantum awareness may be overstated and often concentrated within a small**

group of individuals, which can limit broader strategic engagement. Figure 1 presents the survey data on overall organisational awareness of quantum technologies, indicating a generally strong level of familiarity. A combined 84.6% of respondents reported their organisation as either well-informed (40.4%), knowledgeable (19.2%), or in the early stages of exploration (25.0%). The interviews provide a nuanced perspective, revealing that such awareness is often concentrated within specific individuals or teams, rather than being broadly distributed across the organisation. This suggests that organisational awareness of quantum technologies may be overstated, with knowledge often siloed within specific teams. This fragmentation can hinder cross-functional collaboration, strategic planning, and the organisation-wide capacity to responsibly adopt and integrate quantum technologies. However, this also highlights an opportunity for organisations to leverage existing internal expertise by promoting cross-departmental knowledge sharing and capacity building. Such efforts could enhance strategic alignment and organisational readiness as quantum technologies become increasingly relevant across business functions.

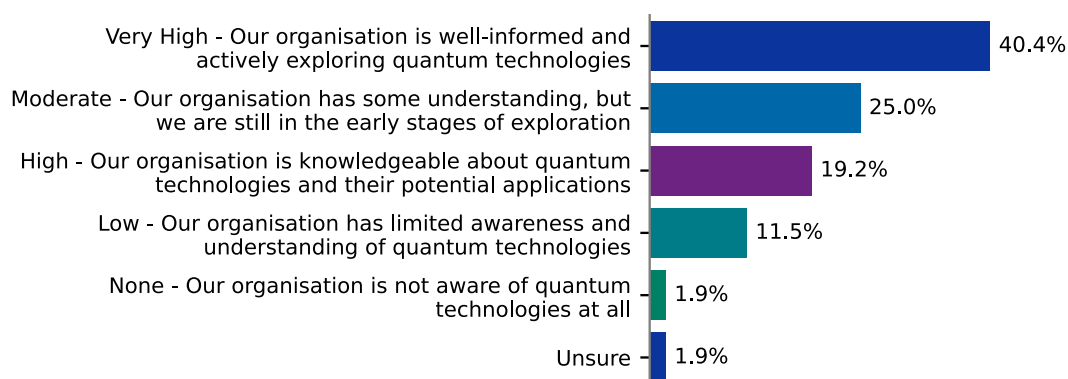


Figure 1 Overall organisational awareness of quantum technologies

- **Awareness of anticipated sector-level impacts presents a mixed picture, with a well-informed core and a broader group still seeking clarity.** As presented in Figure 2, the results indicate a moderate to high level of awareness among organisations regarding the potential impact of quantum technologies on their sector. Nearly half of respondents (46.2%) reported having a clear understanding, suggesting that a substantial portion of organisations are well-informed and strategically engaged. However, around 50% are still in the early stages of exploration or require further information, indicating that while interest is growing, many organisations are still developing their understanding. Only a small minority (3.8%) are not aware of the potential impacts at all. Overall, these findings reflect a cross-sector landscape in transition, with a strong core of informed stakeholders and a larger group actively seeking clarity and direction.

- **Organisations anticipate quantum-driven disruptions, acknowledging both the potential rewards and the associated risks.** Figure 3 shows that organisations anticipate both opportunities and challenges as quantum technologies evolve. Many foresee the emergence of new market possibilities and innovations (46.2%), while also recognising increased cybersecurity risks (44.2%) and potential disruption to existing business models (34.6%). There is growing interest in quantum’s potential to enhance data security and privacy, alongside concerns about evolving regulatory demands and workforce skill shifts. These responses, supported by both survey and interview data, reflect a broad awareness of quantum’s strategic impact. While optimism surrounds its commercial potential, it is tempered by concerns about cybersecurity, disruption, and regulation, reinforcing the view that quantum technologies are poised to reshape industries.

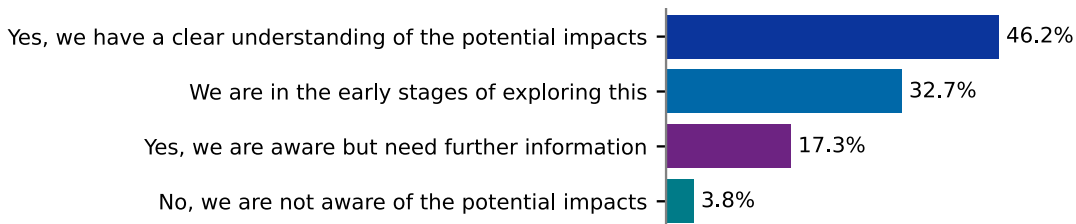


Figure 2 Awareness of anticipated sector impacts

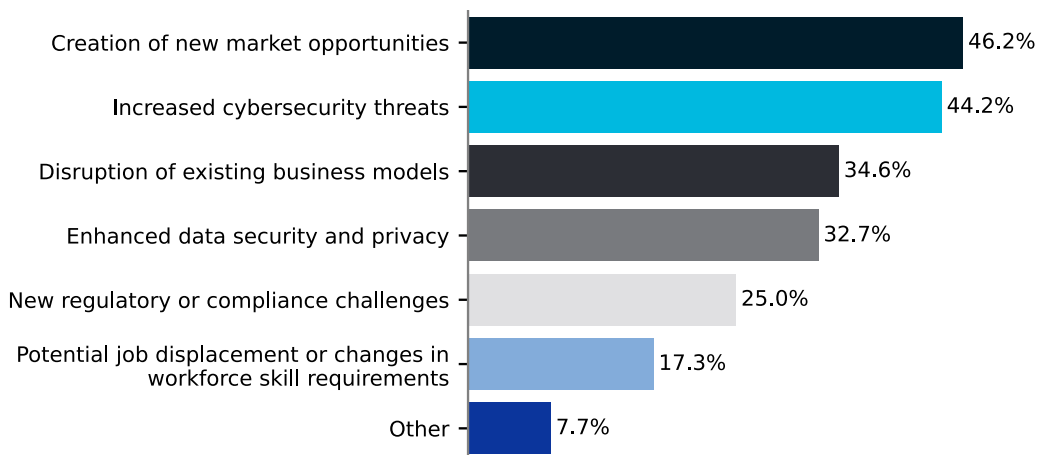


Figure 3 Anticipated impacts (positive and negative) of quantum technologies on sector

- **There is strategic diversity in quantum technology consideration, reflecting varied organisational priorities, levels of readiness, and perceptions of commercial viability.** As shown in Figure 4, quantum computing (69.2%) is the most considered technology, followed by quantum sensing (57.7%) and quantum communications (44.2%). This strong interest across all three core quantum technologies highlights recognition of quantum’s diverse applications beyond computing. In terms of consideration breadth, 34.6% of organisations are exploring all three core technologies, 32.7% are focused on only one, and 17.3% are engaging with exactly two quantum technologies (see Figure 5). This distribution reflects varied strategic approaches, from targeted exploration to comprehensive engagement with quantum innovation.
- **Quantum sensing and communications are considered near-term commercial front-runners, while quantum computing is widely viewed as a longer-term horizon technology.** Survey data reveals clear distinctions in perceived commercial readiness across quantum technologies (see Figure 6). Quantum sensing leads, with 53.8% of respondents expecting it to be ready within 5 years, followed by quantum communications at

40.4%. In contrast, only 25.0% expect quantum computing to be ready within 5 years, and a significant 26.9% believe it will take beyond 10 years. These findings suggest sensing and communications are viewed as near- to mid-term opportunities, while quantum computing remains a longer-term prospect.

