AUSTRALIAN QUANTUM ALLIANCE PROSPECTUS

INAUGURAL EDITION | 2023

TechCouncil of Australia | AUSTRALIAN **Quantum Alliance** ›

Contents

Photo credit: Diraq
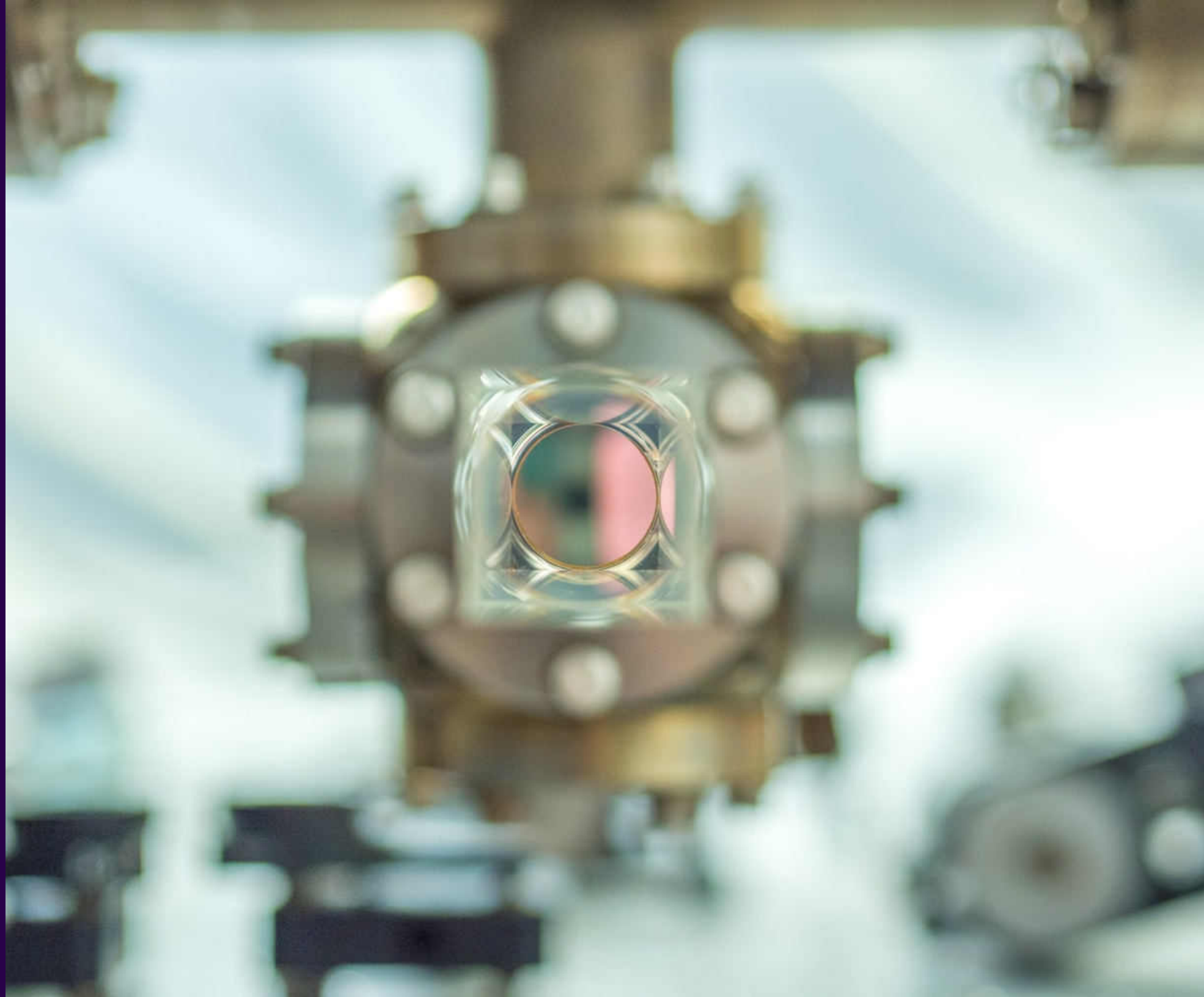
Tech Council of Australia

AQA Prospectus

Foreword

Quantum technology is at an inflection point. Early commercialisation will deliver billions of dollars in economic value and thousands of jobs by 2030 globally and in Australia. Realising the quantum advantage also represents a level-shift in strategic capabilities.

To capture these benefits, leading tech nations and companies have made significant commitments to quantum research, and more recently, commercialisation. Global investment in quantum reached $55bn in 2022, according to the World Economic Forum, with governments accounting for almost 90% of funding.

Australia has been a leader in the quantum ecosystem for over 20 years. As a result of strong Government support of quantum research, Australia now has university-spinoffs and commercialisation ventures that are becoming world-leading in their specialisations in the quantum industry.

Australia is home to more than 3% of global quantum start-ups, almost double our 1.7% share of tech start-ups, on average, according to TCA research.[1] Many of these start-ups are scaling rapidly.

Leading global companies are also choosing to invest in developing a strong quantum presence in Australia, recognising the global potential and growing impact of our quantum industry.

The Tech Council is proud to add global and local leaders in quantum to the Tech Council of Australia. This highlights the breadth and depth of Australia's rapidly growing tech sector, and its potential to be a source of new jobs, growth and investment in Australia. We look forward to working with industry, government and the research community to take the quantum sector from strength to strength.

Kate Pounder
CEO
Tech Council of Australia

AQA Member companies

The AQA is the voice of the quantum industry in Australia. The mission of the AQA is to promote, strengthen and connect Australia's quantum ecosystem.

Our mission

PROMOTE

We help decision-makers and the public **understand** and **adopt** quantum technology.

STRENGTHEN

We **provide advice** to Government on the development of the Australian quantum industry.

CONNECT

We support the growth of the quantum industry in Australia by **building partnerships** with key international and local stakeholders.

Photo credit: Silicon Quantum Computing

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diraq

Delivering revolutionary quantum computing technology to the world.

Diraq, a world leader in silicon quantum dot quantum computing, will be an end-to-end quantum computing provider – providing quantum hardware and software as a full stack, cloud accessible service, in order to unlock all the promise of quantum computing, including drug discovery, schedule optimisation, banking and finance.

Diraq's IP portfolio is built on a history of innovation in quantum hardware and qubit control, and has been validated by high profile breakthroughs such as the world's first single-and two-qubit logic demonstrations in silicon MOS devices.

