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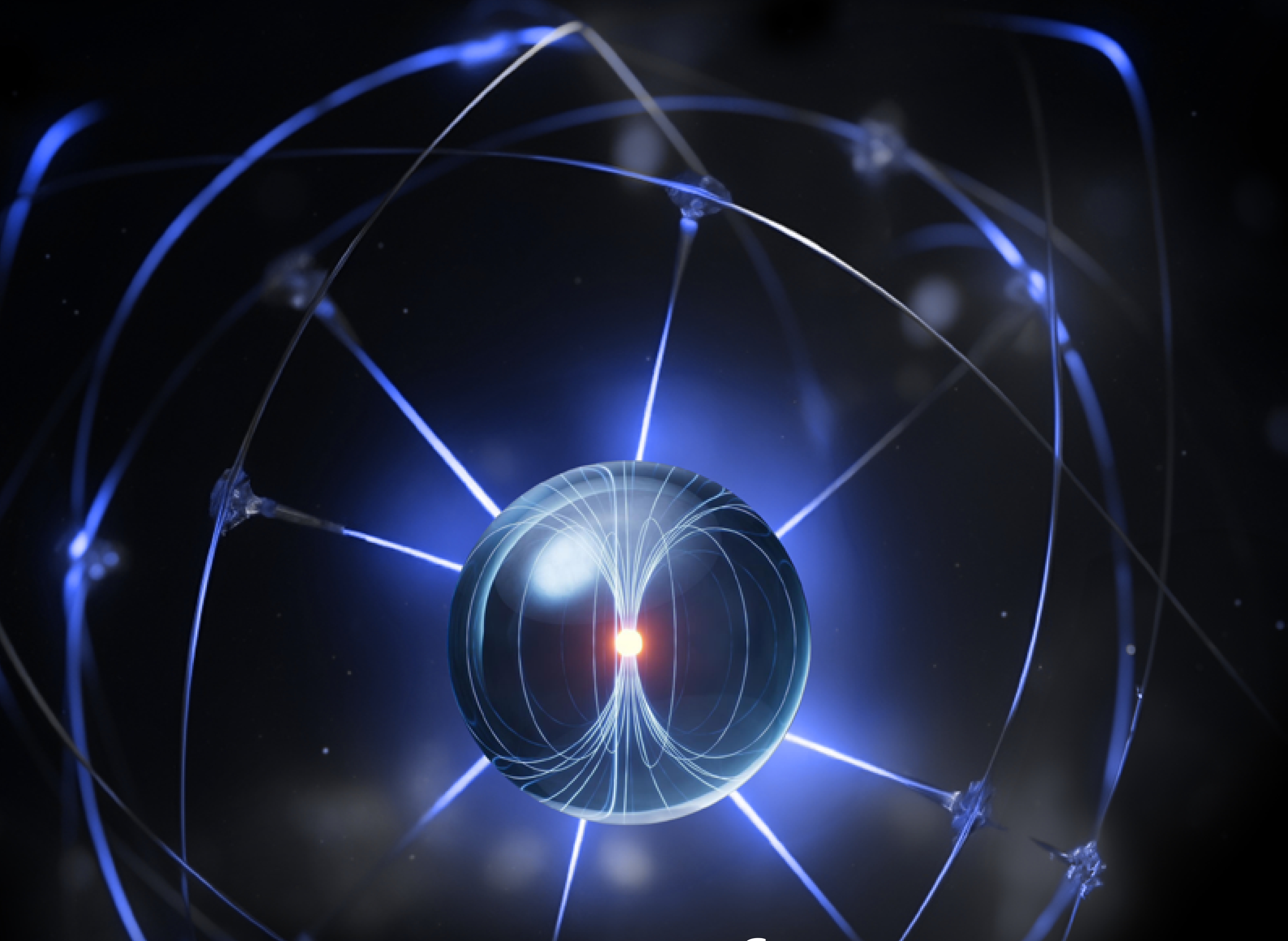

State of Quantum 2026

The latest trends in quantum featuring first-hand insights from global practitioners

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Foreword from IQM Quantum Computers

When we published this report last year, people were still talking about a quantum winter.

Investment had cooled and nobody was sure if the field had real momentum or just a good news cycle. A year later I think that question has mostly answered itself. Contract volume is up **more than sixfold since 2021**. There are now more than **fifty HPC-quantum deployments** live or coming online across **fourteen countries**. Quantum computers are being bought, installed, and actually run. That part feels settled to me.

The harder question is the one this report goes after. It is not really whether you can get access to a quantum system anymore. It is whether you can build something useful around it. Those are very different things, and to my eye the gap between them is where the next few years get decided.

You can see it in how buyers behave now. The serious ones have stopped leading with qubit counts. They want to know if they can see into the machine, calibrate it, connect it to the systems they already run, and learn from it as they go. They are not after one result. They want a capability they get to keep.
And this is the part I think people still underestimate. A quantum computer is not like a server you switch on and start getting value from. The value comes slowly. It comes from the people you train, the algorithms you write for the problems you actually care about, the operational experience you only get by running the thing over and over. You cannot buy any of that in a hurry later on.
Fault-tolerant systems are not here yet. The roadmaps point somewhere between 2029 and 2031, though honestly nobody knows the real date and I would be careful of anyone who says they do. But I do not think that uncertainty is a reason to wait. If anything it is the opposite. The organizations spending these years building talent and partnerships and hands-on experience will be ready when the technology turns the corner. The ones holding out for a clear signal tend to find the signal and the deadline show up on the same morning.

What I like about this report is that it does not oversell. Quantum today is no longer an experiment, but it is not a mature technology either. The momentum is real. So are the gaps, in skills, in algorithms, in proven commercial returns. We did not try to hide either side. The point was to give policymakers, investors, technologists, and educators an honest read on where this is going and what it will take to be ready.

The quantum future is closer than it looks. The work of being ready for it starts now.

Jan Goetz, Co-Founder & CEO,
IQM Quantum Computers

Foreword from The Quantum Insider

This is the fourth edition of the State of Quantum, and it rests on the deepest evidence base we have assembled: tracked transaction data, validated survey research, and in-depth interviews with the people making quantum decisions.

The 2026 picture is one of real scale: **well over a hundred systems contracted**, deployments embedded in national computing infrastructure on **three continents**, and capital arriving at levels the industry has never seen. But the most telling change this year is not in the totals. It is in what buyers told us.

Early editions of this report answered whether the technology worked. The buyers we interviewed for this edition are wrestling with harder questions: how systems integrate with existing infrastructure, how open a vendor's architecture really is, how to build a team that turns access into results, and when exploration should become commitment. Markets mature when their questions do.

This report was built to answer them. Policymakers will find where national programs are converting funding into capability. Enterprise leaders will see where pilots stall, and what separates organizations building durable capability from those accumulating activity.

For investors, the evidence shows a market that now prices demonstrated milestones over roadmap ambition.

The Quantum Readiness Index, new this year, puts a number on the market's preparation. It scores the structural foundations of readiness across workforce, innovation, investment, and adoption. The first score is a baseline: the engaged buyer base has programs and budgets in place, but production deployment and proprietary output are still ahead. Its value compounds from here. Each future edition could measure movement against it, and movement is what will tell us whether preparation is keeping pace with ambition.

An honest record cuts both ways, and this report does not flatter the market. Skills remain the most consistent constraint. Algorithm design lags hardware. There is still no shared way to measure quantum value against classical benchmarks. We have not glossed over them.

We are proud to be part of this report. Our contribution is the view from the data, and what the data says is simple: the work of being ready has started, and it is being done unevenly.

The technology will arrive on its own schedule; readiness is the only part of the timeline anyone controls.

Alex Challans

Alex Challans, CEO,
The Quantum Insider (Resonance)

About the Report

The State of Quantum 2026 is published by IQM Quantum Computers in partnership with The Quantum Insider, a Resonance company.

Currently in its fourth edition, the report tracks the commercial, technical, and organizational state of the quantum computing market through a combination of proprietary transaction data, structured survey research, and in-depth practitioner interviews.

The findings draw on three evidence streams.

1. Market transaction data covers individual QPU sales and deployments from 2021 to Q1 2026, sourced from The Quantum Insider's intelligence platform and triangulated against publicly available information.

2. A structured survey of **107 professionals** working in quantum computing, spanning enterprises, HPC centers, investors, universities, and government agencies across EMEA, AMER, and APAC, provides quantitative grounding for the adoption and procurement. The survey also serves as the primary data source for the Quantum Readiness Index (QRI): a composite scoring framework that benchmarks organizational quantum readiness across customer types and regions.

3. **Nineteen in-depth interviews** with senior practitioners across four stakeholder groups, conducted between April and May 2026, provide the qualitative depth and first-hand perspective that survey data alone cannot capture.

The report's primary focus is on Quantum Computing, with selected coverage of adjacent quantum technology categories where relevant to the investment and ecosystem analysis.

Full methodology, survey respondent profile, interview list, and the Quantum Readiness Index framework are described in the Appendix.

Executive summary

Market momentum and maturity

Quantum computing in 2026 presents a clear tension. Market momentum is increasing: annual contract volume has grown more than sixfold since 2021, reaching **121** tracked deals with an estimated combined value of **$2.6 billion** by Q1 2026. Quantum computing companies raised **$8.3 billion** in 2025. More than 50 HPC-quantum deployments are active or coming online across **14 countries**. At the same time, commercial maturity remains nascent. Most buyers are still running pilots rather than production workloads, and paid hardware procurement remains concentrated among governments, national laboratories and supercomputing centers. The central shift is that quantum engagement is moving from access to capability.

