



QUANTUM
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Annual Report: The Quantum Economy

2024

Executive Summary

- ✓ 2024 will likely go down as a critical point in the history of the quantum industry. Significant research advances, business collaborations and geopolitical maneuvering were among the stories making headlines during the year.
- ✓ Error correction and logical qubits – and their criticality toward developing reliable quantum computing – were the research focus of most teams this year. Big players in quantum – Microsoft, Atom Computing, Quantinuum, and Google – all shared news of scientific advances in this key research area.
- ✓ The announcement of Google’s latest quantum chip, Willow, in December 2024, became a hot topic for mainstream media and even prompted a social media exchange between entrepreneur Elon Musk and Alphabet CEO Sundar Pichai. The news also accelerated an already developing stock market rally for publicly traded quantum companies. However, the excitement also prompted concern from many members of the quantum community that the rally was more hype than realistic expectations.
- ✓ In 2025, the International Year of Quantum, we expect quantum computing to transition decisively from theoretical exploration to real-world application, driven by more advances in quantum error correction (QEC) and the development of hybrid quantum-classical systems.
- ✓ We also see another trend of 2024 – the convergence of quantum computing with artificial intelligence (AI) -- to continue to make progress in the new year and beyond. In this technological convergence, AI-driven techniques could accelerate QEC and qubit performance, for example, while quantum-enhanced AI could offer unique speed ups in certain application domains.

The Big News

Honeywell Closed \$300 Million Equity Investment Round For Quantinum At \$5 Billion Pre-Money Valuation

Honeywell announced the closing of a \$300 million equity fundraise for Quantinum, the world's leading integrated quantum computing company, at a pre-money valuation of \$5 billion. The round is anchored by Quantinum's strategic partner JPMorgan Chase, with additional participation from Mitsui & Co., Amgen and Honeywell, which remains the company's majority shareholder.



SandboxAQ Announced \$300 Million+ in Funding

SandboxAQ announced a round of more than \$300 million from Fred Alger Management, LLC, T. Rowe Price Associates, Inc., Mumtalakat, Parkway Venture Capital, Breyer Capital, Rizvi Traverse, S32, US Innovative Technology Fund, Ava Investments, Eric Schmidt, Marc Benioff, David Siegel, Yann LeCun, IQT, and other prominent investors.



PsiQuantum Received \$940 Million (AUD) From Australian Government

Australia announced a \$940 million – or about \$617 million US – investment in PsiQuantum, a Silicon Valley start-up with Australian roots, in a bid to build the world's first commercially viable quantum computer in Brisbane. The federal and Queensland governments are each contributing \$470 million to PsiQuantum through share purchases, grants, and loans.



Zapata AI Ceased Operations

Zapata Computing Holdings Inc. (Zapata) ceased operations in October, 2024 after its board of directors approved a plan to wind down the business, terminate most employees and address outstanding financial obligations. The decision SEC filing, officially dated October 8, 2024, cited the company's inability to meet its financial obligations as the primary driver behind the closure.



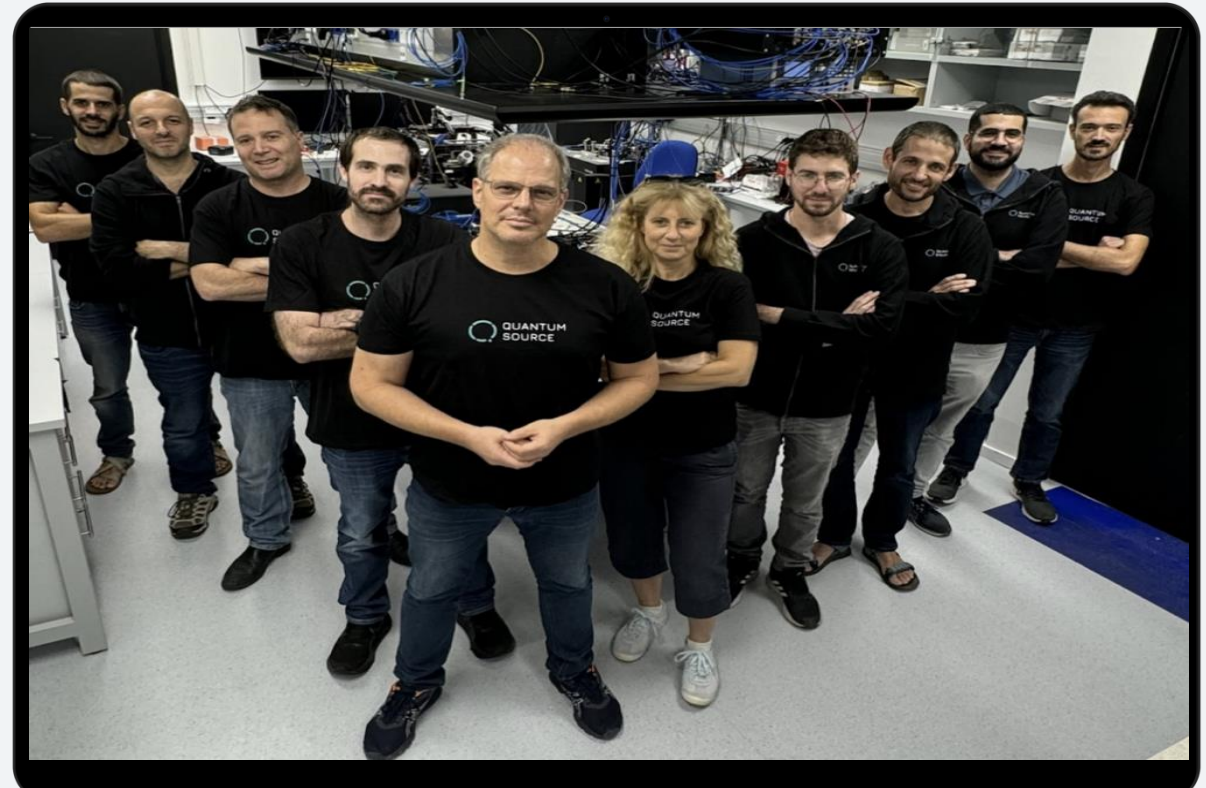
D-Wave Announced Completion of \$175 Million Equity Offering

D-Wave Quantum Inc. raised \$175 million in gross proceeds from its \$100 million and \$75 million “at-the-market” equity offering programs, with the latter completed at an average share price of \$4.8149 over three days. The company reported it ended fiscal Q4 2024 with at least \$160 million in cash.



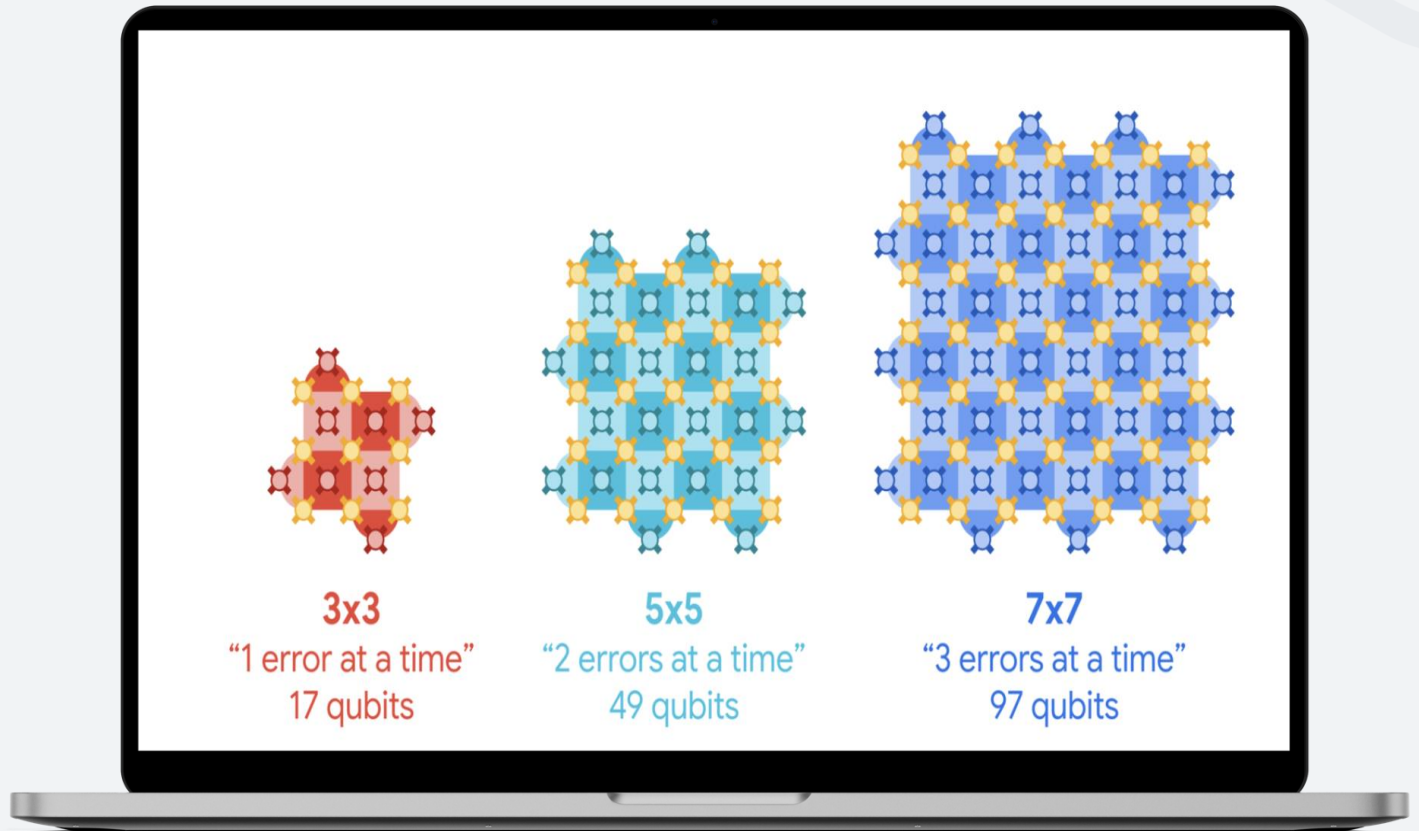
Quantum Source Raised \$50 Million Series A

Quantum Source, an Israel-based company developing technology for powerful, cost-effective, practical photonic quantum computers, announced it has raised a \$50 million Series A investment round led by Eclipse, with participation from Standard Investments, Level VC, Canon Equity, as well as existing investors Pitango First, Grove Ventures, 10D, and Dell Technologies Capital.