The foundational IP, which has been proven through real-world demonstrations of quantum chip fabrication and measurement, can be manufactured at scale using existing silicon chip manufacturing plants which employ a technology known as CMOS. This means highly efficient, tightly packed quantum processor stacks of a similar size to a single server rack that drives the cloud now.

The transformational applications of quantum computing will require many millions, and ultimately billions, of qubits. Diraq's silicon-based technology is arguably the only pathway to the billions of qubits needed to realise quantum computing's huge potential.
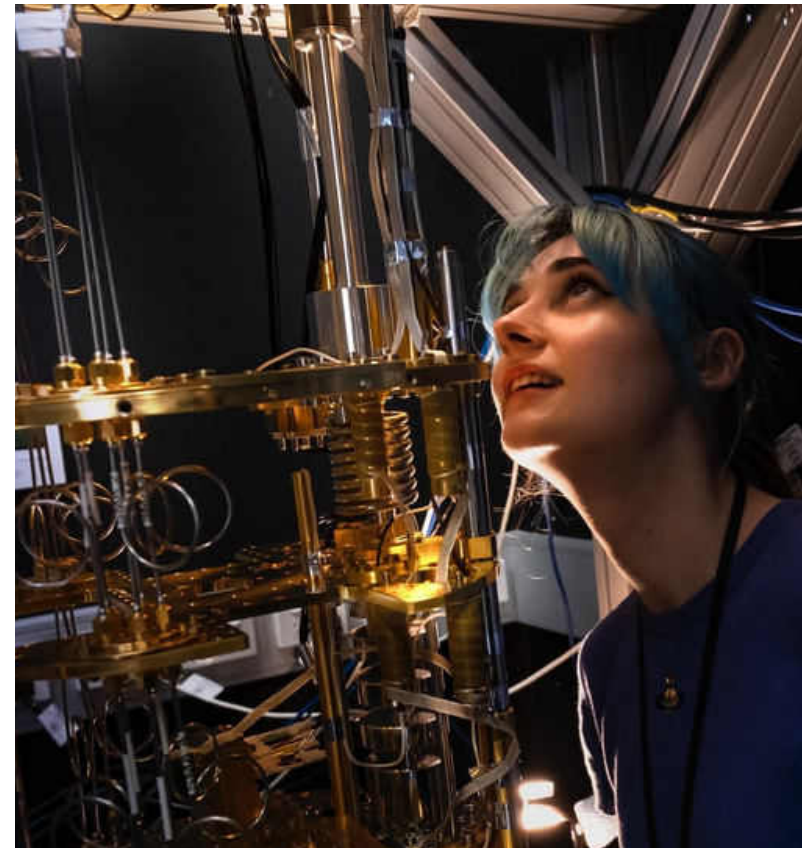

Alexandra Dickie, Test and Equipment Engineer at Diraq, configures test and equipment setups for cryogenic measurement operations.

Diraq was founded in May 2022 by Australian Research Council Laureate Fellow, Professor Andrew Dzurak.

Professor Dzurak has a legacy of over 20 years of world-leading silicon quantum device engineering and is an internationally recognised engineer and scientist, having produced more than 30 publications in Nature and Science group journals.

Diraq's team is comprised of world-leading engineers with the scope of experience required for full integration of silicon quantum device development, including semiconductor process development and fabrication, cryogenic measurement, solid state theory and quantum device engineering.

The team are staffed to not only be an ongoing generator of valuable IP and chip design, but an engineering company; able to drive testing, fabrication, and delivery of genuine high performance quantum computing systems.
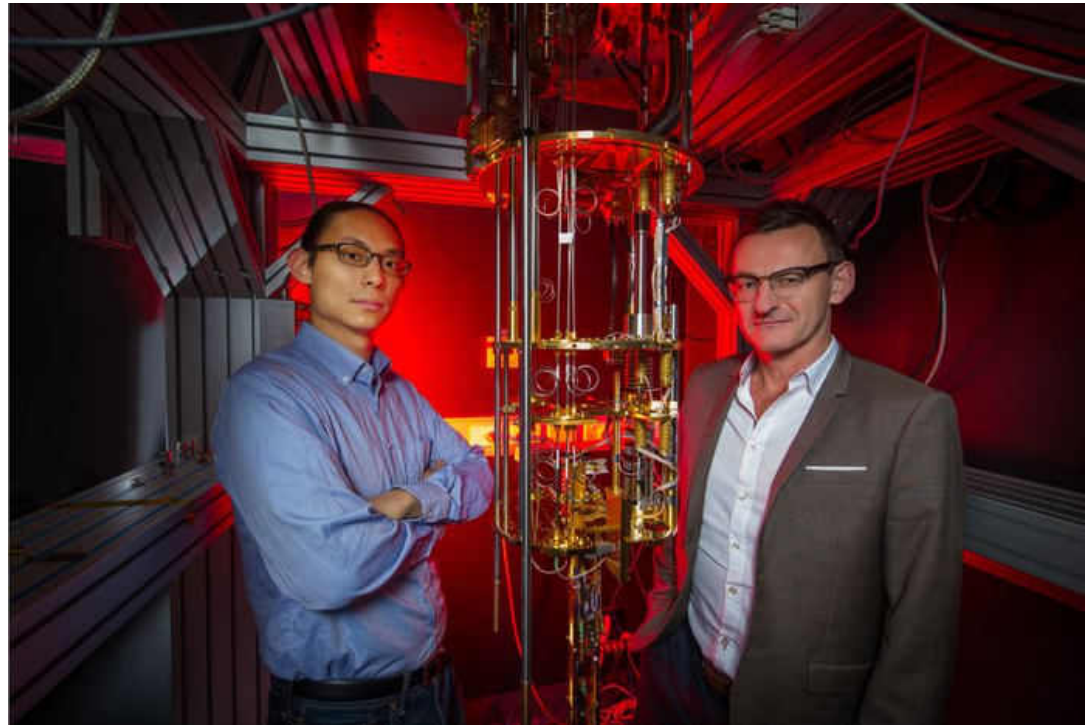
Diraq's CEO and Founder, Professor Andrew Dzurak (R) and Head of Quantum Control, Dr Henry Yang (L) with a millikelvin refrigerator.

Google Quantum AI strives to develop best-in-class quantum computing tools, aiming to enable humankind to solve problems that would otherwise be impossible.

Australian researchers work as part of an integrated global team

Our team sits within Google Research, which reflects the early stage nature of our work. Dr. Maria (Marika) Kieferova, based in Sydney, coordinates our research in Australia.