Technology progress

Vendor roadmaps across all major modalities now converge on a 2029 to 2031 window for fault-tolerant quantum computing. In 2025, the industry's technical attention moved decisively from physical qubit counts toward logical qubits and quantum error correction, from how large a system is to how reliably it works. Logical qubits have advanced from theoretical constructs to demonstrated milestones; QEC has become an engineering discipline with dedicated hiring programs at hardware vendors, funded workstreams at national laboratories, and specific line items in government quantum strategies.

The hardware question is not settled, but it is narrowing. No modality holds an unqualified advantage. What has shifted is the basis of assessment: investors and buyers are moving from roadmap ambition toward verifiable milestone delivery, rewarding demonstrated execution over long-term projections.

From access to capability

The shift is also visible in buyer behaviour. Cloud access remains an important entry point, but operated infrastructure is increasingly critical for sustained work. Across hybrid and standalone on-premises models, roughly 46% of buyers expect on-premises infrastructure to form part of their access model over the next three years, compared with 24% favouring public cloud alone. This reflects not declining cloud relevance but advanced buyers' growing interest in operating systems directly, integrating them with existing compute environments and building workforce, know-how and intellectual property around them.

Procurement, integration and sovereignty

Procurement expectations are changing as a result. Buyers are no longer selecting vendors on hardware specifications alone; for HPC centers, national laboratories and technically advanced enterprises, openness, calibration access, low-level system visibility and co-development quality are increasingly important. A black-box QPU is increasingly incompatible with buyers whose goal is to build capability of their own.

Sovereignty reinforces the same pattern. In markets such as Europe and the Gulf, local presence, data residency and host-country capability are increasingly incorporated into formal procurement requirements.

Barriers to scaled adoption

The constraints on adoption are organizational and economic as much as technical. **Skills shortages** are the most consistently cited barrier across all buyer types, cited by **66%** or more of large enterprises, universities, and government buyers. The second most prominent constraint is not hardware immaturity but **algorithm design**: the binding limit for most teams is the absence of efficient algorithms and the difficulty of mapping real-world problems to qubits. The third is ROI uncertainty at the commitment threshold, concentrated in commercial buyers navigating the transition from exploration to scaled investment. This is less about scepticism than timing: buyers are managing the gap between a four-year quantum returns horizon and near-term budget pressures where Gen AI already delivers demonstrable results. Organizations best positioned are those building the internal case through pilots, benchmarking and workforce development, so that when use cases emerge, they scale rather than start from scratch.

Quantum Readiness Index

The Quantum Readiness Index (QRI) benchmarks quantum readiness across four buyer types: HPC Centers and Public Research Infrastructure, Large Enterprises, Small and Medium Businesses, and Universities, reported also by region. Drawing on a validated survey of 98 quantum-buying organizations, it assesses each buyer type across four dimensions: Workforce, Innovation, Investment and Adoption, on a 100-point scale across five tiers from Aware to Leading. It measures whether buyer segments have the structural foundations to engage with quantum as it matures, not hardware performance or near-term commercial returns. The 2026 scores establish a baseline rather than a definitive assessment. Their value becomes clear as the index is re-measured in future editions: what matters is not where buyers stand today but how quickly they are building readiness over time.

HPC Centers and Public Research Infrastructure score highest at 61, the only buyer type in the advancing tier, underpinned by committed budgets and active multi-vendor procurement. Large Enterprises follow at 59 (developing tier), with the strongest Workforce scores across the cohort, though Innovation and production deployment remain limited.

Small and Medium Businesses score 56 (developing tier), constrained primarily by shallow Adoption: 76% remain at the exploratory pilot stage and no respondent exceeds a $1M quantum budget. Universities score lowest at 52 (developing tier), reflecting grant-dependent investment cycles and persistent hiring difficulties.

Implications for early advantage

Fault-tolerant systems are not yet commercially available and the timing of quantum advantage remains uncertain. Organizations investing in workforce, infrastructure, partnerships and operational experience today are positioning themselves for early advantage; how they use this period will determine how much of it they capture.

For buyers, the priority is shifting from passive monitoring to active capability development. Pilots build organizational learning and vendor fluency rather than computational output, foundations that cannot be assembled quickly once fault-tolerant systems arrive. Workforce development is the highest-return investment available today: training takes two to five years and the pipeline will not grow unless organizations act now. Cloud access across vendors and modalities maintains optionality, while on-premises investment should align to the most relevant problem classes.

For quantum solution providers, closing the procurement gap requires more than hardware roadmaps. Buyers assess openness, integration depth and co-development quality alongside hardware specifications; HPC compatibility and domain-specific evidence matter as much as qubit performance. Local presence is a condition of market access: vendors without a local entity or in-country service model may not reach technical evaluation regardless of hardware quality. Long-term engagement matters as much as the initial sale; vendors treating the first contract as a transaction rather than a joint development relationship are less well positioned for repeat procurement.

For enablers, ecosystem infrastructure must keep pace with hardware progress. Policymakers should prioritise practitioner-focused workforce pipelines, interoperability standards in procurement, and funding that supports deployment over acquisition alone. Investors should anchor on verifiable milestones and diversify across the full quantum stack rather than single-modality bets. Universities should shift curricula toward practitioner roles combining physics, software engineering and domain applications; structured internships and industry partnerships convert academic training into deployable quantum talent.

Acknowledgements

Resonance conducted 19 in-depth interviews with senior practitioners across 4 stakeholder groups: HPC center directors and public research leaders (6), enterprise quantum leads across aerospace, automotive, pharmaceuticals, and technology (5), academic researchers and university quantum leads (4), and quantum investors and venture capital partners (4). Interviewees are located across Europe, AMER, the Middle East, and the Asia-Pacific, representing 10 countries on four continents. The interview program was designed to complement and stress-test the quantitative survey findings, not to replace them; qualitative evidence is used to surface mechanisms, exceptions, and nuance that survey data alone cannot capture. All interviews were conducted by Resonance between April and May 2026, lasted between 30 and 60 minutes, and were recorded with participant consent. Transcripts were reviewed and approved by each participant before publication.

Table 1: *Interview List*

HPC Centers and Government Entities

Name	Organization	Role	Region
Luigi Iapichino	LRZ - Leibniz Supercomputing Center	Head of User Enablement & Applications	Europe
Lois Orosa	CESGA - Galicia Supercomputing Center	Scientific Director & Senior Researcher	Europe
Saber Feki	KAUST	Director of Research Computing Core Labs	Middle East
Ugo Varetto	Pawsey Supercomputing	CTO (Pawsey); Assoc. Professor (UWA); Research Director (CSIRO)	APAC
Saad A. Alowayyed	C4IR Saudi Arabia, KACST	Project Lead, General Manager	Middle East
Laura Schulz	Argonne National Laboratory	Project Lead for Innovation at the Leadership Computing Facility	AMER

Academia

Name	Organization	Role	Region
Alex Krasnok	Florida International University	Assistant Professor, Quantum Optics & Photonics	AMER
Arnab Banerjee	Purdue University	Quantum Materials Researcher	AMER
Ian Walmsley	University of Oxford	Director, Oxford Quantum Institute; Professor of Quantum Science & Engineering	Europe
Jean-Luc Cambier	Chicago Quantum Exchange, University of Chicago	Managing Director, Bloch Tech Hub	AMER

Industry

Name	Organization	Role	Region
Alexey Galda	Moderna	Head of Quantum Computing	AMER
Jacek Michalski	Galaxy Systemy Informatyczne	CEO	Europe
Jasper Simon Krauser	Airbus	Head of Quantum Coordination	Europe
Manfred Rieck	Deutsche Bahn (DB Systel GmbH)	Quantum Software Development Department Lead	Europe
Chandan Kumar & Ralf Nieschulz	BMW Group	Quantum Computational Chemistry Lead, Head of AI Hub, Future & Quantum Computing	Europe

Investor / VC

Name	Organization	Role	Region
Manjari Chandran-Ramesh	Amadeus Capital Partners	Partner	Europe
Niels Nielsen	2xN	Founding Partner, Investor and Board Member (Quantinuum)	Europe
Owen Lozman	55North	Founding Partner	Europe
Ton van 't Noordende	Ground State Ventures	General Partner & Investor	Europe

Theme I

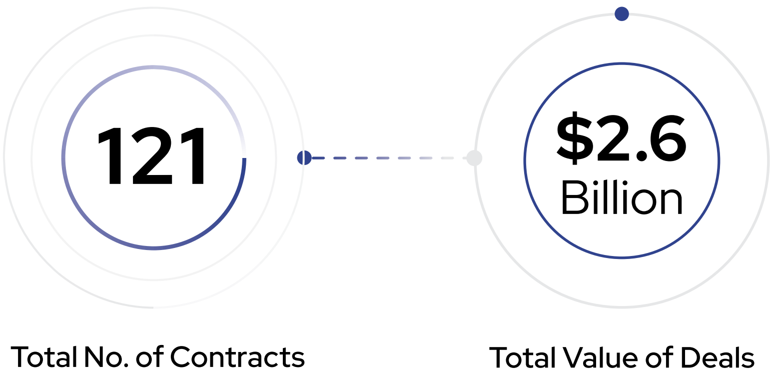
State of the Market – Where Quantum Really Stands in 2026

State of the Quantum Computing Market

Quantum Computers contracts & deals value

Quantum Computing contract volume increased more than sixfold from 2021 to 2025, rising from 4 annual contracts to 25.