Research: New Quantum Chip Outperforms Classical Computers and “Breaks Error Correction Threshold”

Google Quantum AI announced that it was moving past the Sycamore era and taking another leap down its roadmap with the introduction of the 105-qubit Willow, a new quantum chip that has achieved a milestone in computational power and error correction, marking a major step toward large-scale, commercially viable quantum computing.



Research: Microsoft, Atom Computing Announced Record-Breaking Logical Qubit Advance

Microsoft and Atom Computing announced the unveiling of a quantum machine featuring 24 logical qubits – reportedly the largest number of entangled logical qubits achieved to date. They also demonstrated the ability to detect and correct errors, and perform computation, on 28 logical qubits.



Research: Microsoft, Quantinuum Research Yields 'Most Reliable Logical Qubits Ever Recorded'

In what could be a significant advance, Microsoft and Quantinuum scientists reported they successfully demonstrated the most reliable logical qubits ever recorded.



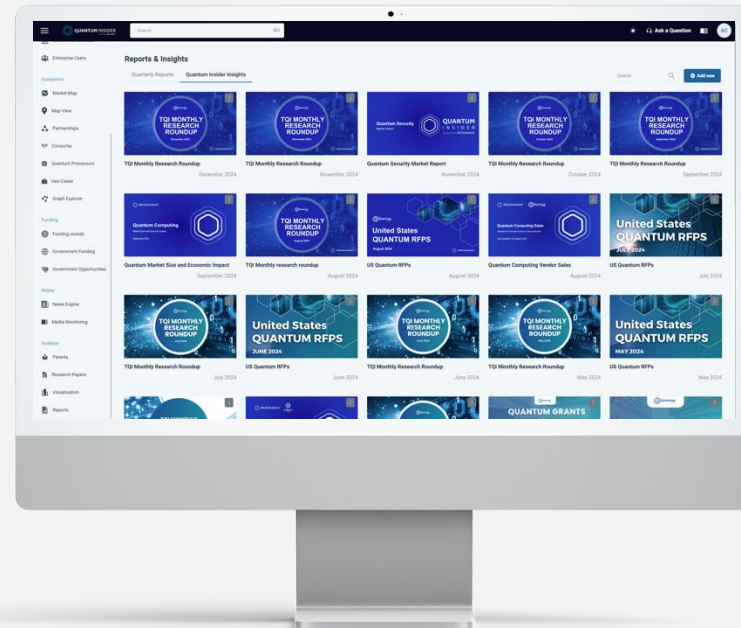
The Quantum Economy

Preview version

This version is a preview of the fuller report which is available to premium subscribers of The Quantum Insider's Intelligence Platform

- ✓ Platform free preview: app.thequantuminsider.com
- ✓ Learn more: thequantuminsider.com/data

Full version of the report includes details on QPU vendor sales, R&D spend, QPU metrics, Quantum Computing market size, Regional Impact estimates, etc.



The Quantum Economy

Investment, commercialization, and the impact of quantum technologies form the three pillars of the **Quantum Economy**, which is driven by the research, development and commercial efforts of hundreds of companies, academic institutions, and governments worldwide.

Investment in quantum technologies has been fuelled by **over \$40 billion in public funding commitments** and **~\$2 billion annually in venture capital from private investors**. Each year, dozens of new companies enter the industry, contributing to R&D efforts aimed at advancing quantum technologies.

Quantum computing alone receives over \$1.3 billion in R&D investment annually according to our estimates, although scalability and the reliability of quantum systems remain challenges.

The commercialization of quantum technologies is poised for growth. We have **tracked approximately \$1 billion in quantum computing (QC) hardware deals since 2017, largely the result of public and academic investments**. Private end users are expected to begin realizing value from quantum after 2026, partly through access to QC via the cloud (Quantum Computing as a Service or QCaaS).

The QC vendor market is projected to reach \$5 billion by 2030. Yet, based on albeit incomplete data, **large hardware deals have plateaued, and average deal values are stable or have declined, reflecting a shift in the quantum market landscape**.

Early-adoption commitments for on-premise systems and large projects peaked during 2022-23, but new entrants are focusing on smaller system deals. This trend, along with irregular bookings, poses challenges for vendor revenue projection and recognition.

As exploratory one-off deals become less significant, vendors are redirecting efforts toward commercial applications, driving QCaaS revenue growth and fostering market stability. **By 2030, we estimate that 2,800 companies will be using QCaaS**.

The industry is also seeing a rise in regional approaches to quantum investment, with **companies making longer-term commitments to quantum innovation hubs**. New countries and institutions are also claiming indigenous quantum capabilities, further diversifying the market landscape.

Companies are ramping up R&D efforts toward viable Noisy Intermediate-Scale Quantum (NISQ) applications, and quantum security and sensing gain traction. Some QC companies are diversifying into quantum networks, potentially reflecting a new approach to achieving production-grade commercial applications that involve high performance computing, artificial intelligence and quantum computing.

Market opportunities must be carefully delineated from the sizable potential impact and value creation of quantum. **The impact of quantum technologies for end users will primarily manifest as new revenue from commercial applications, alongside cost savings**. Globally, the total economic impact is expected to **exceed \$200 billion annually by 2030, creating over 250,000 quantum-related jobs**.

Certain countries and regions are positioned to lead in quantum innovation and benefit disproportionately from this impact due to their investments and commercialization efforts.

When referencing this report in your work, please use cite as
Annual Report: The Quantum Economy, The Quantum Insider / Resonance

Interactive content in this report is marked with a cursor pointer icon

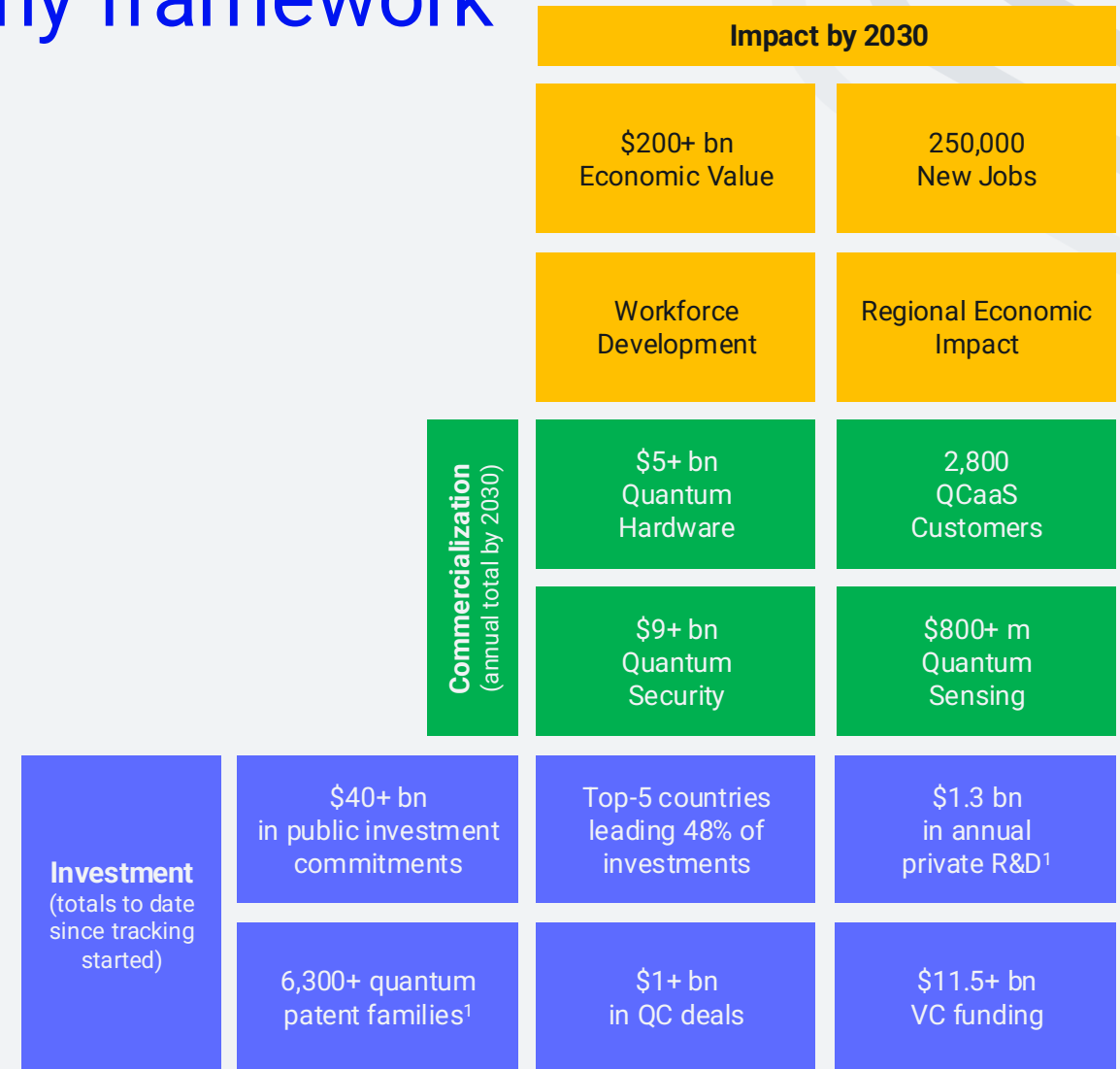


Building the quantum economy framework

This presentation articulates the building blocks of the quantum economy.

We cover investment, commercialization and impact.