- **Uncertainty, low prioritisation, and a lack of expertise are hindering organisational engagement with quantum technologies.** As shown in Figure 7, organisations face several barriers to building awareness and engagement with quantum technologies. The top challenges include uncertainty about relevance timing (53.8%), low prioritisation amid other tech initiatives (48.1%), and a lack of internal expertise or resources (44.2%). These findings contribute to hesitation, highlighting the need for clearer guidance, targeted education, and stronger industry engagement. Interview insights reinforce these findings, noting the difficulty of fostering broad understanding within organisations, especially in large or complex settings, despite isolated pockets of expertise. Participants also cited the resource demands of promoting innovation and thought leadership, reinforcing the need for sustained internal support.

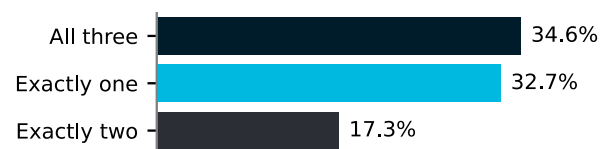
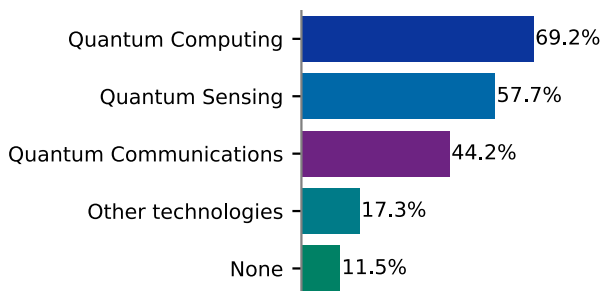


Figure 5 Distribution of organisations by number of quantum technologies under consideration

Figure 4 Quantum technologies under consideration for exploration or implementation

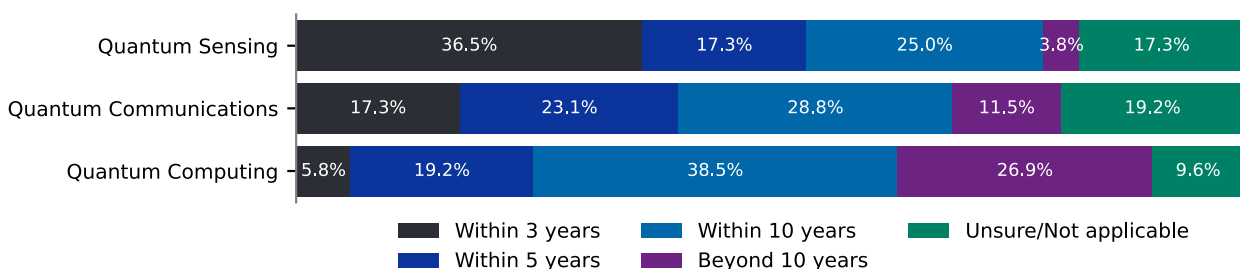


Figure 6 Expected timelines for the commercial readiness of quantum technologies

- **Quantum awareness appears to be advancing more through informal, ad hoc engagement than through structured institutional support.**

Organisations are engaging with quantum technologies through a variety of formal and informal channels (see Figure 8). The most common activities include attending conferences or trade shows (80.8%), networking with industry peers or experts (76.9%), and reviewing industry reports, whitepapers, or market analyses (71.2%). Many also engage with academic research (69.2%), monitor government or regulatory updates (63.5%), and participate in online training (53.8%). Notably, 50.0% report conducting internal R&D, indicating active, in-house exploration.

Interview insights align with these findings but reveal that much of this engagement is informal, ad hoc, and often driven by individual initiative rather than coordinated organisational programs. Participants described informal learning through leadership events, self-study, and external workshops, but also noted challenges in scaling awareness across the organisation. This fragmented approach, while indicative of genuine interest, limits the ability to build consistent, organisation-wide quantum literacy and strategic coherence. These findings highlight a clear need for more structured, accessible, and ongoing training initiatives to support widespread organisational awareness and ensure that quantum engagement is aligned with broader strategic goals.

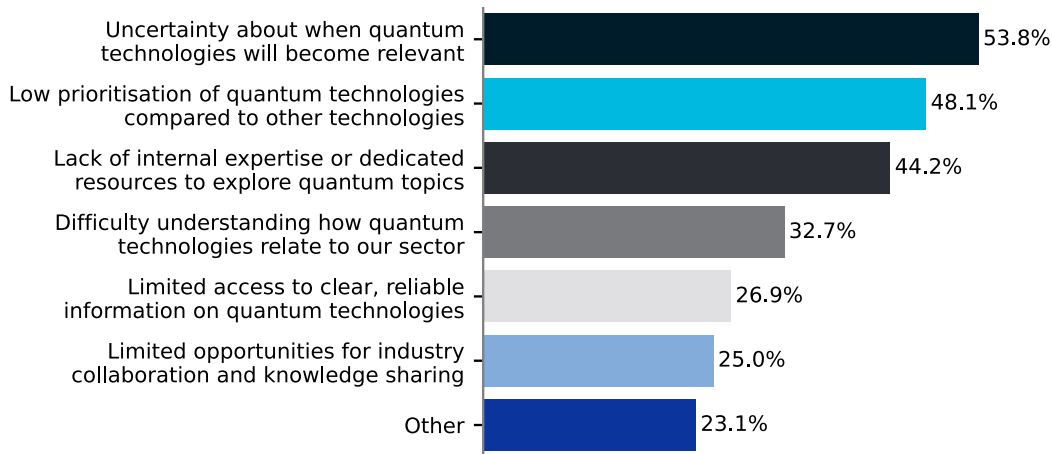


Figure 7 Key barriers to engagement with quantum technologies

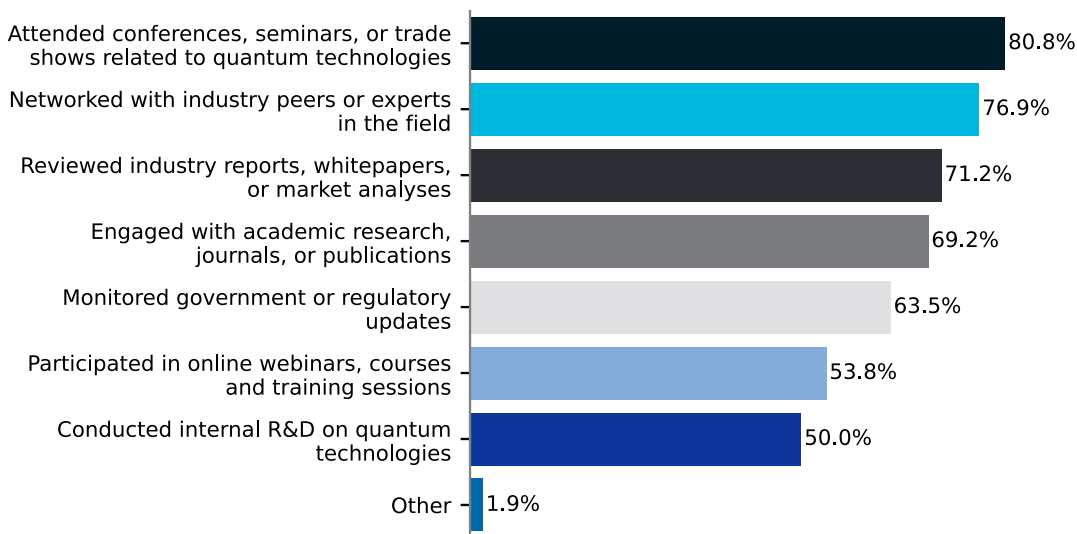


Figure 8 Organisational initiatives to stay informed about quantum technologies over the past 12 months

Theme 2: Quantum readiness

Quantum readiness reflects an organisation’s ability to strategically prepare for and leverage the transformative potential of quantum technologies. This includes developing forward-looking strategies to maintain competitiveness and resilience, assessing risks such as potential disruptions to existing business models, identifying emerging opportunities like quantum computing use cases, building internal expertise, and fostering strategic partnerships.