By Q1 2026, the cumulative total stood at 121 contracts with a combined value of $2.6B.[1]



Contract volume accelerates sharply from 2022

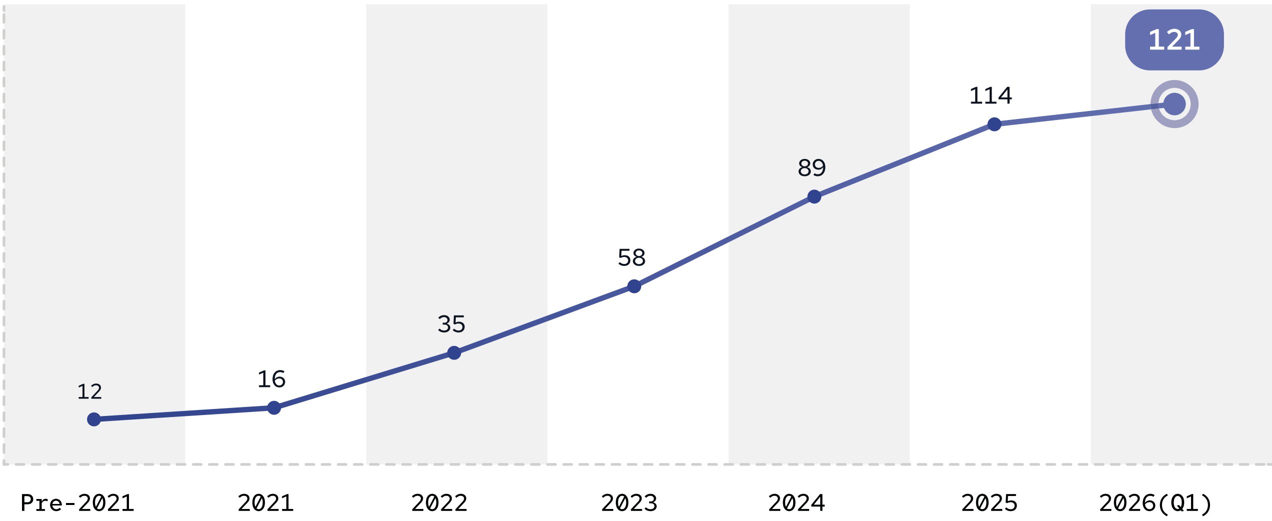


Figure 1: *Cumulative Quantum Computing contracts by units through Q1 2026.*

Vendor landscape

Based on publicly available information, IQM leads the vendors with 19% of Quantum Computing contracts from 2021 to 2026 Q1, reflecting its strong presence in European national supercomputing procurements and the availability of lower-cost systems such as IQM Spark.[2] IBM, Rigetti, and IonQ follow at 11% each, anchored by US and Asian national laboratory contracts. The wide range of vendors indicates that buyers have not yet converged around a single hardware provider or platform strategy. These top 10 vendors make up 60 percent of the total contracts for the time period.

1 *The figure combines publicly disclosed contract values with estimates produced by The Quantum Insider and Resonance analysis for transactions where contract amounts were not publicly available.*

2 *The IQM Spark (5 qubits) costs less than €1 million; IQM press release.*

IQM leads quantum computing contract share among top vendors

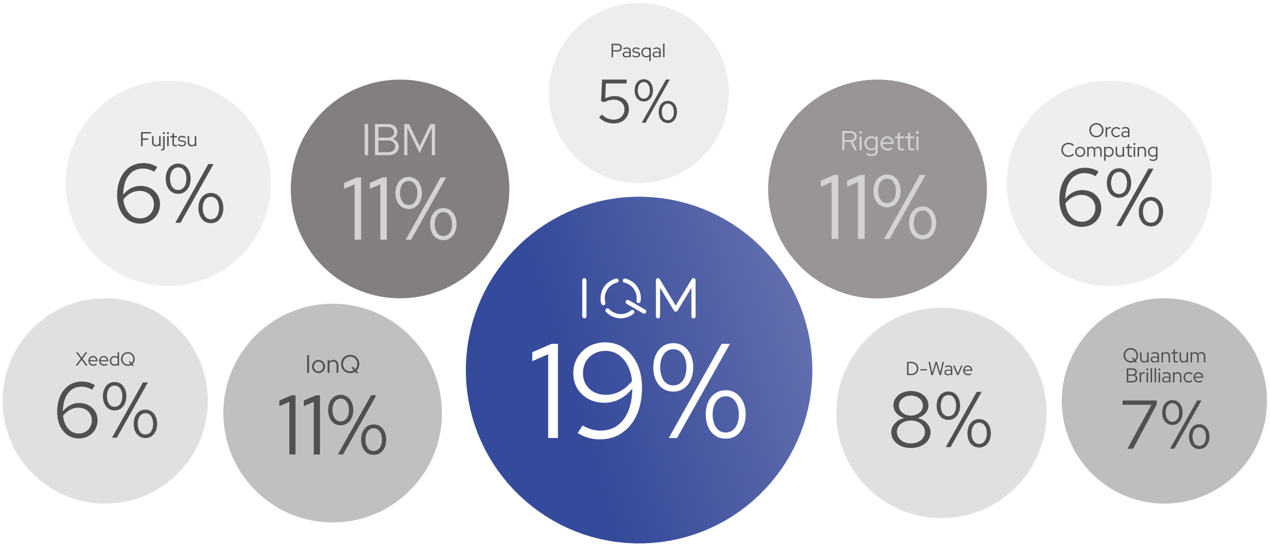


Figure 2: *Share of Quantum Computing contracts of top 10 vendors, based on publicly available data, 2021–2026 Q1*

Technology deployment and delivery models

In 2025, the quantum market centred on physical ownership and long-term managed access. Four delivery models were active, each suited to a different level of customer readiness.

Table 2: *Quantum Computing commercial deployment models*

Model	Description
On-premises ownership	Dominant model – The customer buys the Quantum Computer. Vendor installs, calibrates, trains users, and provides support.
QPU lease / managed	Vendor installs and operates a system on-site, retaining ownership. Customer pays multi-year fees for exclusive access.
HPC coupled	The QPU is installed on-site and connected to an HPC system for hybrid workflows.
Cloud-only access	The organization accesses quantum hardware entirely remotely, with no dedicated physical system. Compute time is shared across users and provisioned on demand.[3]

[3] *Access is available either directly from hardware vendors offering cloud-based access to their own systems, or through QCaaS aggregator platforms such as Amazon Braket, Azure Quantum, or Eviden, which provide a single interface to multiple vendors and hardware types.Cloud-only deployments are typically structured as pay-per-use credits or shots rather than large reported contracts, and are therefore underrepresented in publicly tracked sales data.*

On-premises vs. cloud-only access

Cloud and on-premises access serve different needs.

Cloud access is the clearest entry point for exploration. It offers lower upfront cost, access to different hardware types, and automatic upgrades, making it well-suited to organizations still shaping their quantum strategy.

On-premises ownership supports research sovereignty, workforce development, IP control, HPC integration, and national capability building. These advantages matter most for institutions building long-term quantum capability.

Increasingly, this is not a binary choice. As buyers mature, the two models resolve into layers rather than alternatives: cloud access supports exploration, experimentation, and burst capacity, while operated infrastructure anchors sustained, integrated, and sovereignty-sensitive work. Read this way, the growing preference for hybrid deployment reflects demand for both layers, not a substitution of one for the other. The strategic question for most institutions is therefore not whether to own or to rent, but what to operate directly and what to leave in the cloud.

This view is echoed at the multilateral level, such as in UNESCO's 2025 International Year of Quantum final report, "Reliance on a small number of multinational service platforms raises concerns regarding data sovereignty, national security, latency, service availability and supply chain concentration. Cloud access can lower entry barriers but cannot substitute for local capability development, and its equity depends on supporting conditions, such as edge computing, high-bandwidth networks and data exchange infrastructure, that remain unevenly distributed." [4]

The fuller procurement logic is examined in Section 3.

On-premises ownership

- **Control.** Full control over scheduling, calibration data, and experimental settings.
- **Workforce development.** Access for students/ researchers building competencies in-house.
- **IP protection.** Algorithm development and proprietary use-case testing stay with the institution.
- **Accessibility.** Dedicated systems allow local teams to run experiments at any time with full scheduling flexibility.
- **HPC co-location**. Enables real hybrid quantum-classical workflows.
- **National strategy.** Supports digital sovereignty, supply chain resilience, and long-term capability development.

Cloud-only access

- **Low barrier to entry.** No capital expenditure, installation overhead, or maintenance burden. Ideal for exploratory algorithm development.
- **Hardware variety.** Let users test different modalities and qubit counts before committing to one architecture.
- **Automatic upgrades**. Hardware improvements are provided without replacement costs or downtime for the customer.
- **Best for exploration.** Suited to organizations still defining their quantum strategy.