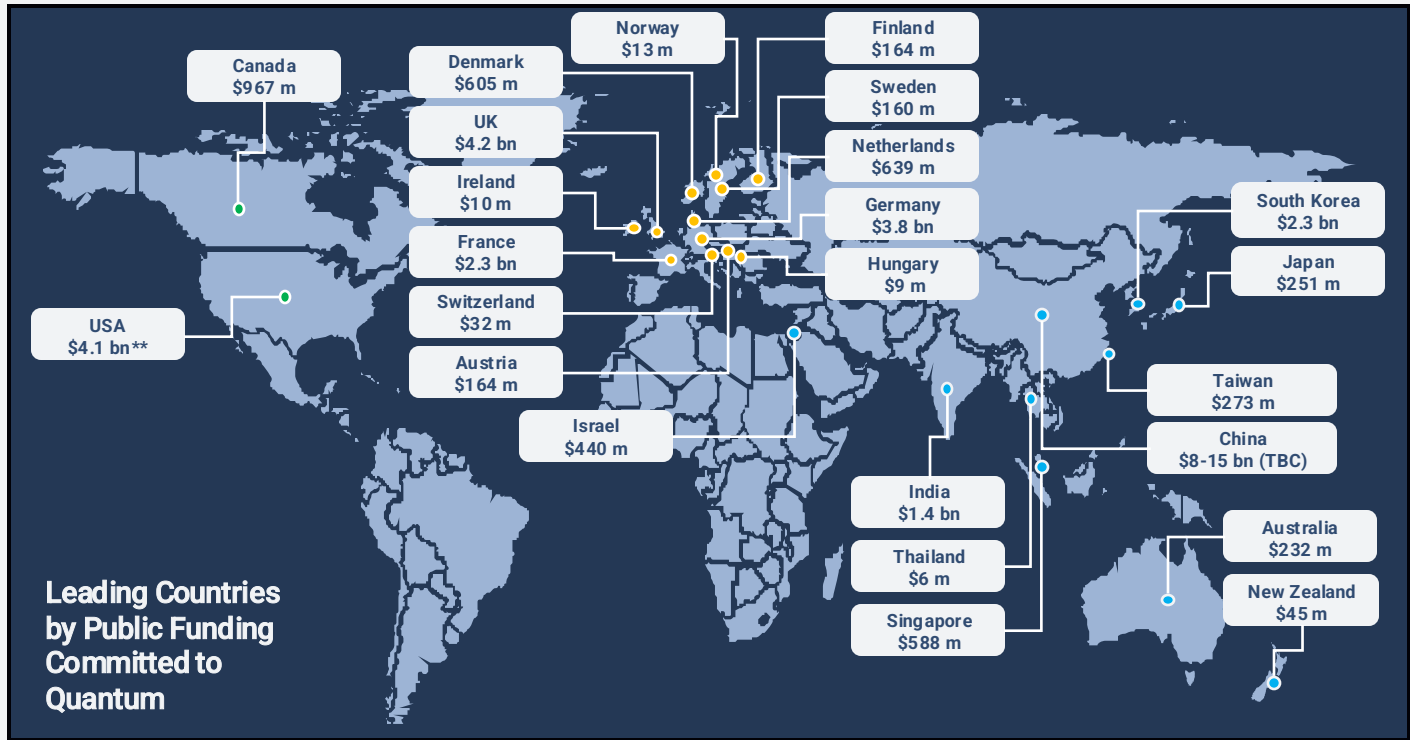
The Quantum Economy



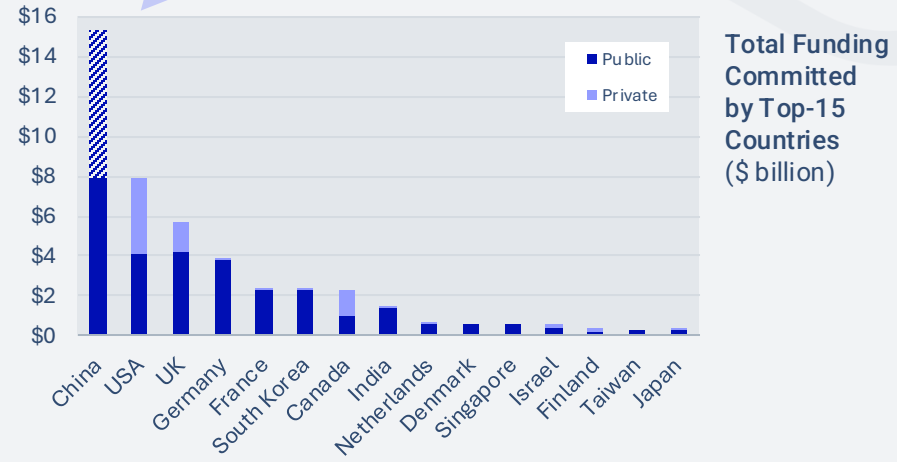
Quantum Investments



Public investment commitments by a handful of leading countries continued to lead quantum development efforts in 2024

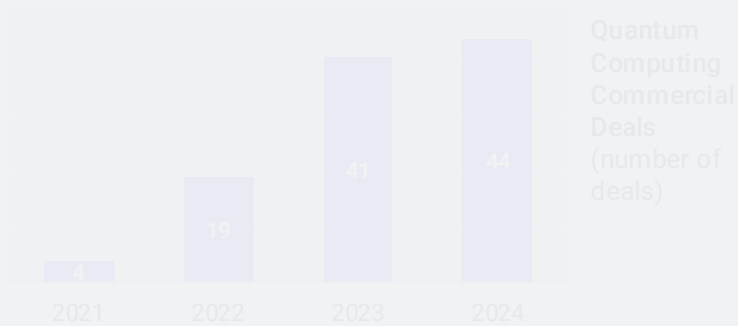


China's \$15 bn announcements could not be confirmed / are disputed

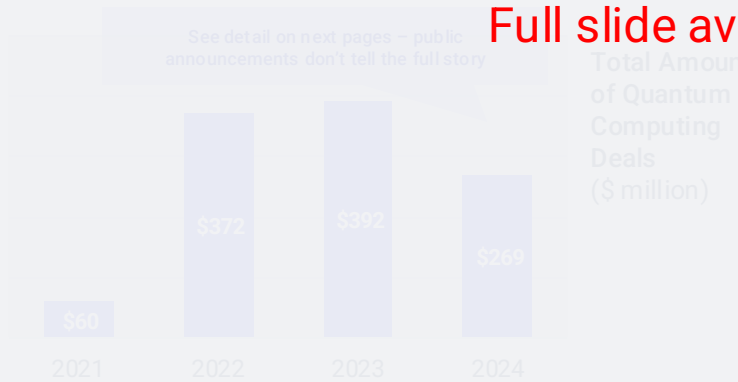


- ✓ Global interest in quantum technology has surged, with regional leaders beginning to emerge.
- ✓ Of 33 governments with significant quantum initiatives, over 20 have established formal, coordinated policies.
- ✓ Public funding commitments exceed \$40 billion, complemented by approximately \$8 billion in private investment.

Quantum hardware deals, however, a key public investment signal, have flattened according to the public announcements made by vendors

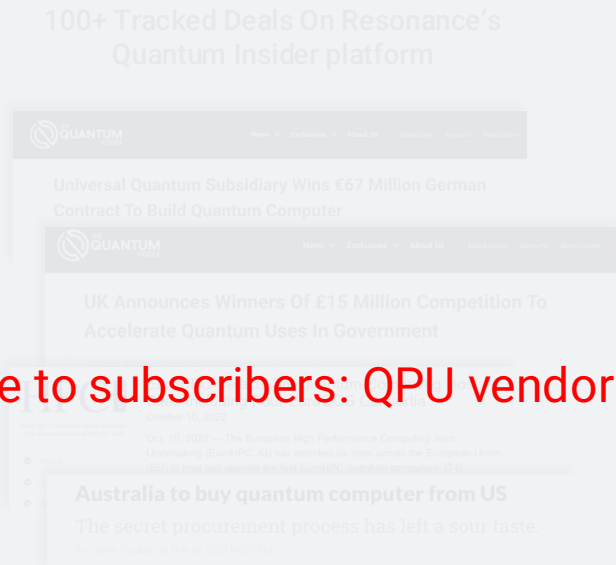


Quantum Computing Commercial Deals (number of deals)



See detail on next pages – public announcements don't tell the full story

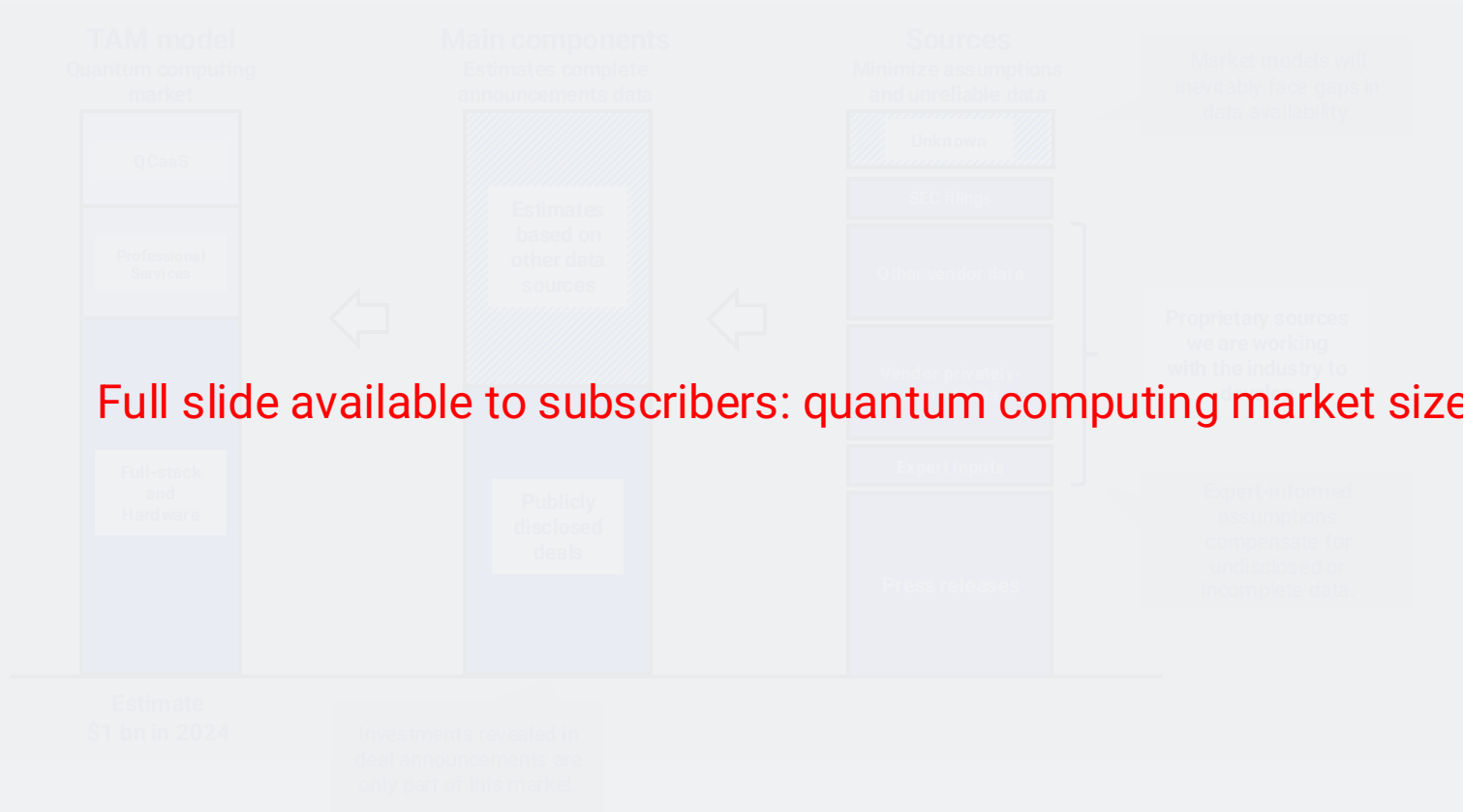
Full slide available to subscribers: QPU vendor sales