To explore this theme, interviews examined whether organisations have formal quantum strategies, the urgency of developing them, current or planned use cases, and the roles, resources, and expertise involved. The survey complemented these insights by assessing how quantum technologies are being integrated into strategic planning, budget allocation, workforce development, and pilot initiatives, as well as identifying perceived barriers to adoption.

Together, these findings offer a comprehensive view of how organisations are preparing for quantum disruption, revealing varying levels of strategic maturity, ranging from early-stage exploration to more advanced, coordinated readiness efforts.

• **Many organisations are engaging with quantum technologies, but strategic approaches remain fragmented and uneven.** As shown in Figure 9, over 60% of respondents indicate active engagement with quantum technologies, through exploration (26.9%), strategic planning (21.2%), or as a core priority (13.5%). Yet, 25% of respondents do not consider quantum a major priority, and 9.6% remain unsure. Interview findings complement this data, revealing a wide spectrum of strategic approaches. Some organisations reported having no formal quantum strategy or were uncertain whether one existed, while others described informal or underdeveloped efforts. In contrast, several participants shared examples of established strategies, often tailored to specific departmental goals or commercialisation pathways. Together, these insights suggest that while many organisations are transitioning from awareness to action, the strategic maturity of quantum engagement remains uneven. This variability reflects differing levels of urgency, resource allocation, and internal expertise across sectors.

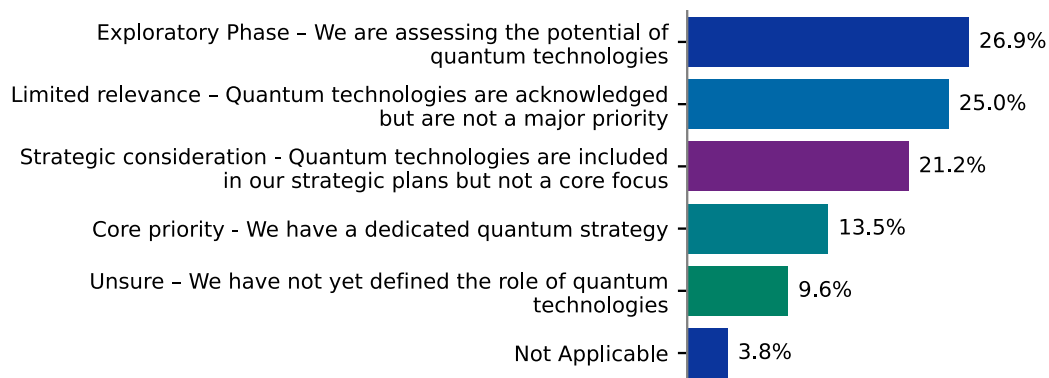


Figure 9 Level of consideration given to quantum technologies within organisational strategy

- **Despite growing awareness and strategic interest in quantum technologies, financial commitment remains limited, with over half of the organisations yet to allocate dedicated investment to support foundational activities essential for quantum readiness.** Figure 10 shows that while awareness and strategic interest in quantum technologies are growing, this has not yet translated into widespread financial investment. Only 21.2% of respondents have allocated a dedicated budget for quantum initiatives, and 26.9% include quantum within a general technology or innovation budget, suggesting flexible but non-targeted funding. In contrast, 28.8% report no budget allocation, and 23.1% have not considered budgeting for quantum at all. This means that over half of the organisations (51.9%) are either not committing financially or have yet to consider doing so, highlighting a gap between strategic interest and financial readiness.

- **Quantum expertise is emerging within organisations but remains uneven and concentrated in specialised pockets, with broad workforce literacy still a major challenge.** Over 60% of respondents reported some level of quantum expertise within their organisation (see Figure 11). However, for many (28.8%), this expertise is limited to a few individuals with specialised knowledge. Meanwhile, 32.7% reported having no in-house expertise, while a small proportion were either unsure (3.8%) or in the process of hiring (1.9%).

Interview insights reinforce these findings, revealing that even where dedicated teams exist, cultivating broad organisational understanding is difficult. Participants described the challenge of educating large and diverse workforces, particularly in complex environments where promoting innovation and thought leadership requires significant resources. These findings highlight a critical capability gap: scaling quantum literacy across organisations remains a major hurdle, even for those actively exploring quantum technologies. Addressing this gap will be essential for translating strategic interest into meaningful, enterprise-wide readiness.

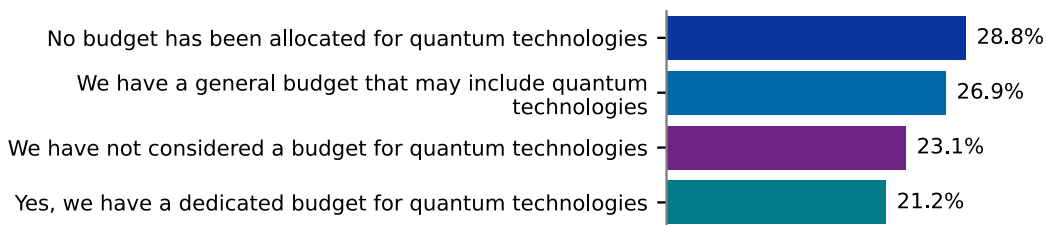


Figure 10 Organisational budget allocation for quantum technologies

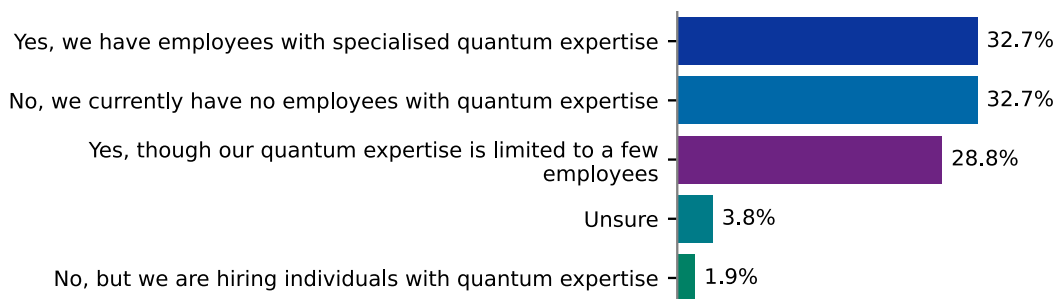


Figure 11 Current levels of in-house quantum expertise

- **Organisational approaches to quantum training reveal a clear divide: while many are actively building capabilities, a significant portion remain disengaged, highlighting both growing momentum and a persistent readiness gap.** The survey results reveal a clear divide in organisational approaches to quantum training and reskilling (see Figure 12). While 33% of respondents have no plans to engage in such efforts, 51% are actively taking steps to build quantum capabilities, and 15% remain uncertain about their direction.

Among those investing in workforce readiness, organisations are pursuing a range of strategies including internal initiatives and external partnerships. While strategic planning and financial investment in quantum technologies remain limited across many organisations, workforce development is emerging as a key marker of quantum readiness. Notably, these efforts are often unfolding ahead of formal strategic planning and dedicated budget allocations, indicating that organisational capacity

building is outpacing formal strategy. This disconnect between talent development, strategic intent, and financial commitment reflects a transitional phase, where organisations are laying the groundwork to respond more swiftly as quantum technologies become more relevant to their industries.