[4] *UNESCO, IYQ2025 Final Report, Ch. 7.3, p. 87*

HPC Coupling

HPC-coupled deals have grown quickly since 2021. Cumulative deals rose from 7 at the end of 2021 to 17 in 2023, then climbed sharply to 37 in 2024 and 50 in 2025. Six further deals in Q1 2026 brought the total to 56. [5]

Quantum accelerates into the HPC mainstream

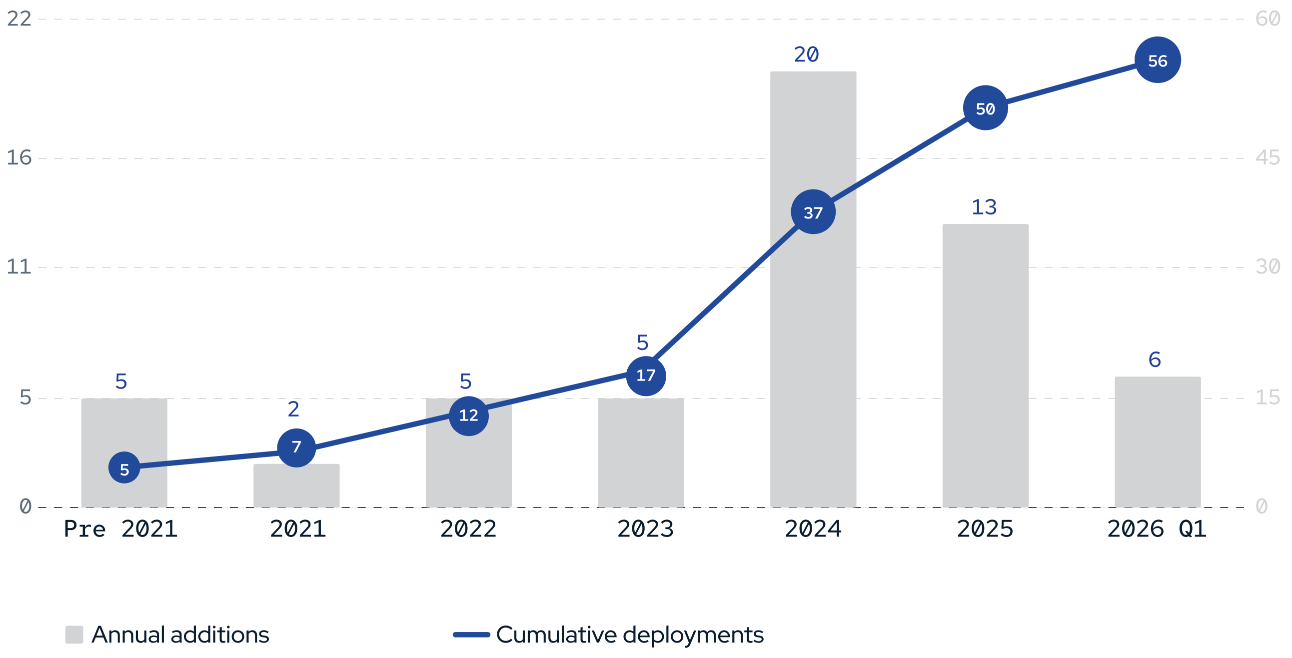


Figure 3: *Cumulative HPC-coupled Quantum Computing deployments, pre-2021 to 2026 Q1*

Why HPC coupling matters	HPC coupling reduces latency between quantum processors and HPC systems, allowing tighter hybrid workflows and system integration models.

> // There is real value in hosting a quantum computer on site, because it allows you to experiment with genuine integration with the HPC system. If the two are co-located – connected via a high-speed, low-latency link – you can properly test what tight coupling between quantum and classical infrastructure actually looks like in practice. "
>
> **– Ugo Varetto**

[5] *Source: The Quantum Insider. Although the aim is track all qualifying deployments, some may not yet be captured. Based on public available information*

> We see quantum computers as accelerators, the same way we see a GPU. You always need the classical component, always need to do something in HPC for post-processing, pre-processing, or parts of the algorithm that are simply more efficient to do classically. That is why integrating HPC and quantum is so compelling. ”
>
> **— Lois Orosa**

On Track Towards Fault Tolerance

Hardware vendors still define “useful” Quantum Computing in different ways, including circuit fidelity, application benchmarks, and logical qubit targets. Vendors differ in how they define progress and the milestones each modality must reach, but many roadmaps now converge around 2029-2031 as the target window for Fault-Tolerant Quantum Computing (FTQC).

Market Alignment in 2030

Qualitative extracts from published vendor roadmaps show consistent staging: incremental hardware milestones through 2026–2028, followed by a projected step-change in computational capability around 2029–2031. The definition of “useful” varies: some vendors anchor it to specific chemistry or optimization benchmarks; others frame it in terms of logical qubit counts or native gate fidelity.

> Quantum utility will become evident when an application saves $10 billion for a business—something that could only be achieved with Quantum Computers. That is the benchmark that will make people take real notice. ”
>
> **— Ian Walmsley**

> Even two years ago, we could only reach J/5. Now we can reach J/20 — four times better. When you apply a Hamiltonian or an objective function to the system, you can now resolve the spectrum at that level of precision. That is a fundamental difference. Results are beginning to match experimental resolution. We are entering an era in which Quantum Computing is becoming genuinely useful for understanding datasets that were previously out of reach. ”
>
> **— Arnab Banerjee**

> I do not regard the risk of reaching many hundreds of logical qubits at a fault-tolerant level as particularly great. We can debate whether that happens in 2029 or 2031, but it will fall within this window — it is not going to slip beyond it. ”
>
> **— Niels Nielsen**

Physical and logical qubit targets: ambitious across all modalities

The operative benchmark for hardware roadmaps has shifted. Physical qubit counts dominated vendor communication for most of the field's commercial history, but 2025 marked the year logical qubits became the primary frame:

units that incorporate quantum error correction and can execute operations reliably enough to support fault-tolerant computation. The shift matters because a system with millions of physical qubits but limited error correction capability is not inherently more useful than a smaller, higher-fidelity system.

> Previously, emphasis was predominantly placed on the quantity of qubits, platforms, and related aspects. I would assert that this year marks a turning point towards a more pragmatic perspective — the focus has shifted from merely the number of qubits to their functional capabilities: whether they are fault-tolerant or not, and whether they are physical or logical qubits."
>
> **— Alex Krasnok**

By 2030, published roadmaps show steep scaling across all three primary modalities, but the physical-to-logical qubit ratio separates them in a way that physical counts alone do not capture. Trapped ion vendors project the largest physical qubit base at up to two million, combined with the most favourable error correction overhead at approximately 25:1. Superconducting roadmaps aim for 40,000 physical qubits with an approximate ratio of 83:1, whereas neutral atom vendors estimate 100,000 physical qubits, representing the highest overhead among the three, around 100:1.

Table 3: *Projected physical and logical qubits by hardware modality, by 2030. Figures represent publicly disclosed roadmap targets by modality and should be read as ceiling projections, not average vendor commitments.*[6]

Modality	Physical qubits by 2030 (max value)	Logical qubits by 2030 (max value)	Physical-to-logical ratio
Superconducting	40,000	480	~83:1
Trapped Ion	2,000,000	80,000	25:1
Neutral Atoms	100,000	1,000	100:1

6 *A Resonance synthesis across publicly available roadmaps.*

The ratio difference has operational consequences, though no modality holds an unqualified advantage. Superconducting architectures combine the fastest gate speeds with the most developed manufacturing base and the deepest installed research infrastructure of any platform, characteristics that underpin the majority of recorded QPU deployments to date. Trapped-ion systems project a more favourable error-correction overhead, supported by all-to-all qubit connectivity and high gate fidelity, but face well-documented constraints in gate speed and physical scaling in control systems that will determine whether their roadmap projections hold. Neutral atom platforms offer reconfigurability and scalability potential at the cost of the least proven logical qubit efficiency among the three. They also face important challenges in scaling the associated control, laser, and readout systems required to operate increasingly large quantum processors.

Qubit count is not the only performance metric. Gate speed, gate fidelity, and connectivity vary materially across modalities, and they shape which architectures are best suited to which problem classes.

Spin and photonic systems are excluded from the figures; their absence reflects the difficulty of mapping current roadmaps to a comparable scale rather than a lack of technical progress. Similar reasoning is applied to Majorana 2 particles,[7] which promise highly efficient physical-to-logical qubit overhead, however lack defined roadmaps beyond the goal of a "scalable" quantum computer by 2029.

No modality has demonstrated a decisive or durable advantage on the metrics that matter for fault tolerance. Each continues to attract capital and post credible roadmaps. Any single-architecture commitment placed today carries material technical risk.

> "Which modality will ultimately prove superior remains genuinely unclear. Several may well survive, each finding its own niche across different problem types. "
>
> **— Jean-Luc Cambier**

[7] *Majorana 2 – Microsoft's Scalable Quantum Processor With Reliable, Long-Lasting Qubits*

Quantum error correction (QEC): Research and Workforce demand

QEC is the engineering layer that converts noisy physical qubits into reliable logical ones. As logical qubit targets scale, QEC becomes structurally central to the entire stack. The table below maps the primary forces shaping QEC workforce demand over the near and medium term.