- ✓ The Quantum Insider intelligence platform tracks hundreds of quantum computing deals that we analyze to calculate market size estimates. Deal announcements include quantum computing (QC) hardware and services bookings by governments, academic institutions, and corporations.
- ✓ In 2024, we recorded 44 quantum computing deals (three more than in 2023) with a disclosed total of \$269 million, marking a 30% decrease in announced amounts compared to 2023. Consequently, although 2024 set a record for the number of deals, the average deal size dropped from a \$20 million peak in 2022 to \$5-\$10 million, contributing to the decline in quantum hardware \$ sales.
- ✓ Nearly 60% of QC deals tracked historically, totaling over \$1.1 billion since 2017, occurred in the past two years.

We put deal announcements in context and also track investments that drive other segments; we continuously refine our estimates

Key components of our quantum computing market model and its data sources



Full slide available to subscribers: quantum computing market size composition

- ✓ Quantum Computing (QC) Full Stack and Hardware deals represent the largest fraction of quantum investments and are an important component of our market models.
- ✓ However, these models still rely largely on assumptions and other secondary data sources. We aim to minimize assumptions and unreliable data by (i) continuing to analyze and (ii) incorporating alternative data sources.
- ✓ Other data sources include SEC filings and other data publicly disclosed by vendors, and data that vendors can share with us publicly or confidentially. Expert inputs confirm our assumptions or provide additional data points to build our quantum market models.

The shape of quantum commercialization appears to be changing, with regional initiatives being more important than commercial sales

Learn more in next section

Data Signals

SPINQ
Colombia's First Quantum Computer: Advancing Education, Research, And Technological Innovation
Quantum Computing Business | Clara Choucair • December 4, 2024

TURKEY
Turkey Announces First Quantum Computer To Be Unveiled At TOBB University Of Economics And Technology

ISRAEL
Israel Announces First Domestically Built 20-Qubit Quantum Computer Using Superconducting Technology
Quantum Computing Business | Clara Choucair • December 17, 2024

IONQ
"we've worked with companies, sometimes for a one-off or maybe an R&D kind of project. We largely put an end to those."
"We have solidified our push into quantum networking via our recent contracts less than a year after announcing our networking initiative"

IBM
Illinois And IBM Launch National Quantum Algorithm Center To Drive Quantum Utility

Google
"Fantastical Or Abstract", Google's Quantum AI Lab Propelling The Mission Of Quantum

IQM
IQM Quantum Computers Opens Quantum Data Centre In Germany To Support Industry Applications
Quantum Computing Business | Matt Swayne • June 21, 2024

rigetti
"When it comes to on-premise QPU orders and deliveries, it's going to be lumpy until the business becomes large enough."

D:WAVE
"...as applications move into production, they tend to generate on the order of high hundreds of thousands or more per year of recurring QCaaS revenue..."

Market Landscape

- Large hardware deals have plateaued, and average deal values declined
- Early-adoption commitments for on-premise systems and large projects peaked in 2022-23, though vendors continue recognizing revenue as quantum systems are delivered
- New entrants announce smaller system deals (e.g., SpinQ in Colombia)

Business dynamics

- Lumpy hardware deals, QCaaS growth, focus on commercial applications, and diversification
- Irregular bookings challenge revenue projection and recognition
- Commercial application development ends up driving QCaaS revenue growth
- Exploratory one-off deals become less important

Company strategies

- Companies adopt regional approaches to quantum investment and make longer-term investments in quantum innovation hubs

Technological development

- New countries and institutions claim quantum capabilities and build their first quantum systems
- Companies increase R&D efforts

Near-term Scenario

- Hardware deals remain the primary driver of quantum markets, but smaller deals, new applications, expanded QCaaS access, and diversification stabilize and expand company revenues.
- Developing production-grade quantum applications for commercial use is increasingly critical, prompting vendors to intensify efforts to deliver practical results.
- Expansion into other segments reflects a need for diversification or alternative quantum strategies (e.g., IonQ investment in quantum networks resembles IBM's quantum-centric supercomputer approach of integrating HPC and QC across global locations to achieve scale).
- Regional commitments seek to tap into resources from quantum ecosystems.
- New entrants target second-tier, lower-budget institutions entering the quantum space from new countries.

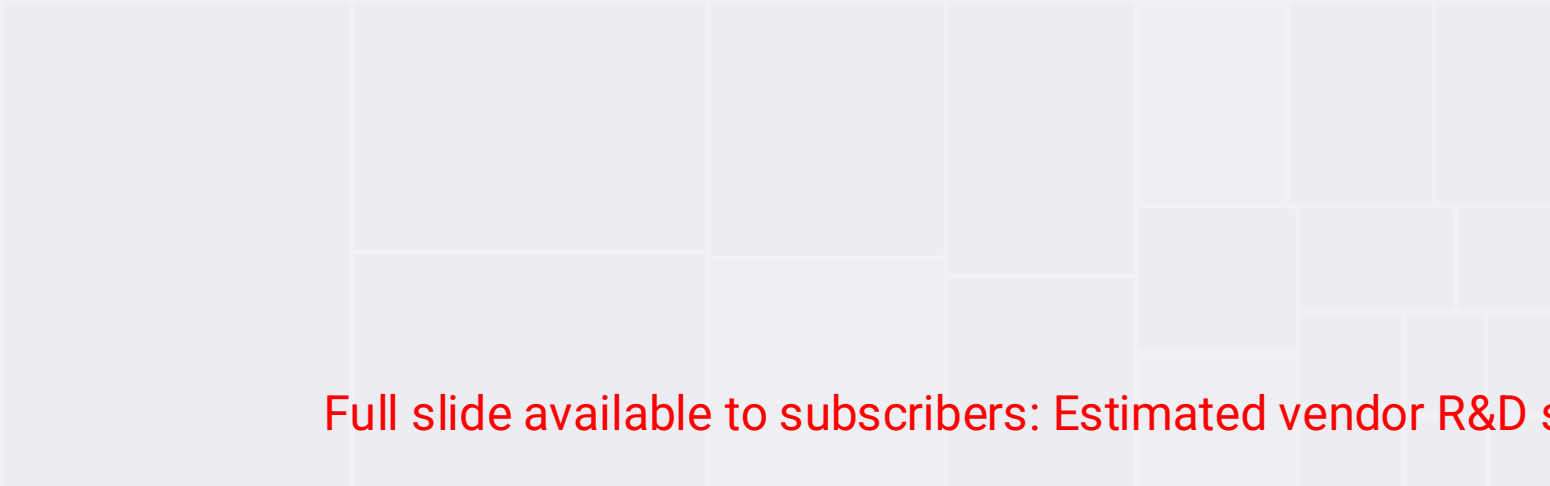
* Not exhaustive

Quantum computer manufacturers continued and accelerated their R&D efforts to address key technical challenges such as error correction

Analysis of R&D spending of selected companies

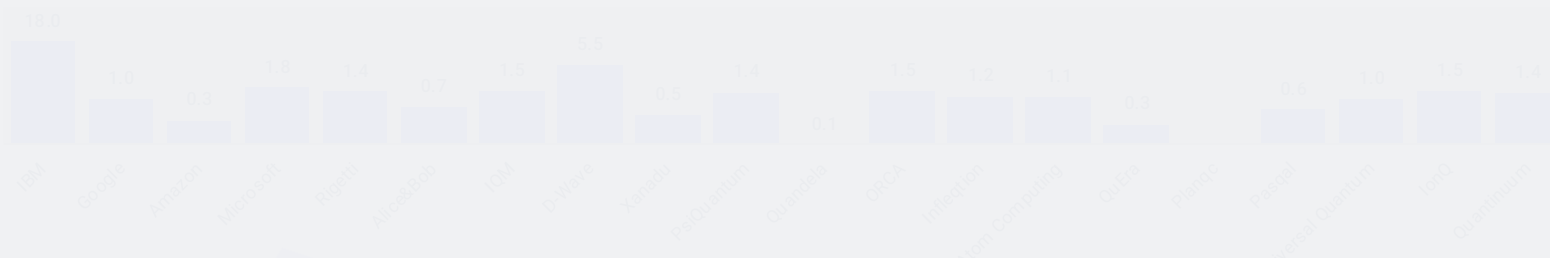
Estimated Annual Spending Actual 2023 Spending

Annual quantum R&D spending by leading companies (\$ million)¹



Full slide available to subscribers: Estimated vendor R&D spend

Quantum Patent Outputs (patent families per estimated \$ million invested, log scale)





One-third of patents are about Quantum Error Correction.

Patent submissions per \$ invested is a measure of R&D efficiency.


















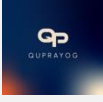

- ✓ QC vendors invest over \$1.3 bn annually to accelerate R&D and enhance gate fidelity, speed, and scalability (though with varying results); error correction takes centre stage.
- ✓ Research papers and patents, combined with R&D investments, provide valuable insights into quantum research and development.²
- IBM leads in both overall R&D production and outputs per dollar invested with 18 patent families per million dollar (IBM is a leader in patent submissions in other fields too).
- ✓ D-Wave stands out as a productive R&D outlier among the smaller companies, with 5.5 patent families per million dollar invested. Microsoft, Rigetti, QuEra, Inflektion, and Xanadu also have high research intensity.