As part of an integrated global team, our Australian researchers are developing quantum algorithms for data analysis, chemistry and optimization, researching properties of many-body quantum systems and developing mathematical models to understand the strengths of small quantum computers. This initiative has resulted in a significant portion of our global partnerships being made here in Australia. We recognise Australia's global leadership in quantum theory research and partner with Australian Quantum Software Network, in addition to being a member of the AQA.

In 2022, we announced an investment in quantum computing in Australia as a part of Google's Digital Future Initiative. This investment extended partnership with Macquarie University and UTS and established ties with University of Sydney and University of New South Wales.

Google Quantum AI is working to:

1 build a fault-tolerant quantum computer, using superconducting qubits, by 2030, and;

2 develop algorithms and applications for both Noisy Intermediate Scale Quantum (NISQ) processors and fault-tolerant quantum computers

Dr. Marika Kieferova and Professor Michael Bremner at work at UTS.

Photo credit: CQC2T

Our research in Australia focuses on developing quantum algorithms. Quantum computers operate under completely different principles than computers that we have today. Rather than speeding up existing algorithms, we must develop new computer programs that utilise properties of quantum mechanics. Quantum mechanics makes many problems in physics and chemistry intractable for traditional computers but solvable on mature quantum computers with appropriate algorithms.

Our research suggests that quantum computers can help calculate properties of molecules. This will help us solve problems in fields such as chemistry and materials science. For example, with early fault-tolerant quantum computers, we may be able to model more efficient chemical reactions to produce fertiliser.
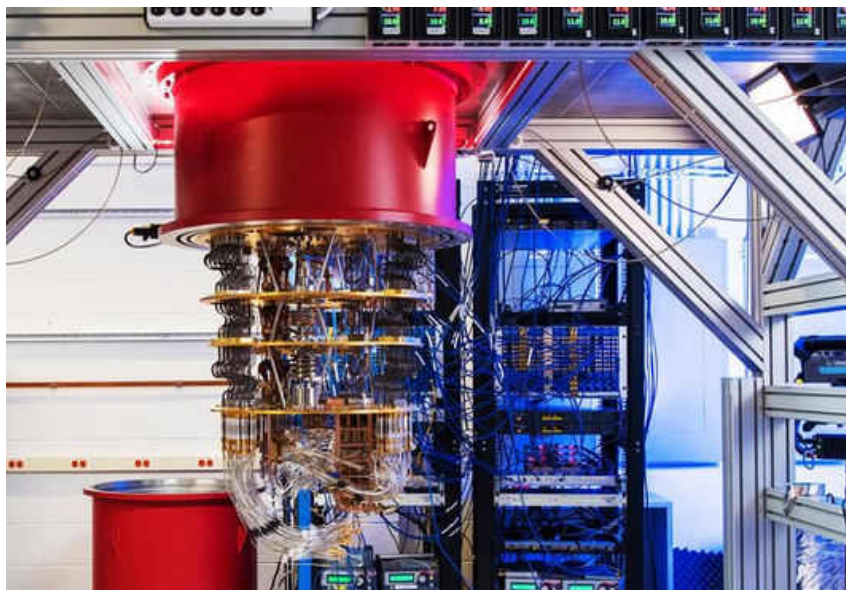
Nitrogen in commercially produced fertiliser is produced by the Haber-Bosh process that accounts for over 1% global carbon dioxide emission and between 1-2% of the world's energy.

There is a more efficient pathway exploited by certain bacteria, but existing chemistry methods are not advanced enough to understand and replicate this reaction on a large scale. Mature quantum computers could perform quantum chemistry calculations that are intractable otherwise, helping us to understand a critical component of nitrogen production and eventually lead to the development of cheaper and greener fertilisers.

We work with Google Quantum AI lab in California
Australian quantum researchers work closely with Quantum AI teams based in California to discover and evaluate new quantum algorithms.

Together, we published several novel quantum algorithms for chemistry, data science and characterising quantum devices and supported more research on the theoretical foundations of quantum computing. While many of our algorithms are aimed at future generations of quantum computers, we also actively investigate what experiments can be performed on Google's quantum processors. Our most recent model, "Sycamore", has 72 superconducting qubits and state-of-art precision of operations. In 2019, our team demonstrated a beyond classical result using 53 qubits and we estimate that a mature, fault-tolerant, quantum computer will require on the order of 106 (1 million) qubits.

Microsoft

For nearly two decades, Microsoft has worked to advance quantum computing.

Microsoft's work includes investments to develop a scalable, programmable quantum computing system and to create the hardware and software required to support it. Our approach has brought together experts in quantum physics, mathematics, computer science, and engineering and has involved collaboration with universities, industry, and government on cross-cutting research that aims to make quantum at scale a reality.

Since 2017, Microsoft and the University of Sydney have worked together to build Microsoft Quantum Sydney.

Microsoft Quantum Sydney is the Australian arm of Microsoft's global quantum computing initiative to create a useful, scalable general-purpose quantum computer.

Led by Professor David Reilly, Microsoft Quantum Sydney is located in the University of Sydney's $150 million Nanoscience Hub.

Tech Council of Australia

AQA Prospectus
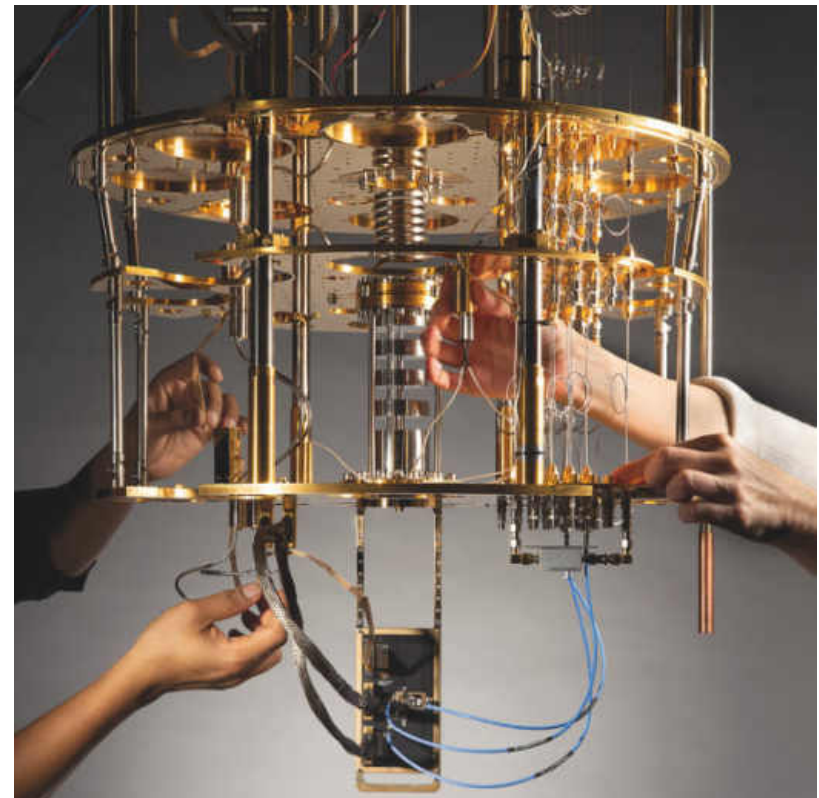
Professor Reilly and his team have pioneered new techniques for controlling thousands of qubits at cryogenic temperatures.