Driver	Commentary	Impact on QEC workforce
Logical qubit advances	Every step up in logical qubit count requires larger, specialized QEC teams.	Once companies achieve 100–1,000 logical qubits, demand for QEC engineers will increase significantly.
Hardware scaling & error rates	QEC intensity depends on physical qubit error rates: the noisier the hardware, the larger the QEC workforce needed.	Slow error rate improvements will increase QEC headcount significantly.
Funding & investment	Governments view FTQC as a strategic technology and a number of national programs fund QEC research.	Investment will lead to strong hiring across national labs, startups and universities.
Commercial adoption	Once error-corrected compute is available, commercial adoption will ramp up.	Strong pull from end customers will push vendors to scale QEC hiring.
Talent pipeline	The ability of the QEC workforce to increase will depend on the availability of QEC specialists who typically require ~5–10 years of training.	Talent scarcity could cap the growth of the market.
Automation and AI	While AI and automation will eliminate some jobs, it will also shift roles upwards in skill level and outward into hybrid domains.	Overall job impact could swing positive or negative depending on developments in AI.

QEC skills are likely to face strong demand and limited supply. If companies reach 1,000 or more logical qubits before the end of the decade, as some roadmaps suggest, demand for QEC engineers will rise sharply. Error rates will shape the scale of demand. Slower hardware improvement means more QEC work per logical qubit, while faster improvement could accelerate adoption and hiring. Government programs add further pressure, as national labs and universities compete with companies for the same limited talent pool.

Talent scarcity

The scarcity of quantum talent represents a fundamental structural constraint. Both the funding and commercial demand for QEC expertise are on the rise. The workforce's capacity to expand is limited by the availability of trained specialists rather than financial resources.

> "There are far more people seeking training in this area than there are places available to train them. On the demand side, the market is nowhere near saturated. The master's level and the technical level are where the real appetite lies — not just PhDs, but the people needed to make this work in practice, to turn the prototype into a real machine. "
>
> **— Ian Walmsley**

Practitioners and researchers describe the shift in similar terms: 2025 was the year quantum error correction moved from a research topic to the center of the industry's planning.

> "The most significant shift is the much stronger focus on quantum error correction. Companies like NVIDIA are hiring QEC teams with considerable urgency. The neutral atom community has been generating significant momentum around lower thresholds for fault-tolerance algorithms — and with it, a steady decline in interest in NISQ approaches."
>
> **— Alexey Galda**

The signal is clear: in 2025, QEC became a point where capital, talent demand, and roadmap claims converged. Progress is now visible not only in experiments, but also in the engineering architecture needed to scale, including three-dimensional packaging and modularity.

Research output: publications and patents accelerating

Academic publication counts and patent filings in quantum error correction have both grown year-on-year, with the growth rate itself accelerating. This is characteristic of a field moving from foundational science toward applied engineering. Patent output grew 45% CAGR from 2021 to 2025, while research papers grew 30% CAGR on the same period.[8]

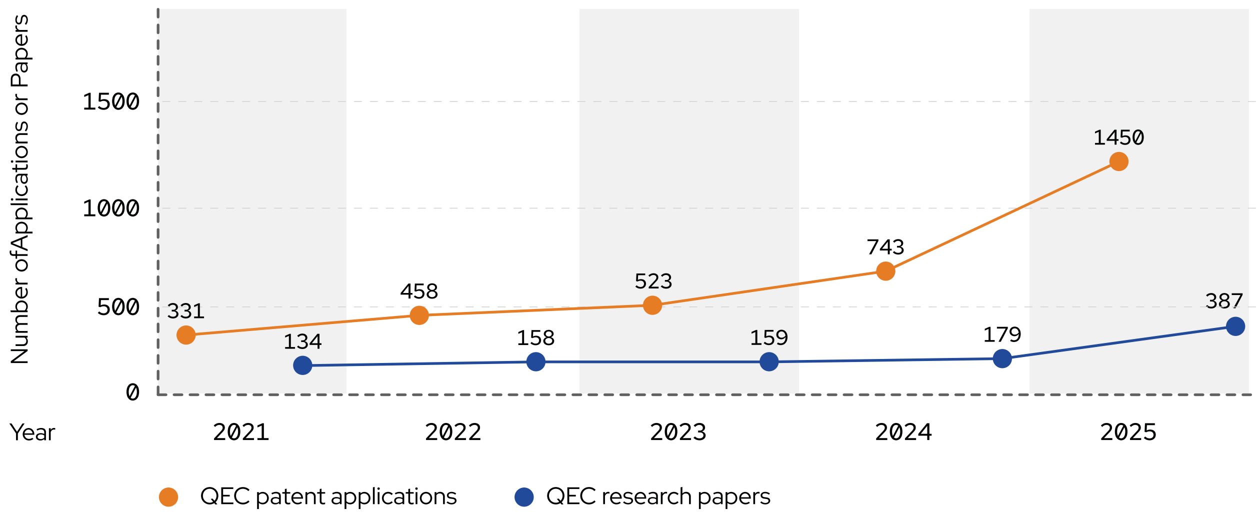


Figure 4: *Annual QEC patent applications and research papers published, 2021–2025*

Publication growth points to an expanding QEC research community across universities, national labs, and industry. Patent growth tells a complementary story: organizations are moving specific QEC techniques and architectures closer to commercial protection.

8 *The Quantum Insider's own database.*

What changed in 2025

HPC coupling is a core architectural model for quantum deployments

CHANGED

In 2022, just 25% of deployed systems were paired with a classical supercomputer. By 2025, that figure reached 40%, with seven deployments coupled to named HPC systems.

The market became genuinely multi-modal

CHANGED

In prior years, superconducting technology held a commanding share of QPU sales. In 2025, five distinct modalities each recorded multiple transactions: superconducting, neutral atom, trapped ion, annealing, and NV-diamond.

Software emerged as a first-class procurement item

CHANGED

Error mitigation, circuit compilation, and hybrid development tools have moved from research add-ons to commercial line items. This signals a maturing ecosystem where hardware is no longer the entire value proposition.

The industry aligned on logical qubits as the operative metric

CHANGED

In prior years, vendors reported progress primarily in physical qubit counts and their own definitions (such as algorithmic qubits or quantum volume). In 2025, logical qubit targets (and the error correction overhead required to reach them) became the dominant frame for roadmap comparison and investor communication. Physical qubit counts are now treated as an input, not an output.

Quantum error correction moved from research function to engineering discipline

CHANGED

QEC was historically the domain of academic groups and a small number of dedicated researchers. In 2025, it has become a discrete hiring category at hardware vendors, a funded workstream at national labs, and an explicit line item in government quantum strategies.

Government programs began funding QEC specifically, not just quantum broadly

CHANGED

Earlier national quantum initiatives funded hardware platforms and general capability. A growing number of 2025 programs designate fault-tolerant quantum computing and QEC research as named priorities, directing capital toward a narrower and more technically specific workforce need.

What has not changed

Government and research institutions still drive procurement

PERSISTENT

No private-sector vertical has produced recurring, multi-deal procurement cycles at scale. Government, national labs, HPC centers, and universities account for the majority of Quantum Computing purchases since tracking began.

Superconducting maintains modality leadership in the number of sales

PERSISTENT

Nine of the 25 Quantum Computing sales in 2025 were superconducting, continuing a pattern from prior years. Although the gap is narrowing as competing modalities accumulate transactions, no alternative has yet displaced superconducting as the most purchased on-premises technology. This leadership in contract volume is partly driven by lower unit prices for some superconducting systems which lower the procurement barrier and enable a higher number of transactions compared to other modalities.

No modality has broken away from the pack.

PERSISTENT

Superconducting technology retains the largest installed base, but neutral atom, trapped-ion, photonic, and spin qubit approaches all continue to attract serious capital and post credible roadmaps. The hardware layer remains genuinely multi-modal, with no architecture having demonstrated a decisive and durable advantage on the metrics that matter for fault tolerance.

Most buyers remain in research and workforce-development mode

PERSISTENT

Hardware procurement in quantum computing remains concentrated among government institutions, national laboratories, and universities, which continue to acquire systems mainly for R&D and capability-building rather than production use. Enterprise adoption at scale has yet to emerge. The industry has also aligned around a broadly consistent timeline. While vendors differ in how they define useful quantum computation, their roadmaps increasingly point to 2029-2031 as the point when fault-tolerant quantum advantage may become achievable across all major hardware modalities.

These patterns reflect a market still building the commercial foundations that scaled adoption requires. Theme II examines the investment momentum accumulating in anticipation of the transition ahead.

Theme II

Market opportunity, Investment, and Momentum

The Quantum Opportunity

The Quantum Computing market today

Industry estimates place the Quantum Computing revenue market between $1.1 to $1.4 billion in 2025.[9] The four US-listed pure-play vendors reported combined FY2025 revenue of $162 million, representing 12% of the global figure.[10]

Resonance-tracked deals grew from $167 million in 2021 to $630 million in 2025. EMEA leads cumulatively at 46% of value, followed by APAC at 34% and AMER at 20%. Total investment in quantum technology grew over 4 times year-over-year to $10-$12 billion in 2025, with 80-90% flowing into Quantum Computing.[11]

Near-term: 2026–2028

Quantum Computing company revenue is projected at $3.2 to $4.4 billion by 2028, reflecting a 47% CAGR from 2024. A more conservative trajectory projects $3.1 billion in 2028, a 30% CAGR from 2025 ($1.4 billion).[12]

Long-term: 2030, 2035, and 2040

Forecasts vary greatly based on the methodology used. When including revenue, investment, and internal big-tech funding, the market projection increases from $15 billion in 2025 to $25–$34 billion by 2030 and $43–$71 billion by 2035. By 2040, the market is projected to range from $77 billion to $170 billion, with an implied CAGR of 12% to 17% for the period 2030-2040.[13]

What will move the numbers

Upside drivers would include credible proof points on the path to fault tolerance and demonstrated quantum advantage in a commercially meaningful use case. As Niels Nielsen notes in the interview, several companies have already produced verifiable results that make fault-tolerant quantum computing more tangible. Investors are increasingly rewarding demonstrated execution over long-term roadmaps, allowing the most credible companies to pull ahead.