PsiQuantum and new quantum players drove VC funding; public companies took advantage of the growing interest in quantum stocks to raise more funds

 **\$2.4+ billion raised**
 Announced VC funding in 2024 (compared to \$1.5 bn in 2023; however, the 2024 total includes PsiQuantum's \$617 m round)

 **31 startups launched**
 Startups launched in 2024 with \$33+ m in funding (similar to 2023)

- ✓ Quantum startups continued to attract VC funding, but a significant share of the total funds raised in 2024 was driven by PsiQuantum's \$617 million round from the Australian government.
- ✓ As a result, the total publicly disclosed VC deals reached more than \$2.4 billion in 2024, marking a 67% YOY increase. The 31 new quantum startups founded in 2024 collectively raised over \$33 million.

	Americas			EMEA			APAC	
Quantum Software								
Hardware Components								
Comms & Security								
Sensing & Imaging								
Quantum Computers								

- ✓ Some public companies took advantage of a growing interest in quantum stocks to raise additional funding (see next page). D-Wave, for example, raised a total \$175 million with two "at-the-market" equity offering programs. Rigetti Computing successfully completed a \$100 million at-the-market equity offering launched in March 2024. Quantum Computing secured \$50 million in gross proceeds via a registered direct offering and a concurrent private placement.



Quantum Startups Launched in 2024 by Segment and Region

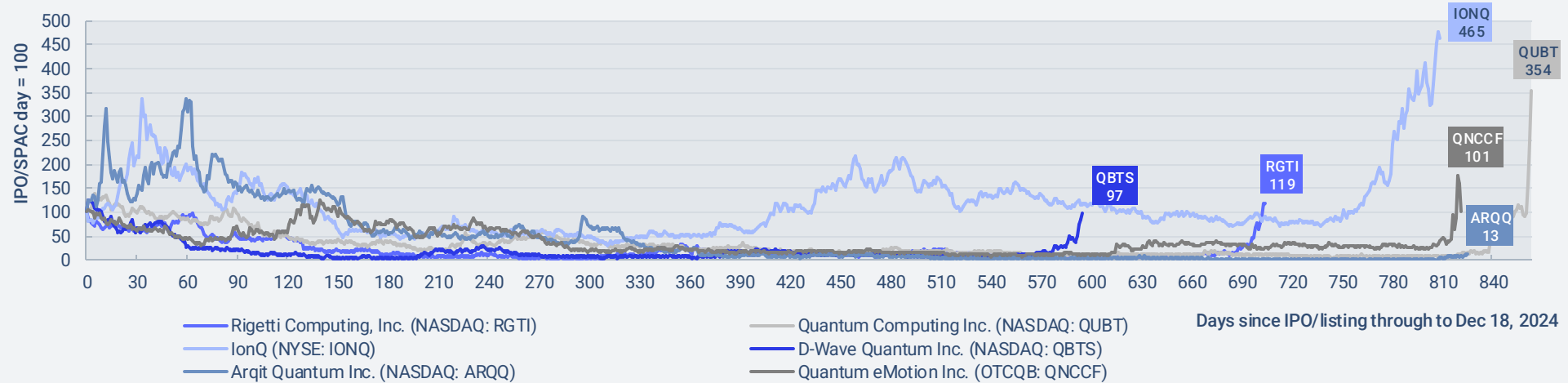
New startups are mainly focused on software and hardware components, mostly in the Americas and EMEA.

The enthusiasm for quantum in the stock market started (then stopped) to grow again, but most quantum stocks are just recovering their debut values

- ✓ Quantum stocks gained notable traction in Q4 24, with IonQ and Quantum Computing leading the growth. IonQ's stock index level surged to 465 from its initial IPO/SPAC value of 100, while Quantum Computing's price level has risen to 354.
- ✓ However, most quantum stocks are generally recovering to price levels observed shortly after their IPO or SPAC debut. January saw a reversal for most after negative (throwaway) comments from NVIDIA's CEO.
- ✓ Zapata Computing Holdings Inc. (not shown by this analysis) has officially ceased operations as of October 7, 2024, following a series of financial difficulties that rendered the company unable to meet its obligations.

Quantum Computing, Inc. changed its focus significantly before listing on NASDAQ; we take this market as a reference.

Company	Var. since IPO/SPAC	Var. last 3 months *to Dec 18 2024
IonQ (NYSE: IONQ)	+465%	+587%
Quantum Computing Inc. (NASDAQ: QUBT)	+354%	+3,929%
Rigetti Computing, Inc. (NASDAQ: RGTI)	+119%	+1,248%
Quantum eMotion Inc. (OTCQB: QNCCF)	+101%	+337%
D-Wave Quantum Inc. (NASDAQ: QBTS)	+97%	+1,024%
Arqit Quantum Inc. (NASDAQ: ARQQ)	+13%	+485%



Early January saw material reversal post comments from NVIDIA CEO regarding "very useful" QCs being 20 years away

Arqit and Quantum eMotion focus more on quantum security (note we understand Arqit is pivoting away from a quantum focus)

Quantum investment highlights

- ✓ **The quantum investment landscape shows significant commitments, with over \$49 billion in public and private funding committed globally.** The top five countries alone account for 48% of these investments, underscoring the strategic prioritization of quantum technologies in some nations. Furthermore, the local and regional levels have gained significant importance as companies and governments commit to establishing long-term quantum innovation hubs.
- ✓ **Private sector investment is also significant, with an estimated \$1.3 billion spent annually on quantum computing (QC) R&D,** for example. These combined efforts have fueled significant innovation, with the top-20 QC companies accounting for over 6,300 quantum patent families, highlighting the rapid pace of intellectual property generation in the field.
- ✓ **Orders for new QC systems and services have already exceeded \$1 billion** (since 2017), led mostly by government and academic customers. However, large deals and projects flattened and smaller deals by new entrants suggest, along with other indicators, that the market landscape is changing (details in next pages).
- ✓ **Quantum companies secured \$2.4+ billion in venture capital funding in 2024,** but this year's total has been driven to a great extent by a sizable round raised by PsiQuantum. Moreover, some public companies (e.g., Rigetti, D-Wave) took advantage of a growing interest in quantum stocks to raise additional funding.
- ✓ **New entrants are primarily focused on quantum software and hardware component development,** often headquartered in countries with the highest levels of investment.
- ✓ **Large companies and hyperscalers are spending hundreds of millions on R&D annually,** while smaller companies are estimated to invest only a fraction of that amount. **Company size, however, is not a good predictor of R&D efficiency** (at least when measured by patent families per million invested). Yet, each QC modality (semiconductor, trapped-ion, neutral atom, photonics, and others) advances at its own pace, with some companies prioritizing long-term development over maintaining an impressive near-term R&D output track record.

Investment	
\$40+ bn in public investment commitments*	Top-5 countries leading 48% of investments
\$1+ bn in QC deals*	\$11.5 bn in VC funding*
6,300+ quantum patent families (top-20 companies)	\$1.3 bn Private R&D (annual est.)

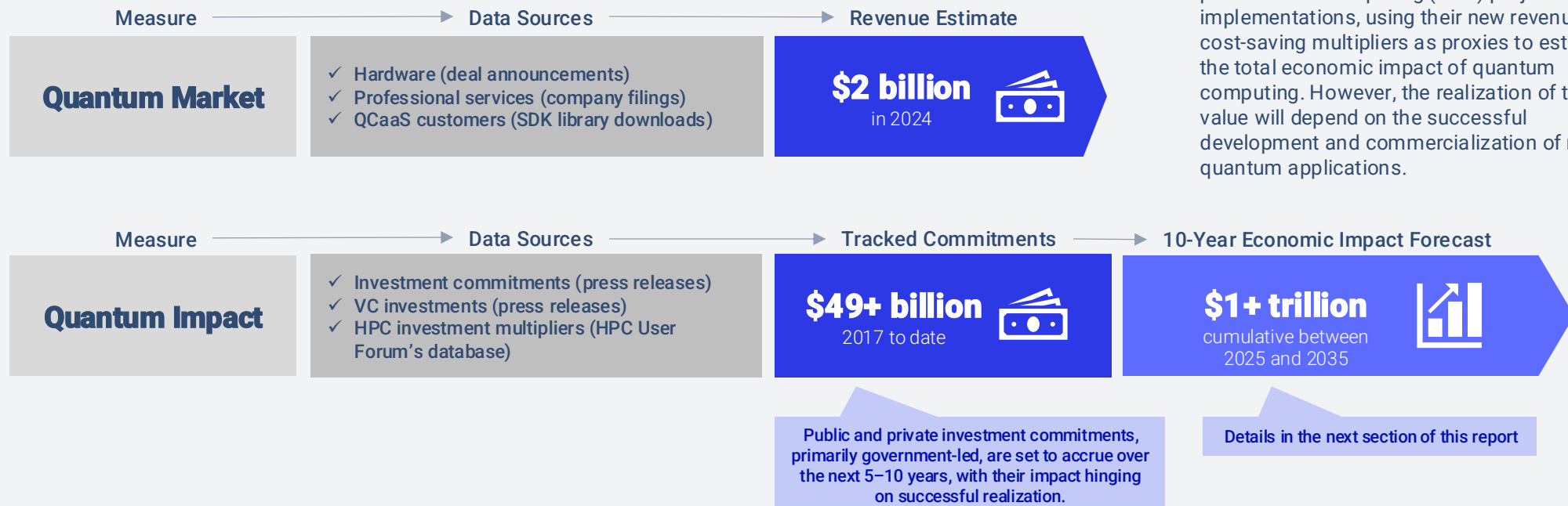
Quantum Commercialization



Quantum is a nascent market with vast potential economic impact

The quantum market (including quantum computing, security and sensing) is valued at \$2 billion. According to our forecast, it could drive up to \$1 trillion in economic impact between 2025 and 2030.

- ✓ Market size calculations are based on actual commercial activity, whereas impact estimates project and make assumptions about unrealized economic value over the coming years.*
- ✓ Specifically, we analyzed data from real high-performance computing (HPC) project implementations, using their new revenue and cost-saving multipliers as proxies to estimate the total economic impact of quantum computing. However, the realization of this value will depend on the successful development and commercialization of new quantum applications.