- **Most organisations have yet to formally assess quantum-related risks, with structured risk preparedness still in its early stages.** As shown in Figure 13, survey results indicate that 34.6% of the participating organisations have not yet considered a quantum risk assessment, while 19.2% are unsure of their stance. Although 23.1% have conducted informal assessments, only a small fraction of respondents has initiated or completed formal assessments. These findings suggest that quantum risk preparedness remains limited, with most organisations still in the early stages of understanding and addressing the potential risks associated with quantum adoption.

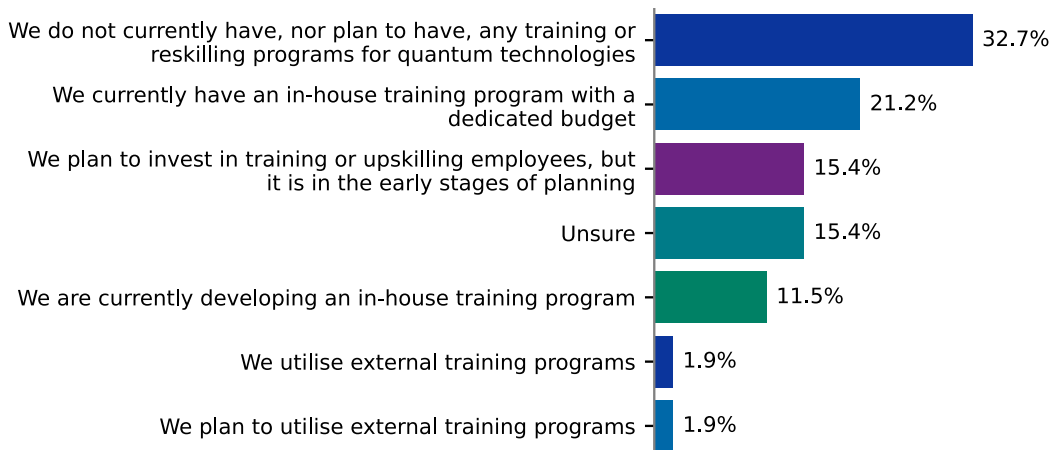


Figure 12 Approach to quantum technology training and reskilling

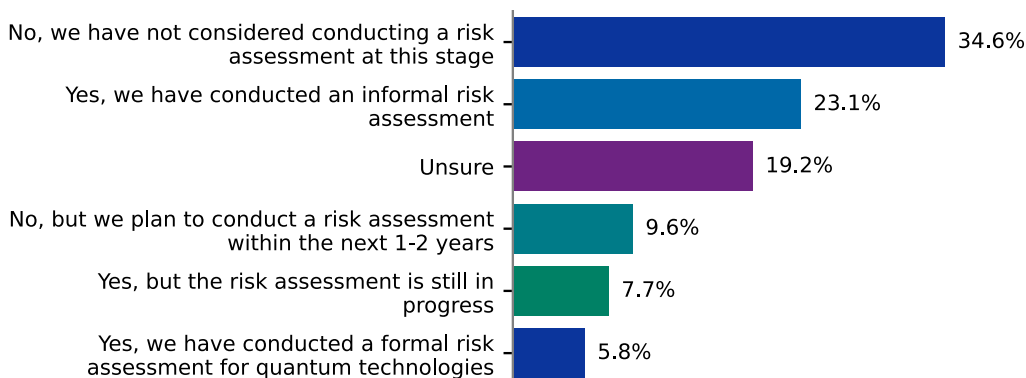


Figure 13 Status of quantum risk assessments across organisations

- **Quantum use case awareness is increasing across industries, but many organisations remain unfamiliar with sector-specific applications, reflecting an uneven understanding of quantum’s practical relevance.** Survey results show that 50% of respondents are familiar with quantum applications relevant to their industry, while 40.4% report no familiarity and 9.6% are only somewhat familiar (see Figure 14). This suggests that many organisations are still in the early stages of exploring quantum’s relevance to their sector.

Both survey and interview data highlight a diverse range of quantum use cases being considered or developed, such as quantum computing for materials design, pharmaceuticals, finance, and logistics; quantum sensing for navigation, environmental monitoring, and biomedical diagnostics; and quantum communication and cryptography for secure data transmission and cybersecurity. Respondents also noted efforts in infrastructure development, software integration, and cross-sector coordination, underscoring the growing strategic importance of quantum technologies across diverse operational domains.

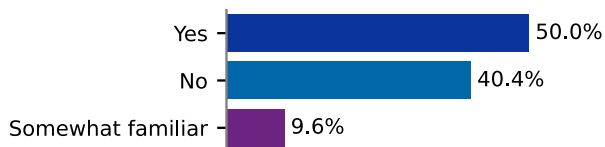


Figure 14 Organisational familiarity with industry-specific quantum use cases

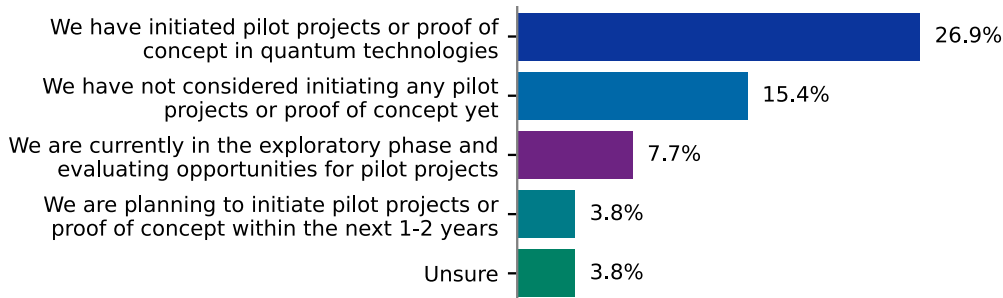


Figure 15 Quantum pilot project activity across organisations

- **Organisational engagement with quantum pilot projects is emerging, but structured implementation remains limited and largely in its early stages.** As shown in Figure 15, organisations are at varying stages of engagement: 26.9% have initiated pilot or proof-of-concept efforts, 7.7% are exploring opportunities, and 3.8% plan to begin within the next 1–2 years. Meanwhile, 15.4% have not yet considered such initiatives, and 3.8% remain unsure of their organisation’s position. These findings suggest that while interest in quantum experimentation is growing, most organisations are still in the early stages of engagement.

- **External partnerships are driving early organisational engagement with quantum technologies, although a significant portion remain unaligned, highlighting both growing momentum and the need for broader strategic direction.** Figure 16 shows that 53.8% of organisations are actively partnering with universities, research institutions, or technology providers to explore or implement quantum technologies. Another 17.3% are in discussions or exploring potential collaborations, indicating growing interest. However, 25.0% have yet to form any partnerships, and 3.8% remain unsure, suggesting that many organisations are still in early exploration stages or lack a defined strategic direction.

Interview insights reinforce the importance of external partnerships, particularly in areas such as cybersecurity preparedness. Several participants noted reliance on external partners for solutions, monitoring, and strategic guidance. This underscores the critical role of collaboration not only in advancing quantum technology adoption but also in supporting essential operational functions.

- **Despite growing interest, organisations face major external barriers to quantum adoption, including high costs, limited talent, and immature solutions that hinder progress.** These challenges highlight the need for clearer value propositions, practical demonstrations, and stronger alignment with business needs. As shown in Figure 17, survey results identify several prominent obstacles: uncertain return on investment (59.6%), high cost of investment and implementation (53.8%), limited availability of quantum-skilled talent (50.0%), and a lack of industry use cases and success stories (50.0%). These barriers reflect broader concerns around resource constraints, workforce readiness, and the evolving nature of quantum applications.

Interview insights add further nuance, revealing that expectations often exceed current capabilities. Participants noted that many quantum solutions remain research-driven, lack clear performance advantages over existing technologies, and are not yet tailored to specific business needs. This highlights the need for practical demonstrations, clearer value communication, and industry-led development to close the adoption gap.