As Owen Lozman argues, the next signals that matter may lie less in headline qubit counts and more in whether the quantum ecosystem is showing real commercial maturation, both through supplier revenue growth and a clearer shift from technology push to market pull.

The main downside risks are a major vendor failure, federal R&D budget cuts in 2027 to 2028 and limited progress beyond NISQ systems through 2030. Slower enterprise adoption, supply chain bottlenecks in cryogenics and specialized lasers and geopolitical fragmentation of the quantum stack would add further pressure.

9 *McKinsey Quantum Technology Monitor 2026, p. 8; QED-C SGQI 2026, p. 11*
10 *Resonance analysis*
11 *Resonance analysis; see following chapter for more details.*
12 *McKinsey & Company's Quantum Technology Monitor 2026 (April 2026), QED-C's State of the Global Quantum Industry 2026 (April 2026), and BCG's The Forecast for Quantum Computing Still Looks Bright (2024).*
13 *The Quantum Insider, alongside McKinsey & Company's Quantum Technology Monitor 2026 (April 2026), and BCG's The Forecast for Quantum Computing Still Looks Bright (2024).*

The public-listing wave

A structural shift in the 2025 to 2026 capital landscape is the wave of quantum companies entering public markets. This reflects more than investor exits: larger players are moving to scale, acquiring specialist vendors and reshaping competition across the stack.

As the timeline illustrates, seven quantum companies have completed SPAC mergers since 2021, with a second wave accelerating in 2025: Horizon Quantum, Infleqtion, and Xanadu all announced SPAC mergers in the second half of 2025, with IQM, Terra Quantum, and Pasqal in the pipeline.[14]

SPAC Update

Upcoming IQM Terra Quantum Pasqal

	IONQ	ARQIT	Rigetti	D-Wave	Horizon Q.	Infleqtion	Xanadu
SPAC Merger Announcement Date	March 2021	May 2021	October 2021	February 2022	September 2025	September 2025	November 2025
Public ticker after merger	IONQ	ARQQ	RGTI	QBTS	HQ	INFQ	XNDU
SPAC Completion Date	October 2021	September 2021	March 2022	August 2022	March 2026	February 2026	March 2026
SPAC Partner	dMY Technology Group, Inc. III ("dMY")	Centricus Acquisition Corp.	SuperNova Partners Acquisition Company (Supernova II)	DPCM Capital	dMY Squared Technology Group	Churchill Capital Corp X	Crane Harbor Acquisition Corp.

Figure 5: *Quantum Computing SPAC mergers; completed and upcoming, 2021–2026 Q1*

The regional dimension matters. Several investors noted that public listings are easier in the US than in Europe. European exchanges often have less analyst coverage and a smaller retail investor base for quantum companies. This could push European late-stage quantum companies towards US exchanges or US acquirers, adding to Europe's late-stage capital gap discussed later.

[14] *As of early June 2026.*

The Quantum Ecosystem in Numbers

1,910

Total quantum organizations

All categories tracked

479

New quantum companies founded

2021–Q1 2026, all segments

53

New quantum companies founded

2025, all segments

110

Dedicated Quantum Computing companies [15]

5.8% of total ecosystem

48

Quantum Computing companies founded

2021–Q1 2026

5

Quantum Computing companies founded

2025

[15] *QPU manufacturers and developers, classified by qubit modality: superconducting, trapped ion, neutral atoms, silicon, photonics, topological, NV diamond, electrons on helium, cavity QED, NMR, and annealing.*

By Q1 2026, the quantum ecosystem included 1,910 organizations across all quantum categories.[16] Hardware components formed the largest segment, accounting for 36% of the total. Quantum Communications and Security sits at 18% and Software at 15%. Quantum Sensing and Quantum Computing accounted for smaller shares, at 9% and 6%, respectively of the total ecosystem.

Distribution of 1,910 quantum companies by segment; Cumulative figures through Q1 2026

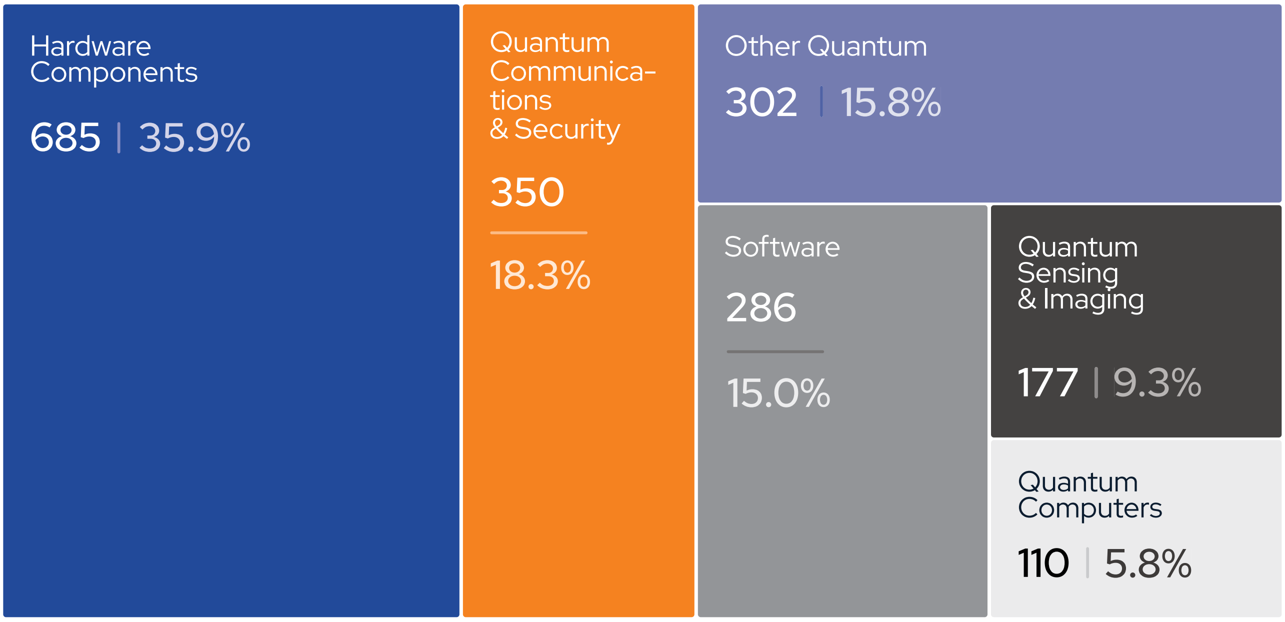


Figure 6: *Distribution of 1,910 quantum companies by segment through Q1 2026.*

Quantum Computing includes 110 dedicated companies. Superconducting is the largest platform category at 30%, followed by photonics at 25% and trapped ion at 16%. Neutral atoms account for 12% and silicon for 9%, with the rest spread across smaller modality groups, including NV diamond, topological and cavity QED.

Distribution of Quantum Computing platforms across all tracked companies; Cumulative figures through Q1 2026

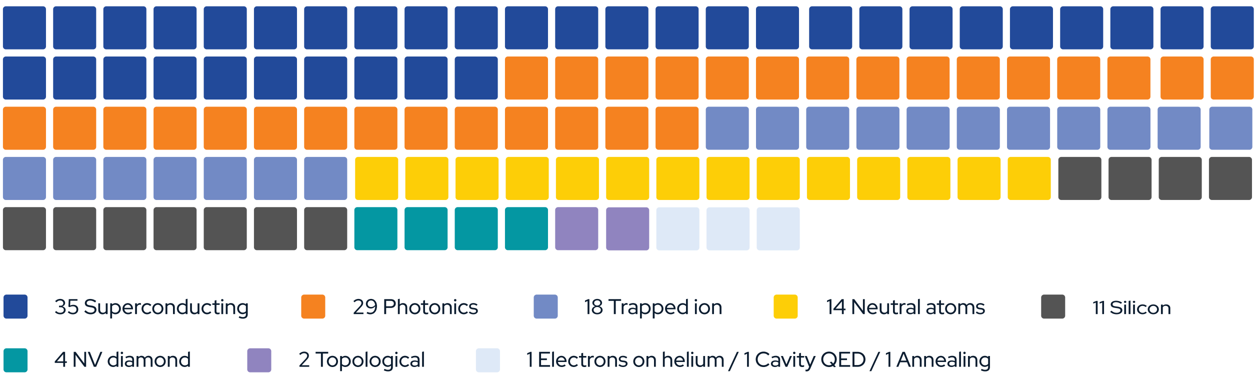


Figure 7: *Distribution of Quantum Computing platforms across all tracked years; Cumulative figures through Q1 2026.*

16 *Refer to the Taxonomy in appendix for the definition of each quantum category.*

The breadth of platform diversity reflects the fact that different modalities may be better suited to different problem types. Superconducting systems offer speed; trapped-ion systems offer all-to-all qubit connectivity; and neutral-atom platforms offer reconfigurability, all-to-all connectivity, and scale. No single architecture has yet achieved decisive technological leadership.
The race remains open, and buyers selecting hardware today are making a research decision as much as a procurement one.