The team invented a classical control chip, dubbed Gooseberry, that sits next to a quantum device and operates in extreme temperature conditions close to absolute zero. Above this sits a general-purpose cryo-compute core that operates at slightly warmer temperatures and performs classical computations. These computations determine the instructions that are sent to Gooseberry which, in turn, feeds low voltage pulses to the qubits.

These novel classical computing technologies are helping to solve many of the issues associated with controlling thousands of unpredictable qubits, the building blocks of quantum technology.
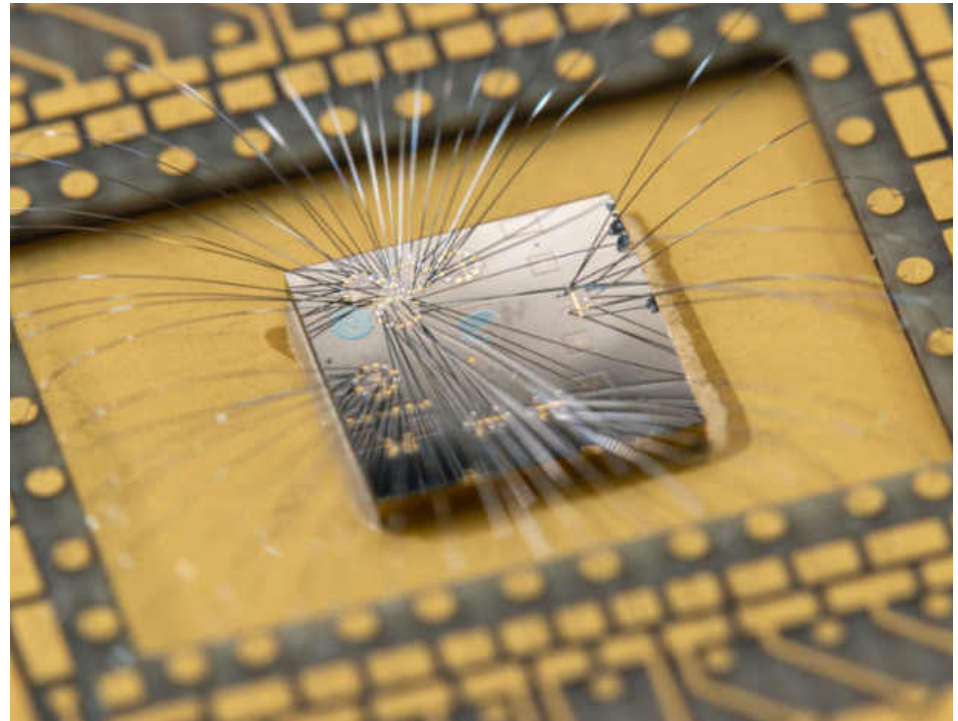
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At Nomad Atomics, we are driven by the desire to see quantum technologies move out of the laboratory and into the world where their true potential can be realised.

Nomad Atomics specialises in the development and deployment of high precision quantum sensors. By exploiting the natural properties of atoms and their interaction with light, we develop state-of-the-art sensors for the measurement of gravity, acceleration, magnetics, and time. We offer end-to-end capabilities covering technology development and manufacture, sensor deployment, and data collection and processing, to provide our clients with greater insights about the environments in which they operate.

Our Technology
Nomad Atomics' initial technology lies in acceleration and gravity sensing. The ability to map and monitor the subsurface is critical to enabling responsible use of our natural resources and mitigation of risks associated with changes that are occurring underground (either natural or manmade). Gravimetry is an attractive technique for interrogating the subsurface because it detects changes in the characteristics and distribution of mass in a non-invasive and non-destructive manner. The unique insights provided by gravity measurements have utility in a range of sectors including resource exploration and monitoring, land and groundwater management, underground storage, and underground infrastructure monitoring.

However, the limitations of current gravimeters have constrained the range of situations that gravimeters can be used, and the usefulness of the information obtained. Many applications require an understanding of the absolute value of gravity and measuring true gravity can only be achieved with absolute gravimeters. Current commercial absolute devices have a complicated architecture, and their large size, fragility, high cost and dependence on main power supply has restricted how they can be deployed.

Nomad Atomics' field-deployable quantum absolute gravimeters provide a step-change in capability over current gravimeters. Our cold-atom gravimeters directly measure the local gravity field to provide a high-precision, drift-free measurement of absolute gravity which allows underground mass changes to be monitored in near real time in a way that has not previously been possible. Our devices are specifically designed and hardened for field and survey operations expanding the range of environments and situations where gravity data can be collected. Our technology offers a pathway to significant miniaturisation enabling further use cases such as next generation navigation systems and space technologies.

About Nomad Atomics

At Nomad Atomics, we are driven by the desire to see quantum technologies move out of the laboratory and into the world where their true potential can be realised.

Our technology is underpinned by research and capabilities developed at world-class universities, including the Australian National University and Humboldt University of Berlin, where our co-founders led advanced quantum sensing programs focused on building and miniaturising deployable sensors.

Since its creation in 2021, the Nomad Atomics team has expanded to include members with extensive backgrounds in quantum sensor development, geophysical sensor application and commercialisation.

Q-CTRL makes quantum technology useful.

Quantum technology promises to be as transformational in the 21st century as harnessing electricity was in the 19th.

We deliver real-world quantum outcomes for Enterprise, Industry, Research, and Government through our globally unique expertise in quantum control.