Figure 16 Organisational partnerships supporting quantum technology exploration and implementation

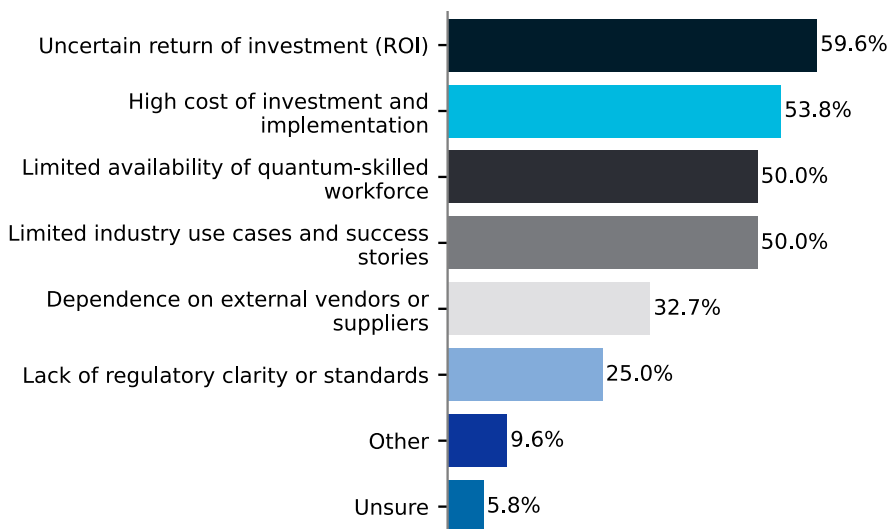


Figure 17 External barriers to quantum adoption

- **Internal barriers such as limited quantum awareness, strategic uncertainty, and low prioritisation are slowing quantum adoption, highlighting the need for foundational education and stronger alignment with business goals.** Figure 18 highlights several key challenges: lack of awareness or understanding of quantum technologies (53.8%), uncertainty about how quantum fits into business strategy (51.9%), and low prioritisation compared to other technologies

(44.2%). These findings point to a need for building foundational knowledge, integrating quantum initiatives into strategic planning, and fostering organisational readiness to support adoption.

- **Addressing the external and internal barriers to quantum adoption requires a more coordinated approach, combining foundational education, strategic planning, and ecosystem development to enable meaningful progress.**

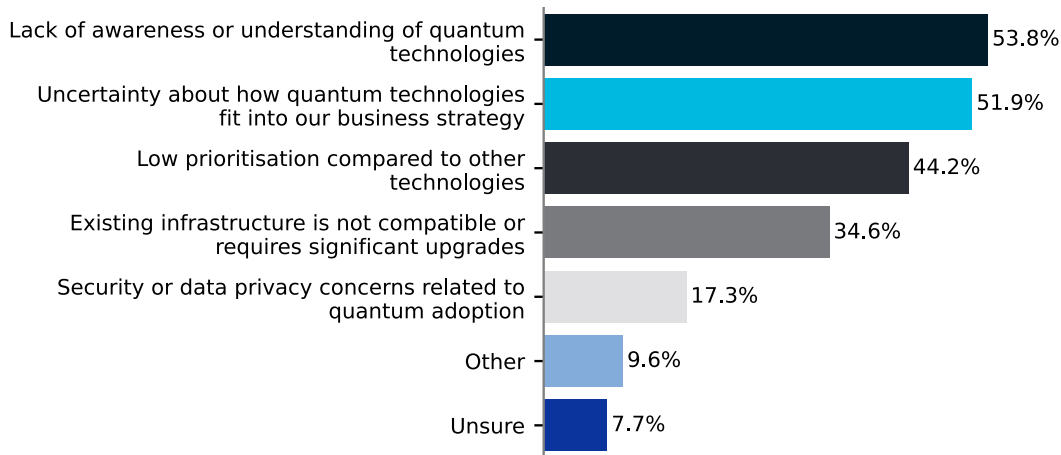


Figure 18 Internal barriers to quantum adoption

Theme 3: Quantum cyber readiness

Quantum cyber readiness refers to an organisation's preparedness and capability to understand, address, and adapt to the cybersecurity challenges posed by quantum technologies. As quantum computing advances, it introduces risks to traditional cryptographic systems, making proactive cybersecurity planning essential. Quantum cyber readiness involves recognising these risks, adopting quantum-safe technologies, and aligning cybersecurity strategies with emerging standards and recommendations.

This theme aligns closely with the 2023–2030 Australian Cyber Security Strategy [5], which identifies quantum computing as a critical and emerging technology with both transformative opportunities and significant cybersecurity risks. The Strategy calls for proactive preparation for a post-quantum world, including the adoption of post-quantum cryptography and sector-wide reviews of data holdings to prioritise protection of sensitive and critical information. Recent guidance from the ASD regarding transition to post-quantum cryptography by 2030 is part of government efforts to help organisations protect their systems and data from quantum-related cyber threats. The Strategy also emphasises collaboration between government, industry, and research institutions to develop secure quantum technologies and advance cryptographic innovation.

To explore this theme, interviews focused on participants' assessments of their organisation's current level of quantum cyber readiness, including the cybersecurity measures in place to mitigate quantum-related threats. Interviewees also discussed broader risks posed by quantum computing and the ethical considerations involved in securing systems against emerging vulnerabilities. The survey extended this investigation by examining whether organisations' cybersecurity strategies explicitly address quantum computing-related risks. It explored the scope of quantum-focused cybersecurity planning. This included examining risk assessments, budget allocations, staff training and upskilling initiatives, and awareness of recent guidance from the ASD regarding the transition to post-quantum cryptography. Respondents were also asked about their

organisation's timeline and actions toward adopting post-quantum cryptographic solutions.

These insights provide a detailed view of how organisations are responding to the cybersecurity implications of quantum technologies, revealing varying levels of awareness, preparedness, and alignment with national and global standards.

- **Over half of the participating organisations do not consider quantum threats in their cybersecurity strategies, exposing a significant preparedness gap.** As shown in Figure 19, survey results reveal that 57.7% of organisations are either unsure or have no immediate plans to address quantum computing-related cybersecurity risks, indicating limited awareness or prioritisation of quantum threats within current cybersecurity strategies. In contrast, 42.3% have begun evaluating potential impacts or are actively developing mitigation strategies, with only 5.7% having a comprehensive, documented approach.

Interview insights further enrich these findings, showing that while most participants acknowledged the risks posed by quantum technologies, their perspectives on organisational readiness varied. Some assessed preparedness based on the roles of internal IT teams or external cybersecurity providers, while others focused on perceived risks and the security of specific system components. Several participants expressed ambiguity, citing a lack of prioritisation, certainty, or reliance on assumptions, and several admitted to only basic preparedness, highlighting the need for further improvements.

Among the organisations taking proactive steps, key focus areas include transitioning to post-quantum cryptography, conducting quantum threat assessments, investing in research and development of quantum security technologies, and managing supply chain and vendor-related risks. These combined insights underscore a significant disparity in readiness, with most organisations remaining underprepared and exposed to quantum-enabled cyber threats, regulatory scrutiny, and

reputational damage if timely and strategic planning is not undertaken.

- Fragmented approaches to quantum cybersecurity risk assessments reveal widespread organisational unpreparedness.** Figure 20 shows that 36.5% of respondents have no immediate plans to conduct such assessments, while 34.6% remain unsure, indicating widespread uncertainty or limited awareness of quantum threats. Only 21.2% plan to conduct assessments soon, and just 7.7% have completed one in the past year, underscoring a major readiness gap for emerging quantum-enabled risks. Interview insights further illustrate this fragmentation. Some participants stated that their organisations rely on external providers for security solutions, reflecting limited internal capabilities.