> If speed is the priority, superconducting qubits are the answer. If reconfigurability and scale matter more, neutral atom platforms look more promising right now. Several modalities may well survive and each find its niche for different problem types."
>
> **– Jean-Luc Cambier**

> I don't believe there will be a single modality that dominates all use cases. Instead, one might excel in areas like financial markets, while another is better suited for logistics, etc. However, we won't identify these distinctions for another five years.."
>
> **– Niels Nielsen**

Investment Landscape

$21.4B Total capital raised across all segments 2021–Q1 2026	**$14.8B** Total capital raised on Quantum Computing segment alone 2021–Q1 2026 69% of total capital	**$8.3B** 2025 Quantum Computing alone Nearly 5x the 2024 figure
718 Total deals, all segments 2021–Q1 2026	**193** Total deals on Quantum Computers segment alone 2021–Q1 2026 27% of total deals	**45** 2025 Quantum Computing deals alone Similar to 2024 (46 deals)

From 2021 through Q1 2026, the quantum sector drew in $21.4 billion through 718 deals[17] across all quantum categories.[18] Quantum Computing absorbed the dominant share, with $14.8B flowing into the segment, representing 69% of all capital deployed. Software followed at 13% ($2.8B), with Hardware Components at 11% ($2.3B).

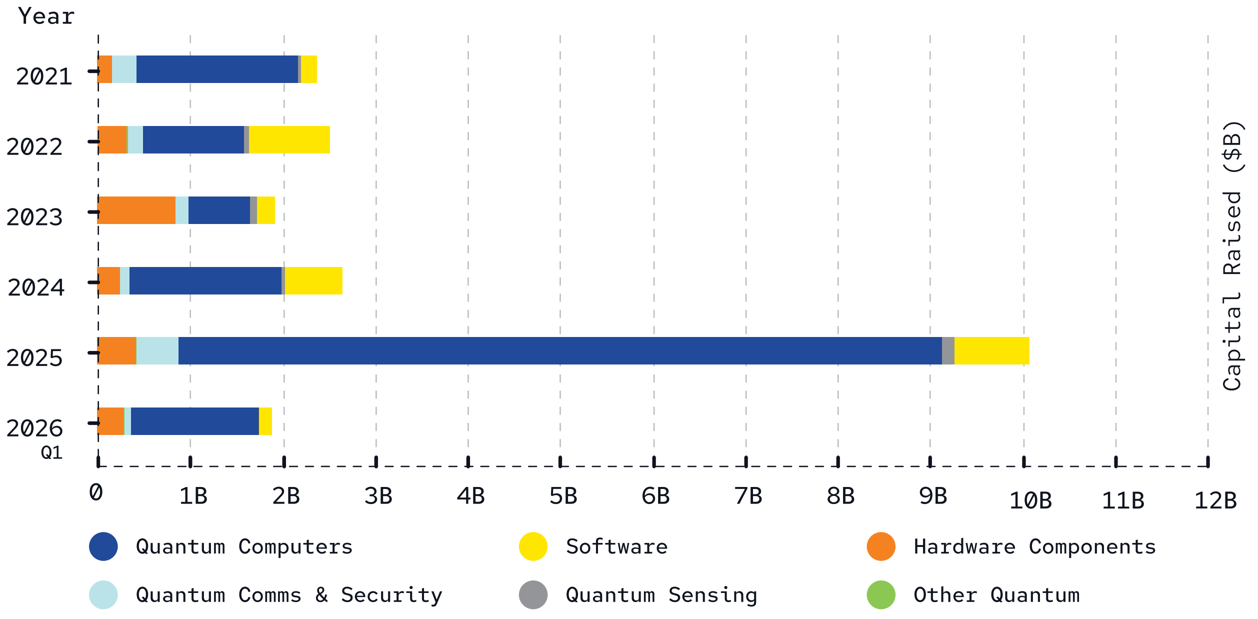


Figure 8: *Total capital raised in quantum technologies by segment, 2021–Q1 2026 ($M)*

Quantum Computing investment rose sharply in 2025, reaching $8.3 billion, nearly five times the 2024 figure. IonQ's $2 billion raise explains part of the spike, but even without it, investment reached approximately $6.3 billion, the strongest underlying year on record. Even outside IonQ, 2025 was defined by a cluster of mega-rounds as investors converged on fault-tolerant quantum computing as a credible near-term thesis. The entry of strategic investors, alongside growing government co-investment, drove a change in deal size rather than deal volume.

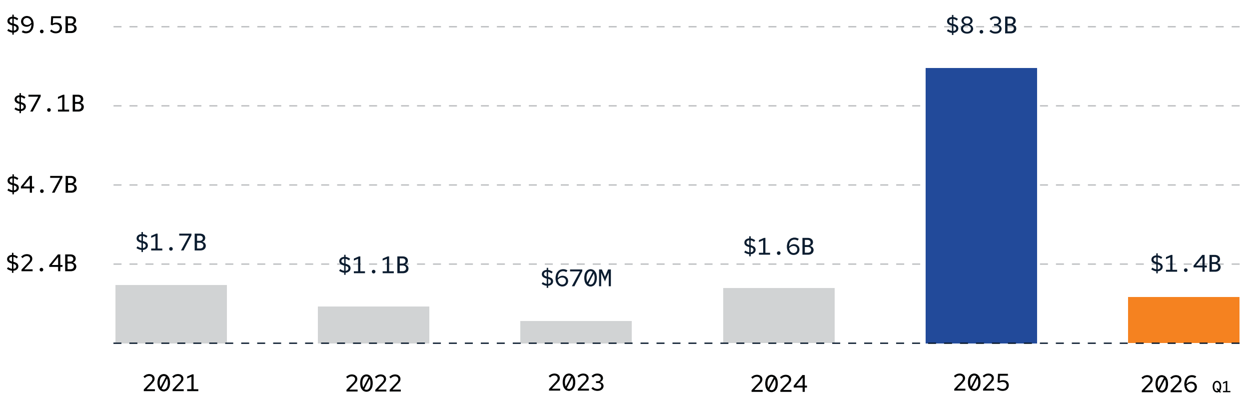


Figure 9: *Annual Quantum Computing capital raised, 2021–Q1 2026 ($M).*

17 *Deals refer to any discrete capital-raising transaction recorded against a quantum company, including venture rounds, corporate and government investment rounds, and post-IPO financing events such as follow-on public offerings, at-the-market programmes, and PIPE transactions.*

18 *Please see the Appendix Taxonomy for detailed definitions of each quantum segment*

The total number of deals demonstrates a consistent trend, with 45 Quantum Computing deals in 2025, comparable to 46 in 2024. The increase in capital was primarily attributable to the size of deals, rather than the number of deals executed.

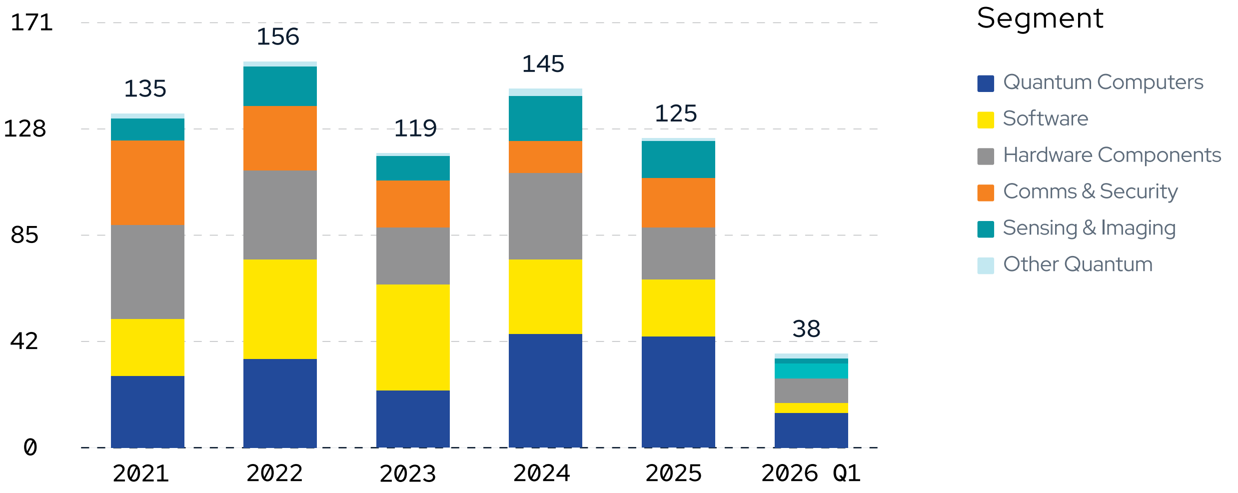


Figure 10: *Quantum deals by segment, 2021–Q1 2026.*

Across all segments, total rounds fell modestly from 145 in 2024 to 125 in 2025, while total capital more than tripled. Within that picture, two segment-level moves stand out. Hardware Components rounds dropped sharply from 35 to 21, consistent with a market where the infrastructure layer is consolidating around existing players. Quantum Communications and Security moved in the opposite direction, rising from 13 rounds in 2024 to 20 in 2025, its highest count since 2021 and a signal that urgency around post-quantum cryptography is translating into active deal flow.