Q-CTRL is a category-defining business building the new segment of quantum infrastructure software to improve the utility and performance of quantum hardware. We address the greatest challenges in the field - hardware error and instability - in order to deliver transformational outcomes for our users.

Our advanced and proprietary technology brings true strategic advantage to teams in quantum computing – from platform vendors to end users – and powers a new generation of sovereign capabilities through software-defined quantum sensing for GPS-denied navigation, Earth observation, and battlefield awareness.

It's our mission to make quantum technology useful for everyone through cutting-edge research and powerful software products.


About Q-CTRL

Founded by Professor Michael J. Biercuk (pictured left), we have international headquarters in Sydney, Los Angeles, and Berlin.

We have been an inaugural member of the IBM Quantum Startup network since 2018 and we are funded by tier-1 international investors.

Q-CTRL Products

FIRE OPAL

Fire Opal delivers effective error suppression technology for quantum computers as a simple, fully automated solution suitable for any user. Leverage Fire Opal across supported quantum processors to gain meaningful insights from quantum hardware that were previously impossible to achieve. Independently validated to demonstrate up to 9,000x performance improvement over existing techniques, Fire Opal maximizes the success of quantum algorithms without any user intervention, hardware knowledge, or configuration required.
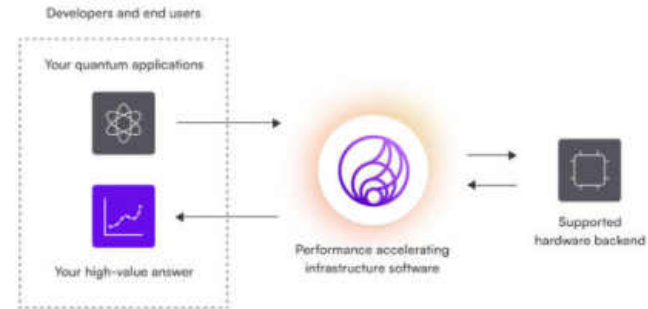
BLACK OPAL

Black Opal helps anyone learn quantum computing through best-in-class product design, social integration, and educational content. With over 350 interactive visual lessons anyone can go from zero to programming real quantum computers in just minutes a day. And full Enterprise features give leaders everything you need to build a strategic advantage with a quantum literate workforce.

BOULDER OPAL

Boulder Opal is a versatile Python package that provides everything you need to accelerate research and improve quantum hardware performance through the power of quantum control and automation. It can be used as a standalone numerical tool or connected directly to hardware so AI agents can automate and accelerate manual tasks. It fully integrates with industry-standard simulation packages like QuTiP, and serves as a powerful extension to expand performance and capability to help researchers address problems that are otherwise out of reach.

Our vision is to make diamond quantum computers an everyday technology which will be embedded everywhere and enable the use of quantum computing in ways never seen before.

Quantum Brilliance is the world leader in room temperature diamond quantum computing technology, which was spun out of Australian National University in 2019. We are backed by leading deep tech venture funds, including Main Sequence. We have a global presence with six offices in Australia and Europe, employing close to 100 staff.

The Quantum Brilliance quantum computer operates entirely at room temperature, and we have clear pathway towards mass deployment and miniaturisation.

Our technology does not require low temperature cooling, large vacuum systems or complex laser arrays. This enabling technology creates opportunities for mass deployment of a huge clusters of Quantum Processing Units (QPUs), as well as, miniaturised edge QPUs deployed anywhere. This will revolutionise industry capabilities from sea to factories and hospitals, and from air to space.

Top: Dr Marcus Doherty, Co-Founder and Chief Scientific Officer in the Quantum Brilliance Lab at the Australian National University. Bottom: a quantum-grade synthetic diamond used for room temperature quantum computing.

Quantum Brilliance Products

Customers can access quantum computing today.

In 2022, we deployed the world's first room temperature quantum computer in a computer centre, at Pawsey Supercomputing Centre, Australia's largest supercomputing centre. We also work with companies today to access our software suite, and work with developers to start designing and testing quantum applications.

Diamond Quantum Computer – Plug & play, operates at room temperature, low power consumption, and low barrier to adoption. Easy to host on site and integrate with existing infrastructure requirements.

Quantum Software Suite – Our software suite includes development tools to help expert users to explore quantum applications. We support popular open-source frameworks and can be programmed in Python or C++.

Quantum Applications Co-Development – We work with customers to explore how room-temperature diamond quantum computers can unlock new possibilities in their industries and create proprietary use cases.

The world's first room-temperature, on-premises quantum computer in a supercomputing centre, designed, manufactured and deployed by Quantum Brilliance at the Pawsey Supercomputing Centre.
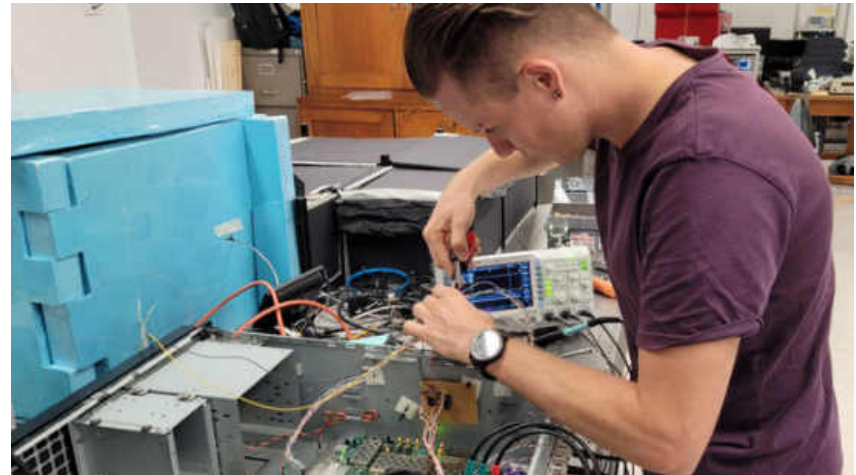
A Quantum Brilliance engineer building a diamond quantum computer in Australia.

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QuintessenceLabs (QLabs) provides quantum-resilient technical measures essential to a strong cyber defence.

We help enterprises build high performance, crypto-agile cyber security infrastructure on premises, in the cloud, and in hybrid IT environments. This infrastructure protects high-value long-lived assets and critical systems from cyber adversaries of today, and from the emerging threat of quantum adversaries of tomorrow.

We have developed and productionised a suite of solutions including quantum random number generation, enterprise-scale encryption key and policy management, and quantum key distribution.