The quantum computing market is projected to exceed \$5 billion in vendor revenue by 2030



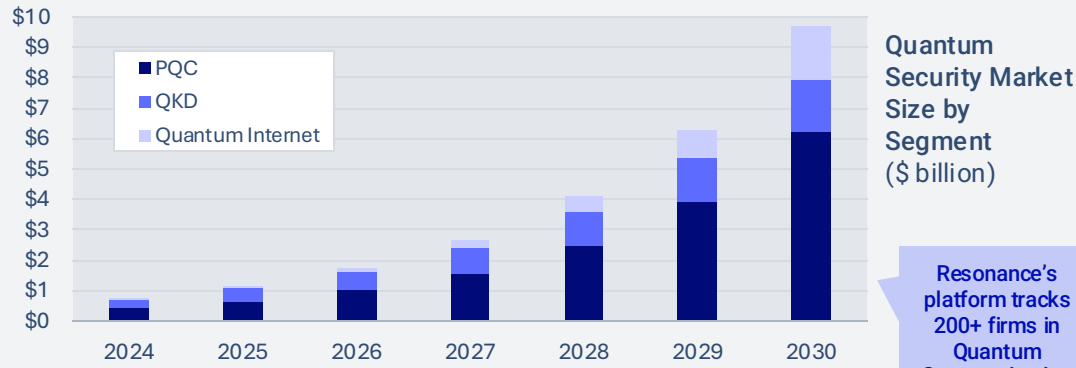
Full slide available to subscribers: quantum computing market size estimates



- ✓ Full Stack & Hardware, the largest quantum computing (QC) market segment, is estimated to be worth \$600 million in 2024. It is forecast to grow at a 36% CAGR to more than \$5 billion by 2030.*
- ✓ Quantum computing vendors, however, are currently limited to providing services and hardware, without yet reaping the anticipated benefits of quantum's broader commercialization.
- ✓ Quantum-as-a-Service (QCaaS) is the fastest growing segment in our estimates. It is projected to rise to more than \$2 billion by 2030, representing a 62% CAGR. Over 2,800 companies are expected to use QCaaS by 2030, with about 70% accessing indirectly via hyperscalers, if trends hold.
- ✓ QCaaS comes in two forms: direct access via manufacturers' clouds and indirect access through hyperscalers. We estimate that 80% of the commercial customers in this segment use IBM Quantum Experience, AWS Braket, and Google Quantum AI.
- ✓ QCaaS usage has remained relatively low in 2024, but annual end-user spending is projected to increase fourfold by 2030. The average annual spending on Professional Services and QCaaS is projected to double to over \$1 million per relevant commercial end user by 2030. Professional Services involves work to advance customers' ability to utilize core products.

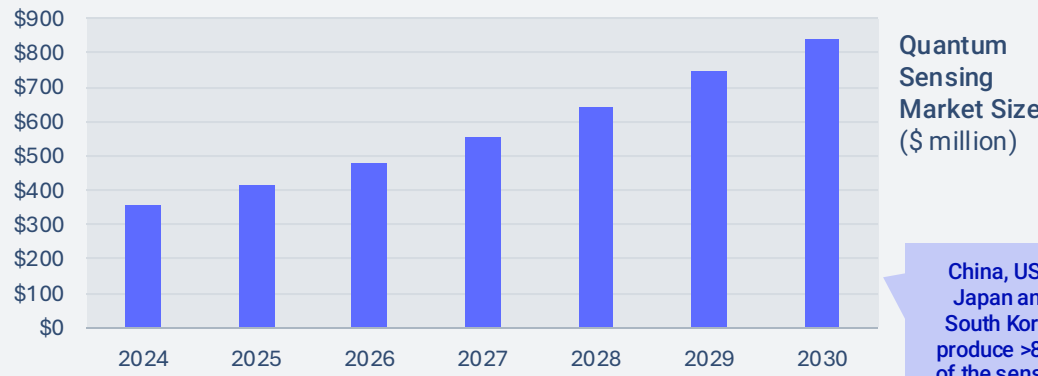
Contact us to request access to our most recent Quantum Computing Market Size and Impact report.

Quantum security and quantum sensing are forecast to add \$10+ billion in new revenue by 2030



Quantum Security Market Size by Segment (\$ billion)

Resonance's platform tracks 200+ firms in Quantum Communication and Security.



Quantum Sensing Market Size (\$ million)

China, USA, Japan and South Korea produce >80% of the sensing patents.²

- ✓ Quantum Security is projected to grow at a 54% CAGR through 2030 and reach ~\$10bn, outpacing the broader Cybersecurity market in terms of growth, indicating increased penetration of quantum technology in security.*
- ✓ This growth is driven by Post-quantum Cryptography (PQC) adoption, which is worth \$400 million and is expected to exceed \$6 billion by decade's end. Quantum Key Distribution (QKD), quantum encryption hardware, is forecast to grow more gradually.
- ✓ The Quantum Internet (quantum network nodes, repeaters, other devices), projected to grow at a 113% CAGR, is anticipated to reach the same \$1.7 billion market value as QKD by 2030.
- ✓ The Quantum Sensing market is valued at approximately \$360 million according to third-party estimates. It is projected to grow at a 16% CAGR, exceeding \$800 million by 2030.¹
- ✓ Some estimates suggest even faster growth, with a CAGR of up to 25% through 2030. From 2021 to 2023, VC investment remained on average at around \$100 million per year.
- ✓ We have identified more than 120 quantum sensing companies to date. They develop various sensor types, such as atomic clocks, gravimeters, inertial sensors, magnetometers, electrometers, and photon detectors.

Resonance already tracks companies and investments in quantum sensing; market size estimates are the next step.

Higher scale and fidelity in quantum computers are also expected to unlock new applications

Analysis of fidelity and scale metrics in selected quantum computing systems

	System Name (Date of Fidelity Report)	Physical Qubits	Gate Fidelity*	Status
2-Gate Fidelity and Physical Qubit Scale (selected systems)	Quantinuum H1-1 (Apr 2024)			Commercial
	IQM quantum chip prototype (expected 2025)			Announced
	IonQ Tempo (expected 2025)			Announced
Higher fidelity at scale	IBM Marrakesh (Nov 2024)			Commercial
	Quantinuum H2 (Nov 2024)			Commercial
	Google Willow chip (Dec 2024)			Announced
Path to viable NISQ	IonQ Forte (Mar 2023)			Commercial
	Atom Computing array (Nov 2024)			Announced
	IQM 20-qubit system (Feb 2024)			Commercial
	Infleqtion neutral-atom system (Aug 2024)			Announced
	QuEra Aquila (Oct 2023)			Commercial
	Quandela MosaiQ (May 2024)			Commercial
	Rigetti Ankaa-1 (Nov 2024)			Commercial
Alice&Bob Boson 4 chips (Nov 2024)			Commercial	
Rigetti Ankaa-2 (Sep 2023)			Commercial	

Full slide available to subscribers: QPU device comparison



IQM and IonQ's >99.9% fidelity systems are slated for release in 2025.

- ✓ Currently, no commercial quantum computing system has reached the "viable NISQ" status where quantum utility is achieved (>99.9% fidelity at scale).
- ✓ Quantinuum did claim a 99.914% fidelity with its 20-qubit H1-1 system and IQM has also announced achieving a 99.91% fidelity in an upcoming system. QC manufacturers continue advancing toward higher-scale, higher-fidelity systems.

Quantum commercialization highlights

- ✓ **The quantum technology market is estimated to be worth \$2 billion**, comprising \$870 million in quantum computing (QC), over \$700 million in quantum security, and more than \$350 million in quantum sensing.
- ✓ **The QC market is projected to reach \$5+ billion by 2030, at an estimated 36% compound annual growth rate (CAGR)**. Full Stack and Hardware is forecast to remain the primary driver, as more quantum systems are ordered and delivered across industries and the growing demand for advanced computational capabilities. Large deals may give way to smaller commercial agreements involving new vendors and customers.
- ✓ **QCaaS (Quantum Computing as a Service) is expected to see steady expansion**, with the number of customers estimated to reach 2,800 by 2030 (that is, a 24% CAGR in customer growth). **The average commercial end user spending on QCaaS is also forecast to grow four times by the end of the decade.**
- ✓ **Quantum security is poised for substantial growth, with an expected market value exceeding \$9 billion by 2030 (54% CAGR)**. Post-Quantum Cryptography (PQC) is forecast to drive growth as quantum technology increases its penetration in the broader cyber security sector.
- ✓ **Quantum networking has drawn interest from quantum computing companies seeking to scale quantum systems** and develop quantum-centric capabilities integrating AI, high-performance computing, and quantum hardware.
- ✓ **Quantum sensing, while comprising a smaller number of companies and growing at a more modest pace according to third-party estimates, is expected to reach a market value of over \$800 million by 2030 (16% CAGR)**. This market is forecast to expand as production-grade sensing applications gain traction in fields such as healthcare, defense, and environmental monitoring.

Quantum Commercialization by 2030

\$5+ bn
Quantum Hardware
(36% CAGR)

2,800
QCaaS Customers
(24% CAGR)

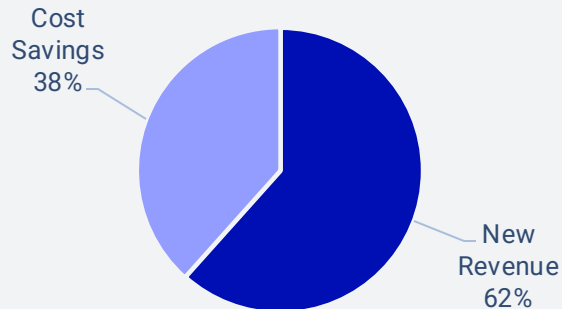
\$9+ bn
Quantum Security
(54% CAGR)

\$800+ m
Quantum Sensing
(16% CAGR)

Quantum Impact

60% of quantum's impact will come from new revenue

- ✓ The economic impact of quantum computing (QC) is projected to exceed \$200 billion between 2025 and 2030.
- ✓ 62% of this value is forecast to come from new revenue generated by products developed using quantum computing. The remaining 38% of the total value is projected to arise from cost savings.
- ✓ In addition, our projections based on QC investments indicate that over 250,000 new QC-related jobs could be created in the same time period. An alternative approach, based on revenue, suggests that QC could potentially generate two to three times more jobs than investment-based projections.



Quantum Computing is forecast to start delivering commercial value to end users in 2025.

Quantum Impact by Type (2025-30)



Top Quantum Applications (most impactful applications at the top, 2025-30)

- ✓ Simulation and Machine Learning are expected to be the most impactful use cases, with about 70% of the value created through 2030.