Others equated readiness with general risk awareness rather than concrete measures. A few viewed quantum threats as low priority, while others acknowledged basic capabilities but noted ongoing improvement efforts. Some were uncertain about their organisation’s readiness, though they believed IT teams might be addressing the issue.

Collectively, these findings reveal a fragmented and inconsistent approach to quantum cybersecurity. Most organisations lack structured assessments and internal capacity, underscoring the urgent need for strategic planning, capability development, and increased awareness to effectively address quantum-related risks.

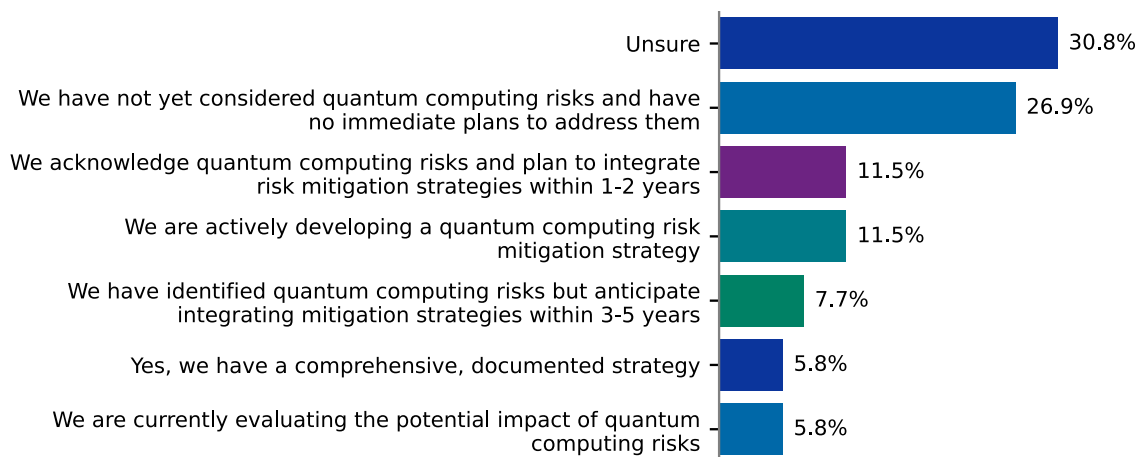


Figure 19 Consideration of quantum threats in cybersecurity strategies



Figure 20 Organisational engagement in quantum cyber risk assessments

- Most organisations lack dedicated budget strategies for quantum cybersecurity, revealing a critical shortfall in overall quantum cyber readiness** (see Figure 21). Survey data shows that 42.3% of respondents are unsure whether any cybersecurity budget has been allocated for quantum-related threats, indicating limited visibility or strategic clarity in this area. In addition, 34.6% have not allocated any budget and currently have no plans to do so, reflecting a notable gap in proactive investment. Only 11.5% plan to allocate budget within the next 3–5 years, and just 7.7% intend to do so within the next 1–2 years. Alarming, only 3.8% of organisations have allocated budget for quantum cybersecurity risks, highlighting a low level of financial commitment to mitigating these threats.
- Most organisations lack training strategies for quantum cybersecurity, exposing a major workforce readiness gap.** As shown in Figure 22, survey responses reveal that 67.3% of organisations provide no training related to quantum cybersecurity risks. Among those that do, the most common approach is awareness training (17.3%), covering general information on quantum

computing and its potential impact. Technical training, focused on areas like PQC or quantum key distribution (QKD), is offered by 13.5% of organisations. Only 7.7% provide training to help integrate quantum considerations into broader cybersecurity frameworks. Hands-on training, involving experience with quantum simulators or emulators, is rare (1.9%).

Interview insights further highlight uneven workforce preparedness. A recurring theme was reliance on external entities for cybersecurity, with several participants noting their organisations outsource security solutions. This dependence limits internal capacity to address quantum-specific challenges and may hinder the development of in-house expertise essential for effective quantum cybersecurity readiness.

These findings suggest that while some organisations are beginning to respond, most have yet to take meaningful steps to prepare their cybersecurity workforce for emerging quantum challenges, posing a risk to long-term resilience and strategic agility.

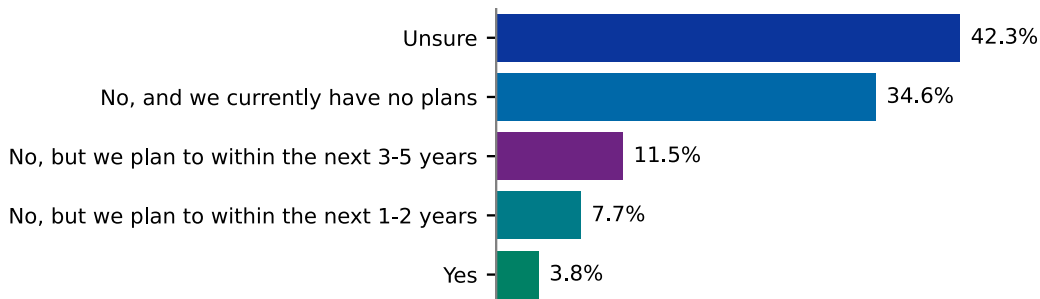


Figure 21 Budget allocation for quantum computing-related cybersecurity risks

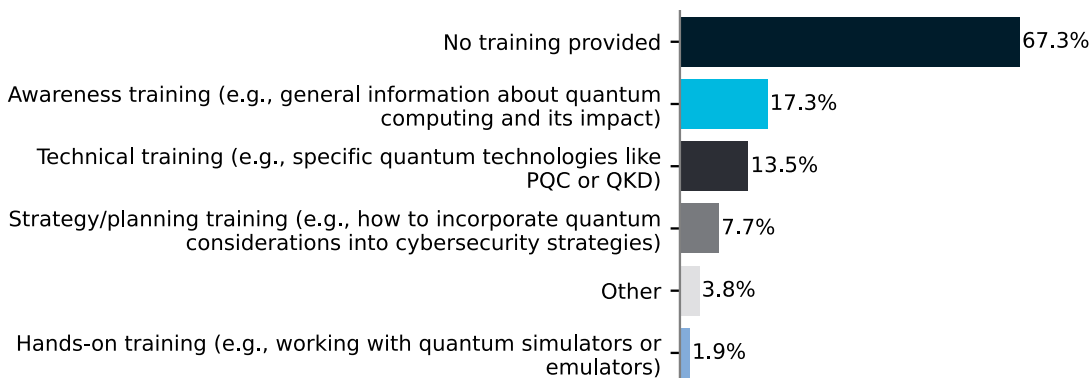


Figure 22 Training and upskilling for quantum computing risks

- **Mixed awareness of ASD’s PQC guidance reveals a strategic communication gap, with half of the participating organisations uncertain or unaware of the 2030 transition recommendation.** In December 2024, ASD updated its Information Security Manual to formally recommend that organisations transition to PQC by 2030 [4]. Survey results indicate a moderate level of awareness among respondents regarding this announcement (see Figure 23). 50.0% reported being aware of these announcements, suggesting a moderate level of engagement with national cybersecurity developments. However, 28.8% were unsure, indicating that a significant portion of participants may have limited understanding or clarity on the topic. Additionally, 21.2% stated they were not aware at all, highlighting a gap in communication or outreach.

These findings highlight the need for more effective awareness campaigns and clearer messaging to ensure organisations are informed and adequately prepared for the transition. Given the long lead times required for cryptographic transitions, early awareness is essential for timely planning, procurement, and risk mitigation.