While our product suite is industry agnostic, core target industries include banking, financial services, and insurance (BFSI), government, critical infrastructure, cloud and IoT providers. We have over a dozen Fortune 500 (and equivalent) customers in ten countries and a host of strategic partnerships of technology providers globally.

We have a presence in Australia, the U.S., and Europe. Our technical team has expertise in many areas, including physics, engineering, and computer science and with specialties in quantum optics, computational physics, astrophysics, and AI.

qStream™ – Quantum Random Number Generator

Random numbers are fundamental to data security. They are used to generate encryption keys and other parameters at the heart of data protection. It is important that the output from random number generators is both unpredictable and has a high enough throughput for commercial use.

Our qStream™ Quantum Random Number Generator uses quantum effects to deliver random numbers with full entropy at 1 Gbit/sec, providing both the randomness and the speed required to applications, servers, and key management systems to support data protection.

QLabs' qStream™ Quantum Random Number Generator

Trusted Security Foundation® − Encryption Key & Policy Management

Enterprise key management incorporates a centralized management tool to secure cryptographic keys that encrypt sensitive data across an organization's distributed IT environments.

Our Trusted Security Foundation® Key and Policy Manager addresses the complexities and challenges of enterprise encryption deployment at scale; generating, distributing, and auditing usage of key material and enforcing security policies related to cryptographic protection of information. It is the industry's most secure crypto-agile key management platform with easy integration into legacy infrastructure and ability to enable enterprises to seamlessly transition to a quantum-resilient posture.

Typical use cases include storage encryption, database encryption, certificate management, VM encryption, secrets management, document security, and network entropy services. The ability to integrate post-quantum algorithms into the TSF® allows enterprises to upgrade existing systems with minimal impact to operations.

QLabs' Trusted Security Foundation® Key & Policy Management

qOptica™ − Continuous-Variable Quantum Key Distribution

Our qOptica™ continuous-variable QKD solution is part of a full technology stack that incorporates the TSF® Key and Policy Manager with qStream™ QRNG.

It is a point-to-point protocol that uses specialized hardware to share secret cryptographic keys over an optical link using laws of physics and not maths. Therefore, it has been proven to be information-theoretic secure.

qOptica's compatibility with current telecommunication technologies, and the ability to operate over standard fibre optic infrastructure, allow for cost effective systems.

QLabs' qOptica™ Quantum Key Distribution

qClient™ Software Development Kit (SDK)

With qClient™ (100 SDK), developers can quickly integrate QuintessenceLabs' key management and random number generation into any application. Vendor-neutral software development kit (client SDK) allows developers to effortlessly integrate key management and encryption applications.
Supports industry standard APIs: KMIP, PKCS#11.

Contact
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Rigetti builds quantum computers and the superconducting quantum processors that power them.

Through our Quantum Cloud Services (QCS™) platform, our machines can be integrated into any public, private or hybrid cloud. Rigetti quantum computers are also available on AWS Braket and Microsoft Azure, allowing for easy access to our most up-to-date, state-of-the-art quantum systems.

We work directly with our partners across industry, government, and academia to identify use cases that will advance both quantum technology and their most important business needs.

Quantum computers have the potential to be exponentially faster and more efficient than classical computers.

Quantum computers harness the unique processing capabilities of quantum mechanics to exponentially reduce the time and energy needed for high-impact computing. This computational power unlocks the potential to address complex problems across industries that were previously unsolvable by classical computers alone.

Faster, more efficient computing has the potential to solve complex problems

We believe that over the next decade a single quantum computer has the potential to be more powerful than the entire current global cloud. Integrating quantum into existing classical computing workflows will enable us to address our most computationally complex problems faster and more efficiently, thus creating opportunities for profound new knowledge and accomplishments for humanity.

Applications include:

- Pharmaceutical: Design and optimise new druglike molecules for known targets; Aid drug discovery
- Agriculture: Develop synthetic enzymes and catalysts for food and energy production
- Finance: Optimise returns and manage risk for investment portfolios
- Machine Learning: Train better AI with less computational overhead
- Logistics: Reduce time and fuel costs by optimising vehicle routing

Rigetti quantum computer

Photo credit: Rigetti Computing

Rigetti is a leading full-stack quantum computing company

We build and integrate the full quantum system in-house (excluding the dilution refrigerator) and make our systems available over the cloud. Rigetti owns and operates the world's first dedicated quantum foundry, Fab-1, where we design and manufacture our quantum processor chips. We patented the world's first modular quantum chip, which is the foundation for our scalable architecture that underpins our roadmap to reach Quantum Advantage.

Rigetti employee inspecting a wafer of quantum chips at the company's Fab-1 facility in Fremont, CA

Rigetti employs nearly 200 people worldwide, including individuals from some of Australia's leading universities and companies such as: Quantum Brilliance, NEC Australia, Commonwealth Bank, Yield Broker, UNSW, University of Adelaide, and the

University of Queensland. Our world-class talent also includes 40+ PhD alumni from Yale, Stanford, Caltech, ETH Zürich, MIT, University of Chicago, University of Oxford, Cornell and University of Cambridge.

Rigetti Quantum Compute Center in Berkeley, CA

Our work is a collaborative effort among scientists, engineers, programmers, strategists, account managers, salespeople, IT experts, accountants, and more. We have some of the world's leading quantum experts, but also employ non-technical individuals who bring unique and passionate backgrounds to our shared mission.

Our in-house quantum algorithm and applications experts work closely with our hardware and software engineers, and partners and customers, to make iterative improvements throughout our stack to enhance performance.

Rigetti customers are top-tier commercial and government organisations who are aligned with our focus on accelerating the commercialisation of quantum computing and solving their real-world problems. Our ideal customers are innovators in their industries and aim to have a competitive advantage as first adopters of quantum computing.

Fab-1, Rigetti's quantum foundry in Fremont, CA

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Silicon Quantum Computing (SQC) is a global leader in the race to manufacture a commercial quantum computer.

SQC is the only company worldwide that can manufacture quantum processors with atomic precision. This precision is invaluable for building a commercial quantum computer.

We have a full stack team that can engineer and manufacture all aspects of our processors in-house using our proprietary atomic-scale manufacturing technology. This allows us to integrate hardware, classical control, and software into patented architectures for useful algorithm demonstrations. One result of our all in-house manufacturing control is that we can fabricate new chip designs in just 1-2 weeks, while some competitors have iteration cycles of many months.

Multiple groups globally are racing to build a quantum computer that will transform industries.