USA, UK, Germany are forecast to see the greatest economic and job creation impact

- ✓ The USA, the UK, Germany and Canada are forecast to reap the most significant benefits in both economic value and job creation from quantum computing (QC), according to our estimates.
- ✓ By 2030, the total impact from new revenue and cost savings in these four countries is forecast to reach \$87 billion, representing at least 43% of the global impact. QC is also forecast to create more than 108,000 QC-related jobs in these countries by 2030.
- ✓ The rest of the top ten countries in terms of impact are South Korea, France, Japan, India, the Netherlands and Russia. The impact on these countries is forecast to range between \$3 billion and \$11 billion by 2030.



China's announced investments remain unverified, the chart includes a placeholder.

Full slide available to subscribers: economic impact



India's efforts to build a highly educated QC workforce could lead to higher job creation.

Regions are starting to understand the potential impact of investing in their “quantum economies”

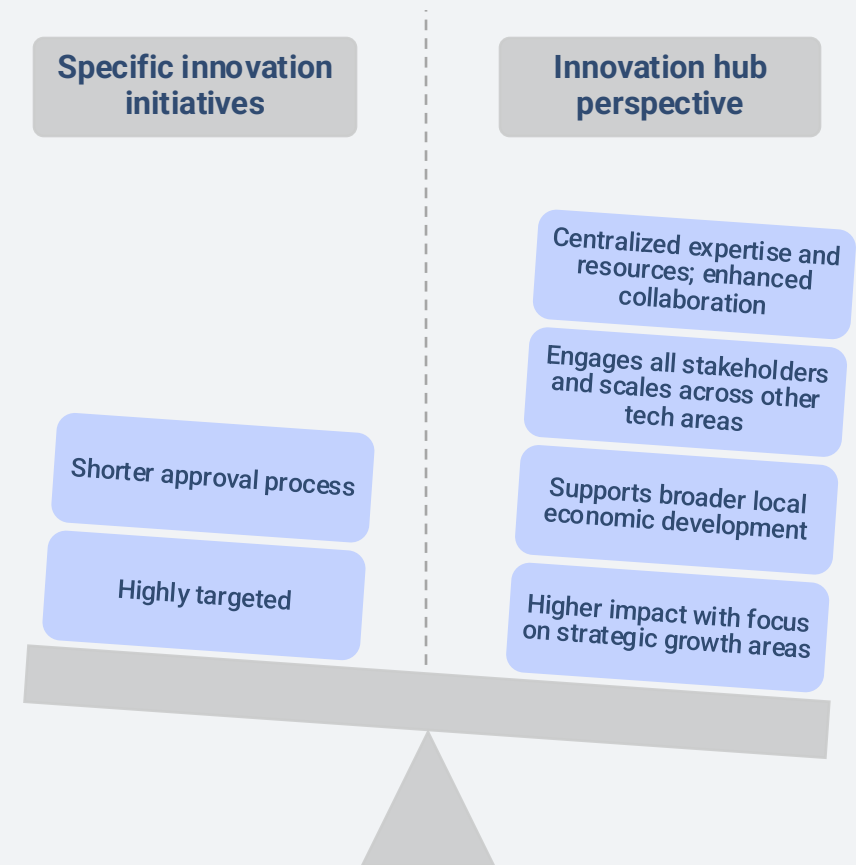
Much of quantum technology is not quite ready for commercialization....

...but it's important and strategic.

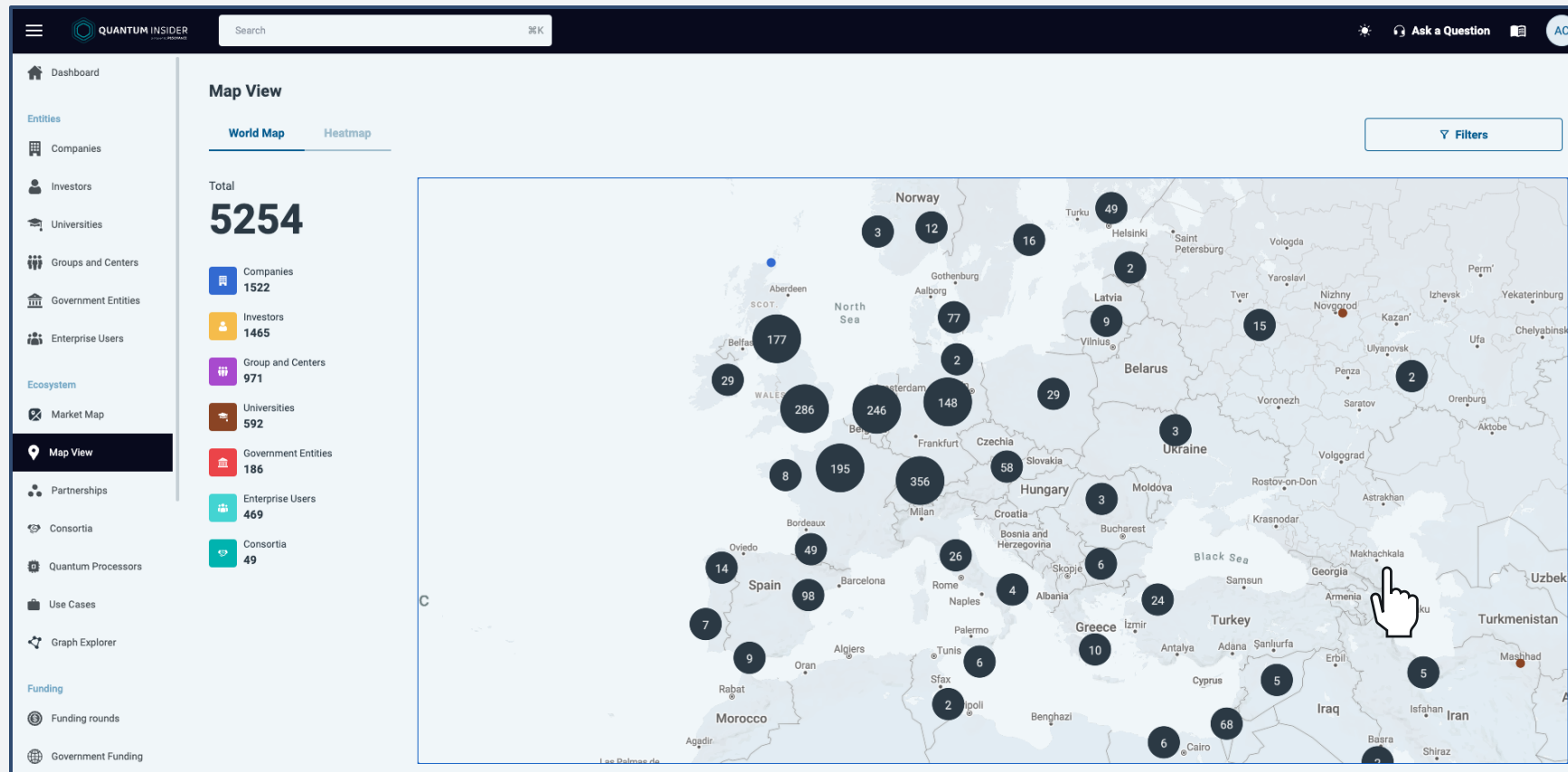
The quantum economy question:

How do we get building today?

- ✓ Regional organizations and corporations want to drive fundamental innovation whilst achieving broader economic goals
- ✓ These are typically done through tools such as focused challenge-based grants and targeted renovation projects
- ✓ Supporting innovation and commercialization of deep-technologies such as quantum requires a significantly more holistic approach



Natural hubs are starting to form where multiple stakeholders are operating in physical proximity








Resonance's Quantum Insider Intelligence platform

This screenshot shows the platform's ecosystem map view including all types of organizations and their activity.

Both regional quantum ecosystems and national initiatives are gaining momentum

Non exhaustive

USA – Regional Ecosystems	
	<p>South Carolina Quantum Hub State-funded initiative to champion the advancement of quantum talent and technology in South Carolina. Expanding influence across Carolinas</p>
	<p>Colorado Tech Hub In Oct-23, Colorado was named a U.S. Tech Hub for QC, which comes with federal funding of up to \$70 million in addition to grants & private sector opportunities (matched by \$74 million in state tax credits)</p>
	<p>Chicago Tech Hub In Oct-23, Chicago was named a U.S. Tech Hub contender for QC. They lost out to Colorado but will continue to pursue quantum aggressively</p>
	<p>California Tech hub with many renowned academic institutions; also home to the UCLA Quantum Tech Hub and QUANT-Net</p>
	<p>Massachusetts Tech hub with many renowned academic institutions.</p>
	<p>Tennessee Tech hub with many renowned academic institutions (also a beneficiary of the NSF Engines Development program for QC-related R&D)</p>
	<p>New York Tech hub with many renowned academic institutions (also a beneficiary of the NSF Engines Development program for QC-related R&D)</p>
	<p>Connecticut Tech hub with many renowned academic institutions (also a beneficiary of the NSF Engines Development program for QC-related R&D)</p>

Rest of World – National Governments	
	<p>South Korea Outlined an ambitious quantum strategy with a total investment of ~\$2.6 billion by 2035. The strategy includes developing a 50 qubit QC by 2027 and a ~1,000 qubit system by 2031; with significant funding being directed to domestic vendors, research, and academic institutions.</p>
	<p>Japan Allocated ~\$600 million (¥80 billion) to its quantum strategy in the 2022 fiscal year. The strategy includes the development of Japan's first domestic QC and significant funding for quantum startups and universities through state-owned institutions.</p>
	<p>UK The UK's National Quantum Strategy was announced in 2023 and committed ~£2.5 billion over a 10-year period to position the UK as a leader in the technology. TBC impact of elections.</p>
	<p>EU The EU's Quantum Flagship program was launched in 2018 with a budget of ~€1 billion over ten years. Since then, the EU HPC JU has been established which is actively buying QCs today.</p>
	<p>Australia Australia's National Quantum Strategy was detailed in 2023 and committed AUD 1bn over 10-years to advance quantum capabilities. A deal with PsiQuantum has been signed since</p>

Resonance helps regions develop quantum innovation hubs and establish a strong global presence