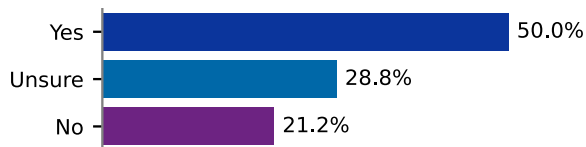


Figure 23 Awareness of ASD announcement on post-quantum cryptography

- **Despite moderate awareness of ASD’s PQC guidance, fewer than 30% of organisations have initiated action, highlighting slow momentum toward the 2030 transition.** Although half of the respondents are aware of ASD’s recommendation, only 28.9% reported taking any form of action (see Figure 24). Of these, 15.4% are planning to implement changes, 7.7% have initiated efforts, and just 5.8% are actively in the process of implementation. With less than five years remaining until the 2030 deadline, these figures suggest that organisational momentum is lagging, potentially increasing the risk of rushed or inadequate transitions. To accelerate progress, more targeted outreach, clearer technical guidance, and supportive measures may be needed to encourage adoption and ensure timely readiness.

NOTE: *The interviews were conducted prior to the official release of the ASD’s updates to the Information Security Manual in December 2024.*

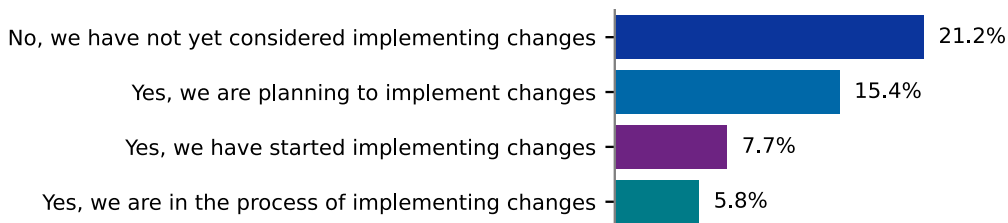


Figure 24 Response to ASD's post-quantum cryptography recommendations

• **Uncertainty in planning timelines signals lagging organisational readiness for PQC adoption.** As shown in Figure 25, 42.3% of respondents indicated they were unsure when their organisation would adopt PQC. Only 3.8% reported plans to adopt PQC within the next 12 months, while 19.2% expected to do so within the next three years. An additional 11.5% anticipated adoption within the next five years, and 5.8% projected it would occur beyond that timeframe. Notably, 17.3% of respondents

stated that their organisation had no plans to adopt PQC at all. These findings suggest that while some organisations are beginning to plan for the transition, the majority remain uncertain or disengaged. This underscores the need for clearer implementation roadmaps, strategic planning support, and stronger engagement with ASD’s guidance to ensure timely and coordinated adoption across the sector.

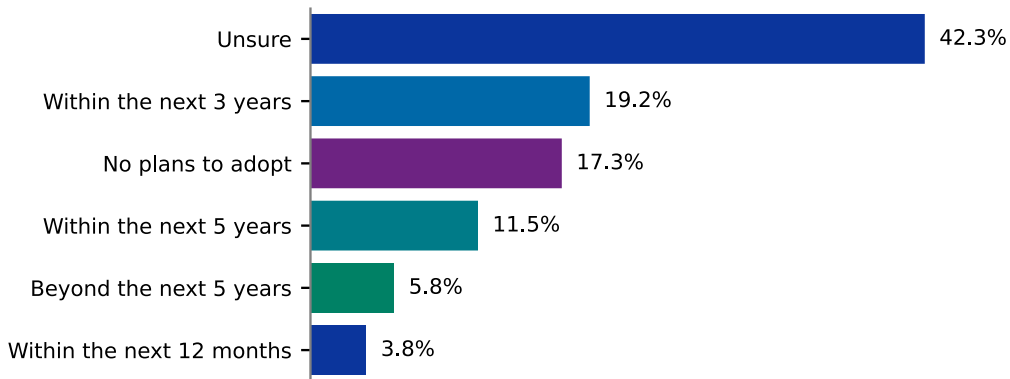


Figure 25 Planned timeline for adoption of post-quantum cryptographic solutions

Theme 4: Responsible quantum adoption

This section outlines how organisations are approaching the responsible adoption of quantum technologies. As these technologies evolve, it is increasingly important for organisations to consider their broader impacts, ethical implications, and long-term strategies for responsible adoption and use. This aligns with responsible innovation, which emphasises that scientific and technological advancement should be guided by thoughtful intent, ethical values, and practices that deliver broad societal and environmental benefits, both now and into the future [9]. This is especially critical in emerging areas like quantum, which are likely to have far-reaching consequences across sectors and communities.

This is also directly relevant to Theme 5 of the *Australian National Quantum Strategy*, which emphasises the importance of building a trusted, ethical, and inclusive quantum ecosystem. One of the Strategy's key actions is for the federal government to work collaboratively with industry, academia, and state and territory governments to develop principles that guide the responsible and inclusive development and use of quantum technologies. The insights presented in this section offer valuable evidence to inform that national effort, highlighting how organisations are currently engaging with, or struggling to engage with, ethical and governance frameworks.

To explore how these principles are being interpreted in practice, the interviews focused on participants' interpretations of responsible innovation and the ethical or regulatory frameworks their organisations use to guide the development and use of emerging technologies. Interviewees were asked to provide examples where applicable and to reflect on why such frameworks may be absent or underdeveloped. The survey complemented these discussions by assessing whether organisations had evaluated the potential impacts of quantum technologies and whether they had strategies in place to ensure responsible, ethical use. Respondents were also asked to identify the important values guiding their approach to quantum adoption, based on the World Economic Forum's (WEF) *Quantum Computing Governance Principles* [10].

Collectively, these findings offer an understanding of how organisations are approaching the responsible adoption and use of quantum technologies.

- **Only one in four organisations have assessed the broader impacts of quantum technologies, highlighting a widespread gap in forward impact planning.** As shown in Figure 26, 48.1% of organisations have not conducted any impact assessment, while 23.1% are unsure, leaving just over a quarter with any form of evaluation. Among those that have, economic impacts were the most assessed (26.9%), while environmental (13.5%) and social impacts (11.5%) received far less attention, indicating a narrow focus.

Interview participants echoed these findings, expressing concern about the broader implications of quantum technologies. Many emphasised the importance of ethical responsibility, sector-wide awareness, and preparedness. Common themes included sustainability, public trust, and the need for a social licence to operate, alongside calls to balance innovation with potential harms.

These insights suggest that many organisations are underprepared for the broader consequences of quantum adoption and use. Without comprehensive, multidimensional impact assessments, they risk falling behind in developing responsible adoption and use strategies, anticipating regulatory changes, and aligning with evolving societal expectations, especially as quantum technologies become more integrated into critical systems and infrastructure.

- **Lack of clarity in values guiding quantum decisions highlights a gap in ethical focus and strategic direction.** Survey responses to the WEF's *Quantum Computing Governance Principles* reveal uncertainty around value prioritisation in quantum technology adoption (see Figure 27). Over a third of participants (36.5%) were unsure about their organisation's priorities, indicating limited familiarity with quantum governance frameworks. Among those that did express preferences, Common Good and Transparency were most frequently selected (32.7%), followed by

Accountability (26.9%). Accessibility (21.2%) and Inclusiveness (13.5%). Equitability (quantum technology is used in non-discriminatory ways) and Non-maleficence (quantum technology is not used for harmful purposes, and people are not placed at risk of harm through the intended or unintended uses of the technology) received no selections, indicating a lack of prioritisation of these ethical principles.

Beyond the survey, interview insights add depth, revealing that organisations often consider broader values such as societal risk, ethical appropriateness,

sustainability, and public legitimacy, which were not tested in the survey.

Together, these findings suggest that while some organisations are beginning to articulate value-based approaches to quantum governance, many are still in the early stages. Strengthening ethical literacy, clarifying strategic priorities, and aligning with emerging governance standards will be essential as quantum technologies move closer to mainstream adoption.