Quantum computers will be able to solve computational problems that are too complex and time-consuming for classical hardware. Quantum solutions to optimisation problems, simulations of molecular and natural systems, new forms of encryption, and revolutionary machine learning applications will transform the information economy and disrupt industries. The first company to deliver a commercial quantum computer will hold an IP-protected position in a market worth up to $190B annually from 2040.[1]

Corporate Metrics at a Glance

Headquarters Sydney, Australia
Founded May 2017 (research from 1999)

CEO & Founder Michelle Y. Simmons FRS AO
President & CIO Ian R. Hill
Employees 50+

Corporate Investment: from 2017 $82.7m (US$62m)
Seed Shareholders: CBA, Telstra, the Commonwealth Government, State Govt NSW, UNSW Sydney
Patent Portfolio: 94 patents; 34 patent families

Research funding: pre-2017 $150M (US$112M)

1. BCG (2021)

We focus on ensuring quality as our hardware scales.
Quantum computers can be built using different materials. SQC's chosen technology, atom qubits in silicon, holds the best metrics for solid state qubits in terms of coherence times (stability), read-out speeds (efficiency), fidelities (accuracy) and gate operation speeds (speed).

SQC maintains a ruthless focus on ensuring that qubit quality (coherence x speed) is maintained as the hardware scales. The resulting quality will allow SQC's processor to solve complex problems more efficiently than its competitors with less reliance on error correction.

SQC has brought together a world-class team and set of commercial assets.
SQC's state-of-the-art manufacturing and testing facilities span three floors and have been supported by over $150M in investment. Located at UNSW Sydney, this infrastructure has been established over the last 20 years. Our 50+ employees and numerous engineers and researchers have authored over 200 peer-reviewed papers and have 94 current patents.

Revenue models

2022 - 2028	2028 - 2033	2033
End user partnerships	Quantum as a Service	Cloud provider partnerships

SQC Proven Track Record of Delivery

- Single atom manipulation in silicon — **2003**
- **2007** — Full atom-scale device process demonstrated
- Created world's smallest transistor — **2010**
- **2012** — Atom-scale interconnects developed
- Error-corrected architecture patented — **2015**
- **2017** — Silicon Quantum Computing founded
- Fastest 2-qubit gate in a semiconductor — **2019**
- **2019** — Highest fidelity qubit readout
- Lowest charge noise semiconductor qubit — **2020**
- **2021** — Demonstration of world's first integrated circuit at the atomic scale
- Robust, high fidelity readout at high temperatures — **2022**
- **2023** — Atom precision magnetic field sensors
- A logical qubit — **2026**
- **2028** — First commercially useful quantum computer
- Error corrected quantum computer — **2033**

Investor perspectives

Investors are a critical part of Australia's growing quantum industry.

Beyond providing the necessary funding to grow, investors also support start-ups by sharing their expertise, building networks and coaching founders through the challenges and complexities of growing their start-up.

To provide an investors' point of view, we've invited **Main Sequence Ventures**, a VC fund and Tech Council member, to share their perspective on Australia's quantum industry.

Photo credit: Silicon Quantum Computing

The field of quantum technologies is extremely exciting — in large part because it is by no means homogenous.

Some segments like quantum computing have very large potential upsides but are extremely risky due to the long timelines and unknowns about how to build a useful, scalable, fault tolerant system.

Other segments like control, sensing, co-processing, and cryptography are here-and-now opportunities that also have pathways to huge long-term value capture. These here-and-now segments are the critical enablers of quantum computing and the potential it holds.

We invest in Australian quantum companies to tackle some of the world's biggest challenges and build the next generation of global companies.

Main Sequence Ventures invests in companies that solve one of more of our six challenge areas. Our investments in Australian quantum companies primarily address two of those challenges: Enabling the Next Intelligence Leap (Quantum Brilliance) and Supercharging Industrial Productivity (Q-CTRL and QuintessenceLabs).

Critical enabler quantum segments are quietly pushing ahead and capturing commercial traction.

Within our portfolio, we are already seeing these businesses deliver real value in partnership with some of the largest tech companies in the world. In quantum information science, Q-CTRL has some of the leading quantum computing as customers who utilise its infrastructure software to make their computers deliver better value to end-users. In quantum cryptography, Quintessence Labs has developed and is selling cryptography systems to Tier-1 customers globally. In quantum acceleration, Quantum Brilliance has worked with Pawsey Supercomputing Research Centre to install the world's first room temperature diamond based quantum computer located on-site in a supercomputing system.

Quantum technologies have great promise but navigating the quantum sector can be complex from an investment viewpoint. It's important to know that the field is composed of multiple segments which together can realise the benefits of quantum technology.

Australia could become a net producer of quantum solutions rather than a net consumer.

Backed by 25 years at the forefront of quantum research, Australia now has a golden opportunity to build a globally significant quantum industry. To do so requires the collaboration of both the private and public sector, similar to what we're seeing in the US and Europe. International collaboration is also key. Through AUKUS and QUAD strategic partnerships, demand for quantum capabilities could deliver huge opportunities for Australia's quantum industry.

Realising the full benefits of quantum technologies will require years, possible decades, of further investment and hard work. While some quantum segments are delivering immediate value now, others will take longer to mature – and each case has different levels of risk. But we are optimistic and working hard to back those intent on making a difference with quantum technologies.

MSV invests in companies solving at least one of our six challenges. Our investments in **quantum** address two of these challenges.