Innovation Hub: Co-ordinating across all stakeholders

Focused impact where you can win

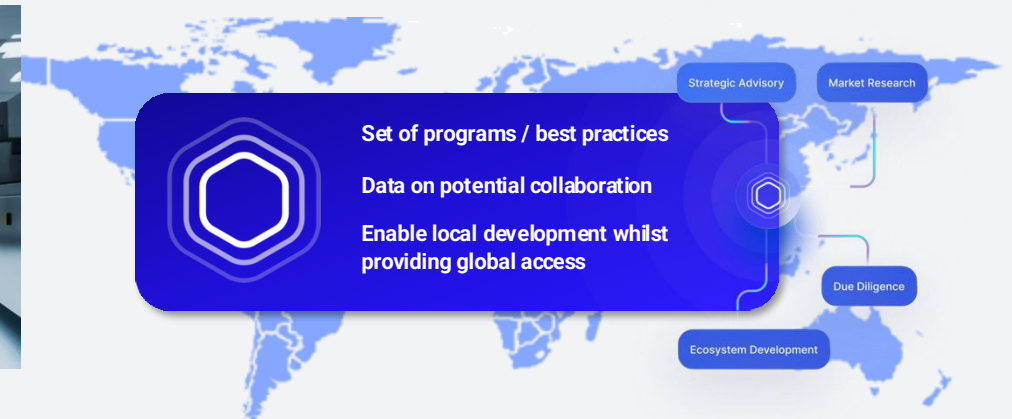
Leverage existing facilities to drive innovation

Drive commercialization, not just research

Focus on near-term leadership areas to unlock new sectors

A future proof quantum workforce

Public bodies are building compelling place-based innovation hubs to build out their quantum economies



Quantum impact highlights

- ✓ **Quantum technologies are forecast to deliver substantial economic value, with an estimated total impact exceeding \$200 billion between 2025 and 2030.** This growth highlights the transformative potential of quantum technologies across diverse industries, from finance to defense and life sciences, among others.
- ✓ **This impact is expected to be localized, with leading countries and regions in terms of investment likely to benefit most from the economic value generated by quantum.** By 2030, the total impact in the top-4 countries by investment is forecast to reach \$87 billion, representing at least 43% of the global impact.
- ✓ **Regions and local innovation hubs can also leverage their networks of corporate, government, academic, and non-profit organizations to amplify the regional impact of quantum advancements.** This may include workforce and education goals in addition to the direct economic value created by commercial enterprises. **Companies are also making longer-term regional commitments,** seeking to tap into local talent and other resources, including direct economic incentives.
- ✓ **Quantum advancements are expected to create 250,000 new jobs globally between 2025 and 2030.** These include roles that span all degree levels and functions, not only research and development. The development of quantum technologies are expected to offer new opportunities for education and training as well, as countries prepare their workforce to meet the demands of the quantum economy.
- ✓ Beyond direct economic contributions, quantum innovation is anticipated to generate significant indirect benefits. This broader economic impact is expected to ripple across sectors, enhancing productivity, enabling new applications, and fostering sustainable growth.

Quantum Impact by 2030

\$200+ bn
Economic Impact
(2025-30)

250,000
Jobs Created
(2025-30)

Workforce
Development
(education, training)

Regional Economic
Impact
(broader impact)

Outlook for 2025

The quantum economy continues to grow as investments and interest in commercial applications expand. **With over \$49 billion in public and private funding committed to quantum, \$2.4+ billion in VC investments in 2024 alone, and \$1.3 billion in annual private R&D,¹ both governments and companies will continue driving long-term advancements.**

Quantum commercialization is expected to accelerate, driven by increasing demand for quantum systems, hardware, services, and security solutions. "Killer apps" for quantum computing (QC) have yet to be discovered.

Investment figures highlight the growing confidence of investors and institutions in the commercialization potential of quantum technologies. As funding continues to scale, the focus is shifting from foundational research to the deployment and scaling of quantum applications, further solidifying the economic and technological impact of the quantum sector.

QC is forecast to begin delivering value to customers through increasing revenue and cost savings next year. Quantum security is projected to outpace cybersecurity's growth rate as its penetration expands. Quantum sensing has yet to scale or achieve production-grade applications, though its potential in defence, aerospace and other industries remains promising.

We expect the quantum industry to maintain its momentum, driven by sustained investment, expanding commercialization, and the emergence of production-grade applications. New entrants and countries with growing quantum capabilities will shape the near-term market landscape. Despite challenges in scaling and enhancing the fidelity of quantum systems, among other technical aspects, forecasts anticipate transformative economic impact, particularly for companies and innovation hubs with long-term quantum initiatives.

Resonance's Quantum Insider platform continues to expand, accumulating extensive new data and empowering decision-makers with up-to-date insights into quantum investment, commercialization, and impact.

The Quantum Economy

Investment (totals to date since tracking started)	\$40+ bn in public investment commitments	Top-5 countries leading 48% of investments	\$1.3 bn in annual private R&D ¹
	6,300+ quantum patent families ¹	\$1+ bn in QC deals	\$11.5+ bn VC funding

Impact by 2030		
\$200+ bn Economic Value	250,000 New Jobs	
Workforce Development	Regional Economic Impact	
Commercialization (annual total by 2030)	\$5+ bn Quantum Hardware	2,800 QCaaS Customers
	\$9+ bn Quantum Security	\$800+ m Quantum Sensing

1. Our estimate for the top-20 quantum computing companies.



Appendix: About Resonance

Executive Summary

- ✓ Resonance **transforms complex information** on rapidly **evolving industries** into **actionable insights**.
- ✓ Powered by a global team of 60 professionals, we unite analysts, engineers, and industry experts to **provide foundational intelligence, strategic advisory and enterprise marketing services to our customers**.
- ✓ We focus on industries that will **define the next century of innovation**: quantum, space, climate, AI, and digital twins.
- ✓ The Resonance Intelligence Platform combines **advanced AI capabilities** with **human industry expertise**, delivering real-time, data-driven insights through a subscription model that powers informed decision-making.
- ✓ Resonance enriches this foundational intelligence to provide **strategic advisory services, having defined regional and national strategies and supported the world's leading tech companies**.
- ✓ Our **portfolio of specialized publications** in the industries we operate in, gives us – and our customers – unique access, reach and thought leadership opportunities.
- ✓ Our comprehensive service ecosystem has empowered over **150 clients**, including top-tier corporations, national governments, and leading academic institutions.
- ✓ Resonance is venture backed, growing >100% yoy, and is headquartered in Toronto, Ontario with operations internationally.

Resonance empowers decision-makers with intelligence to navigate and harness emerging technologies shaping the future

CLIENTS GLOBALLY **150+**

DATA POINTS **1M+**

MONTHLY READERS **1M+**

 **RESONANCE**
INTELLIGENCE

 **RESONANCE**
CONSULTING

 **RESONANCE**
MARKETING

CLIMATE
INSIDER

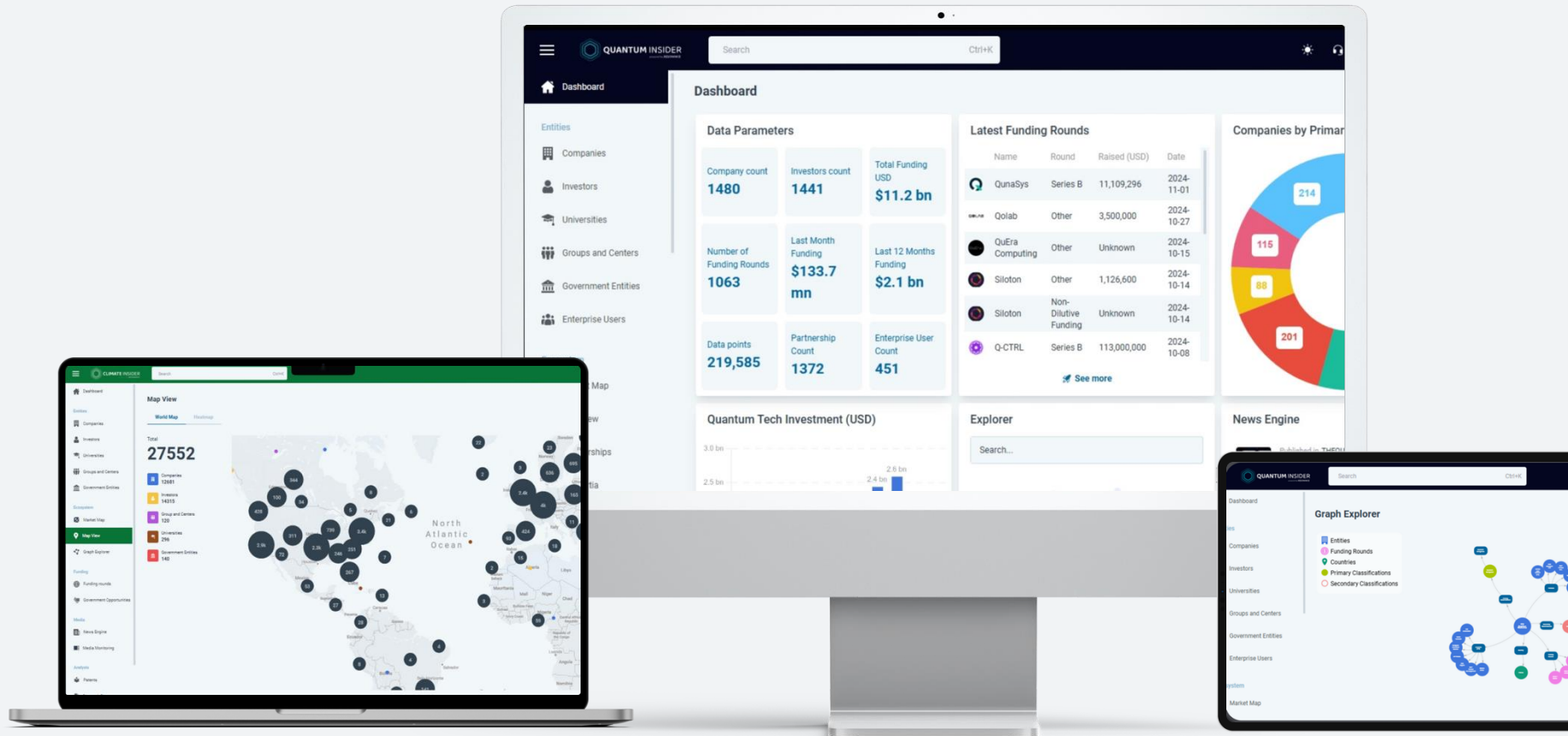
DIGITAL TWIN
INSIDER

QUANTUM
INSIDER

SPACE
INSIDER

AI INSIDER

Our AI-driven Intelligence Platform transforms open-source data into actionable insights, empowering organizations to navigate the emerging-tech landscape with clarity and confidence.



Our intelligence engine leverages AI to structure and present real time data, at scale