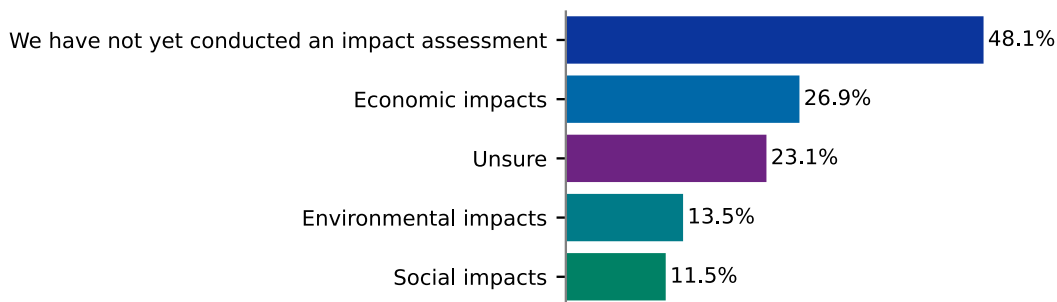


Figure 26 Assessment of quantum technology impacts

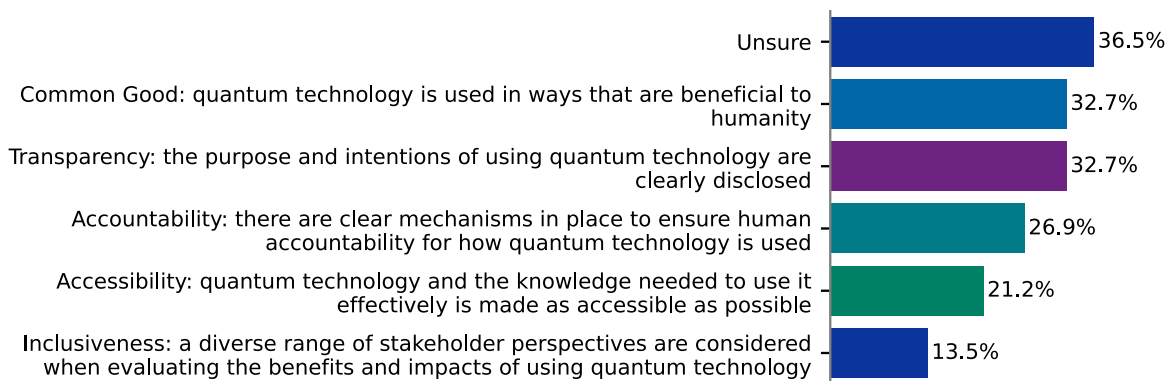


Figure 27 Core values underpinning quantum technology adoption

- Fragmented approaches to ethical strategy reveal a lack of coordinated planning for the responsible use of emerging technologies.** As shown in Figure 28, survey results show a fragmented landscape in how organisations are approaching the ethical, inclusive and responsible use of emerging technologies. While 44.2% of participants indicated that their organisation either has a strategy in place (25%) or is currently developing one (19.2%), the majority (55.7%) have not yet addressed this issue (36.5%), are unsure (11.5%), or selected “Other” (7.7%), often referring to AI-specific policies that may not fully address quantum-specific concerns.

Interview data reinforces and contextualises these

findings, revealing that although formal strategies may be absent, many organisations engage with ethical considerations through existing governance structures and regulatory compliance mechanisms. However, these efforts are often informal or ad hoc.

Together, these findings highlight a fragmented and reactive approach to ethical governance. As emerging technologies like quantum computing become increasingly embedded in critical infrastructure and decision-making, there is a growing need for coordinated, forward-looking frameworks that promote responsible innovation, ethical foresight, and societal trust.

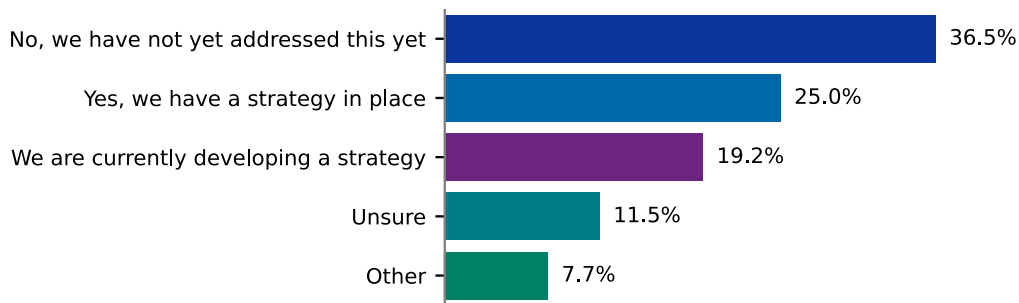


Figure 28 Organisational readiness for ethical use of emerging technologies

Conclusion

As quantum technologies move from theory to application, Australia stands at a pivotal moment. By examining four key dimensions: quantum awareness, quantum readiness, quantum cyber readiness, and responsible quantum adoption, this study provides an exploratory, yet valuable overview of how Australian organisations are preparing for the quantum future.

The findings show that while interest and investment in quantum innovation are growing, organisational readiness varies significantly. Some organisations are beginning to develop strategic plans, invest in workforce development, and engage with the broader ecosystem. However, many who responded remain in the early stages of awareness and preparedness. Cybersecurity readiness is a pressing concern, with organisations expressing limited understanding of the risks posed by quantum computing to current encryption systems. Similarly, commitments to responsible innovation such as ethical frameworks, impact assessments, and value-based governance are not yet systematically embedded across organisations or sectors.

These insights offer a valuable evidence base to inform national efforts under the National Quantum Strategy, particularly its goals of fostering innovation, securing infrastructure, building a skilled workforce, and ensuring ethical and inclusive development. To address these gaps and build on emerging strengths, this report makes several recommendations.

Key recommendations

- **Strengthen quantum awareness and education across sectors.** Investment in targeted outreach and professional development could help build foundational understanding of quantum technologies among decision-makers in industry and beyond, addressing the gaps in awareness identified in this report.
- **Advance strategic readiness through pilot programs and workforce development.** Support for pilot initiatives and training programs could play a

pivotal role in preparing organisations and professionals for quantum integration.

- **Provide guidance and resources for PQC adoption.** Clear, actionable guidance and tools may help organisations navigate the complexities of PQC, building confidence in implementation, and support early PQC adoption in alignment with national cybersecurity directives.
- **Foster cross-sector collaboration and ecosystem engagement.** Establishing platforms for dialogue and partnership may facilitate knowledge sharing, align efforts, and enable coordinated progress across sectors, contributing to the development of a resilient quantum ecosystem.
- **Develop national principles for responsible quantum innovation.** A collaborative, co-design approach to developing ethical and inclusive guidelines could help ensure these principles reflect Australian values and align with *Theme 5: A trusted, ethical and inclusive quantum ecosystem* of the National Quantum Strategy.

Looking ahead, Australia's global leadership in quantum technologies will depend not only on scientific and technical capabilities but also on strategic, ethical, and collaborative choices made today. Shaping a quantum future that is not only innovative and competitive, but also secure, inclusive, and aligned with Australia's strategic vision, will require continued engagement across government, industry, and academia. The recommendations outlined above offer a foundation for such efforts, aligned with Australia's strategic vision.

Ongoing assessment will be important to track progress on quantum readiness and support quantum cyber preparedness, particularly through timely post-quantum cryptography migration. Establishing a **Quantum Readiness Tracker**, akin to the AI Adoption Tracker [11], could enable Australia to monitor developments, identify emerging gaps, and inform coordinated, responsible advancement of quantum technologies.

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