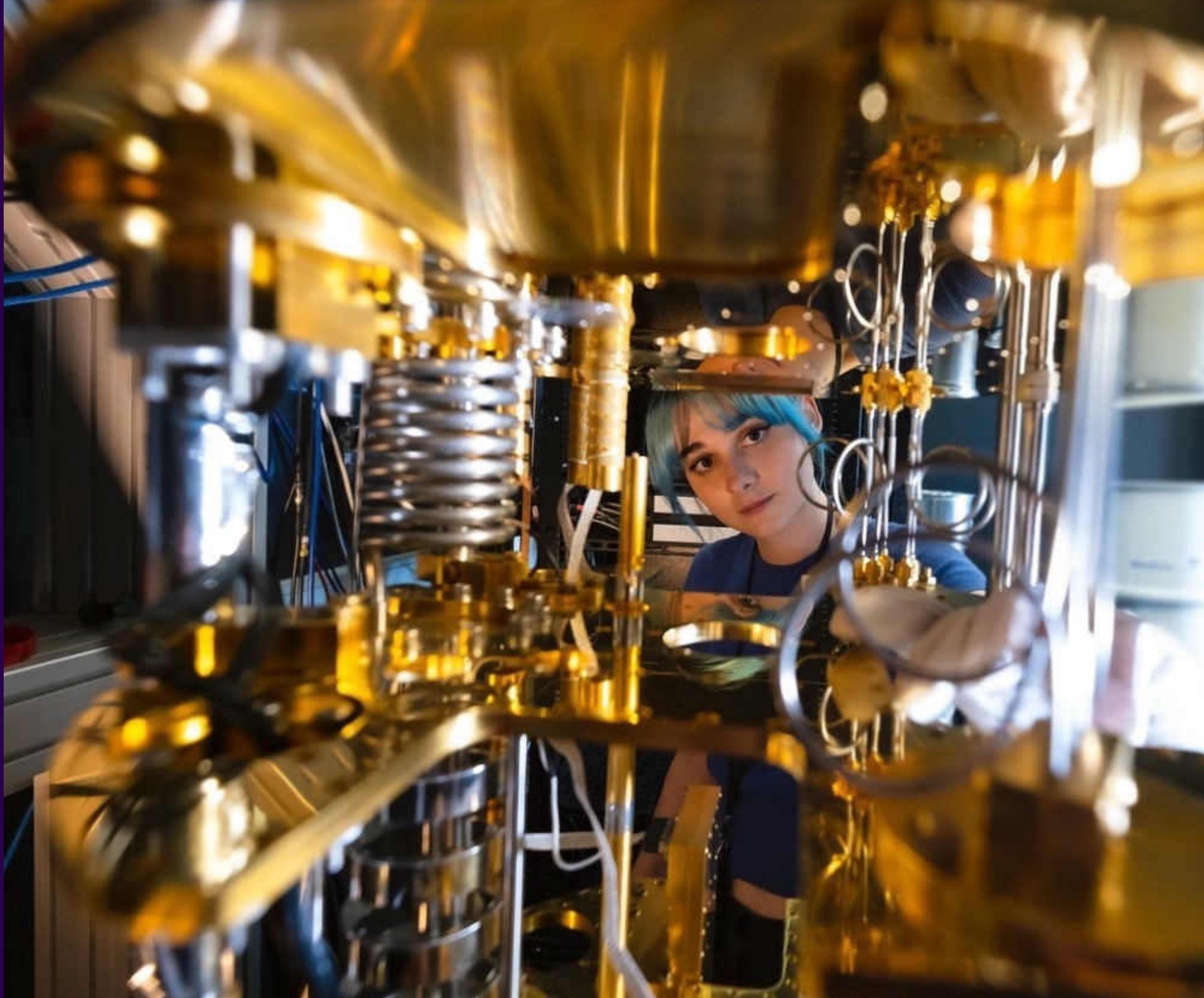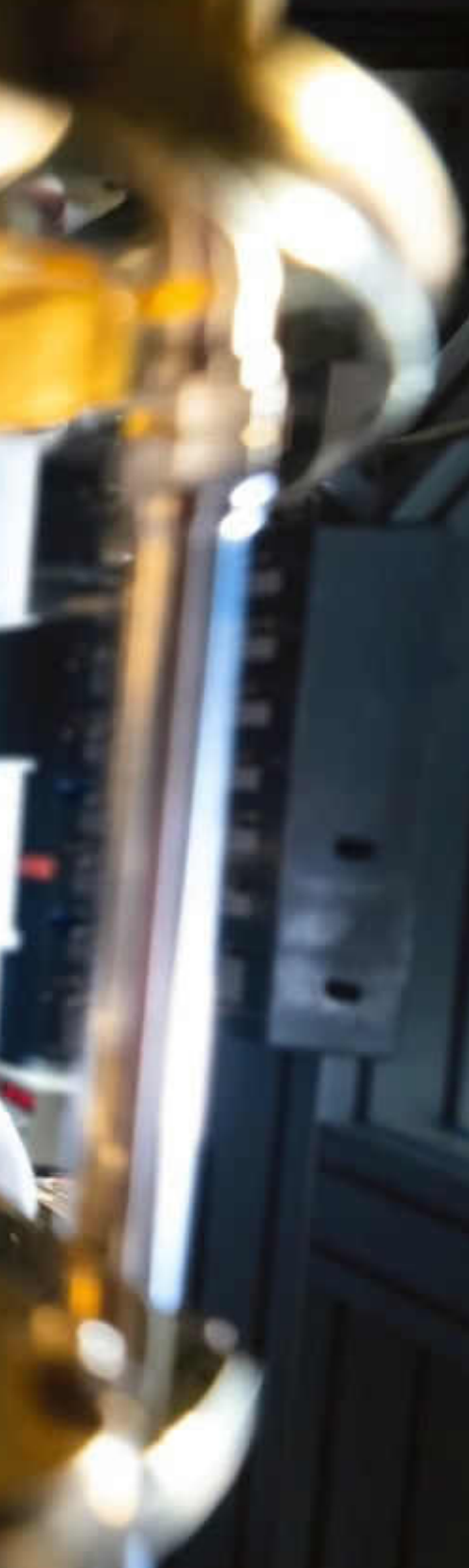|		
Enable the Next Intelligence Leap	**Supercharge Industrial Productivity**	Decarbonise the Planet
Reach Humanity Scale Healthcare	Bridge the Gap to Space	Feed 10 Billion People

Learn more

Scan the QR code to learn more about the Australian Quantum Alliance.

Photo credit: Diraq

AQA and the broader Tech Council membership at the Tech Showcase on 2 August 2022 at Parliament House. Parliamentarians including the Prime Minister, the Hon Anthony Albanese MP, and the Minister for Industry and Science, the Hon Ed Husic MP toured and spoke at the showcase.

About the Australian Quantum Alliance
The AQA is the voice of the quantum industry in Australia. The mission of the AQA is to promote, strengthen and connect Australia's quantum ecosystem. The AQA is part of the Tech Council of Australia, the peak body representing Australia's tech sector.

About the Tech Council of Australia
The Tech Council of Australia is the peak industry body for Australia's tech sector. Providing a trusted voice for Australia's technology industry, with almost 160 members, the Tech Council comprises the full spectrum of tech companies.

We aim to advise and engage with Australian governments, businesses, and the wider community to help support the ongoing creation, development, and adoption of technology across industries.

Our vision is for a prosperous Australia that thrives by harnessing the power of technology.