National Programs and HPC-Quantum Integration

32

HPC-Quantum National Deployments since 2025

(2025 - 2026 Q1)

14

Countries involved

(2025 - 2026 Q1)

66%

EMEA Share of National Projects

(2025 - 2026 Q1)

19

Vendors involved

(2025 - 2026 Q1)

More than 30 HPC quantum programs have been launched since 2025. These government-led programs bring High-Performance Computing and Quantum Computing together as a coordinated capability, treating quantum processors as specialized accelerators alongside classical supercomputers. They typically fund quantum hardware at supercomputing centers, hybrid software tools, benchmarking, workforce development, and applied research in areas such as chemistry, materials science, optimization, and cryptography. Examples include EuroHPC procurements, Germany's QSolid and EPIQ, Finland's Quantum Technology Strategy, Spain's Quantum Spain, and India's National Quantum Mission.

Top 5 vendors by quantum computers deployed at national HPC centers

IQM leads national HPC-quantum vendor activity by a substantial margin, with nine deployments across six countries between 2025 and Q1 2026, three times the figure recorded by the next closest vendor. Pasqal follows with three contracts; Quandela, Quantinuum, and Qilimanjaro each recorded two.[19]

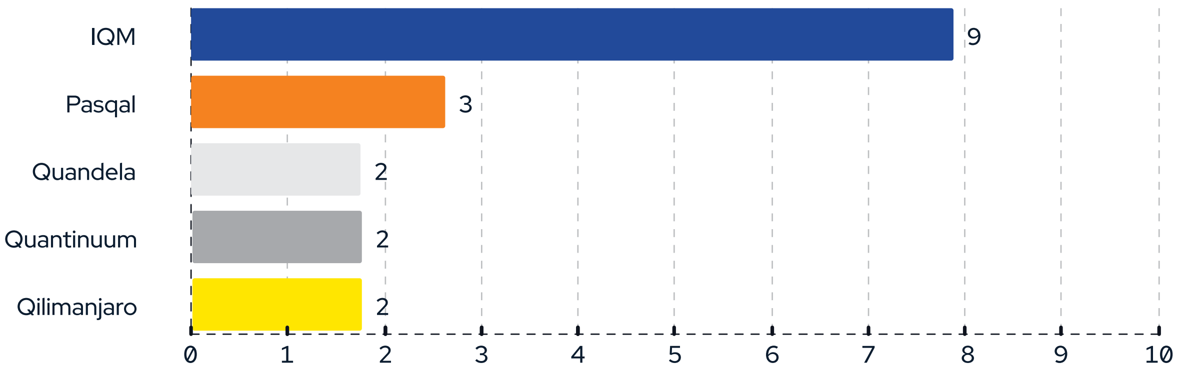


Figure 11: *Quantum Computers deployments at national HPC centers by vendor, top 5, 2025-Q1 2026.*

Recent highlights by Region

Table 5: *Recent national and institutional quantum-HPC integration initiatives by region (2025–2026 Q1)*

EMEA

Germany	May 2026: IQM launched its HPC Integration Service, enabling Radiance quantum computers to operate as Slurm nodes inside HPC environments, already running in production at the Leibniz Supercomputing Center (LRZ) where IQM has four systems installed.	Source
France	April 2026: Quandela's Lucy, the world's most powerful photonic quantum computer, was inaugurated and coupled to GENCI's Joliot-Curie supercomputer at CEA's TGCC, the fourth EuroHPC quantum computer to come online.	Source
Spain	December 2025: CESGA, IQM and Telefónica announced deployment of a 54-qubit IQM Radiance by June 2026, integrated with the Finisterrae IV AI-supercomputer, Spain's first production-grade quantum-HPC integration.	Source

AMER

United States	November 2025: ORNL, NVIDIA and HPE announced a new hybrid quantum-HPC platform on an NVIDIA GB200 NVL72 system, installing early 2026 at the OLCF data center next to Frontier, linked to ORNL's IQM and Quantum Brilliance quantum computers via NVQLink.	Source
Canada	October 2025: Anyon Technologies (Montreal) announced support for NVIDIA NVQLink and CUDA-Q to extend existing HPC and AI data centers into accelerated quantum-AI supercomputers	Source

[19] *This chapter considers only deployments of on-premises quantum computers at national high-performance computing (HPC) centers. Installations at universities, corporate data centers, commercial innovation hubs, and defense or mission-specific laboratories are excluded from the scope. Although the aim is track all qualifying deployments, some may not yet be captured. Based on public available information.*

APAC

Japan	April 2026: Quantinuum announced an upgrade to its System Model H2 (56 qubits) on Reimei-Fugaku, RIKEN's hybrid quantum-supercomputer platform launched Spring 2025 and coordinated by RIKEN's Quantum-HPC Hybrid Platform Division.	Source
India	December 2025: India launched National Supercomputing Mission 2.0 at Supercomputing India 2025, providing a unified roadmap that explicitly integrates HPC, AI and Quantum Computing	Source

Selected 2026 to 2027 deployments to watch

Finland's VTT will deploy an IQM Radiance 300-qubit system in late 2027, the largest publicly announced European integration to date, capping a four-step capability ladder from 5 to 300 qubits.

Germany's LRZ will install an IQM Radiance 150q in late 2026, building on the EuroQX 54q system active since early 2026.

Italy's CINECA brings the Pasqal 140q EuroQCS-Italy system online in Q1 2026, joining the IQM Radiance 54q already active in Bologna since Q4 2025.

France's GENCI/ CEA-TGCC adds Lucy (Quandela 12q photonic) in April 2026, the third EuroHPC integration at the site after Belenos and Ruby.

Spain's CESGA pairs an IQM Radiance 54q with a Spark 5q in June 2026, a dual-system deployment designed to bridge user training and production research.

South Korea's KISTI deploys an IonQ Tempo 100q trapped ion system in early 2026, the first major trapped ion procurement in APAC outside Japan.

India's C-DAC brings a Rigetti Cepheus 108q online in H2 2026, the first significant South Asian HPC-quantum integration outside the established Japanese and Korean programs.

Regional Perspectives: AMER vs EMEA vs APAC

EMEA accounts for the largest share of new quantum computing companies founded between 2021 and Q1 2026, at 53% of the total. APAC follows at 29%, while AMER represents 18%. Company formation activity is therefore heavily concentrated in EMEA, reflecting the scale and density of the European quantum ecosystem over this period.

Since 2021, most new quantum computing companies have emerged from EMEA

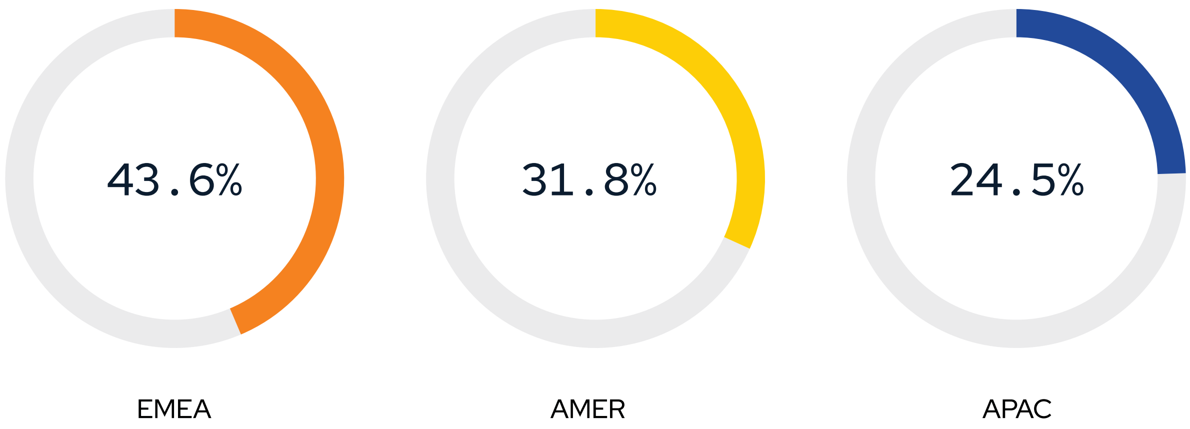


Figure 12: *Regional share of new QC Companies by Region; 2021 - Q1 2026*

Quantum Computing investments perspective

AMER dominates quantum capital raised, accounting for $10.4B of the $14.8B deployed between 2021 and Q1 2026, or 70% of all capital. EMEA attracted $3.5B; APAC $889M.

In 2025, AMER alone accounted for approximately 80% of all Quantum Computing investment that year, with $6.6B of a total $8.3B deployed globally. The headline is largely a function of a handful of mega-rounds (IonQ's $2B raise being the most prominent, as already discussed) rather than a broad-based acceleration in deal activity. Round count held flat year-on-year; it was deal size, not deal volume, that drove the spike.

These figures are based on publicly disclosed transactions and are therefore likely to understate AMER's true share. A meaningful portion of US government and defense-related quantum contracts, including Department of Defense and intelligence community programs, are classified or otherwise not publicly reportable. To the extent that such transactions exist at scale, they would increase AMER's effective share of both contract volume and capital deployed beyond what the data presented here reflects.

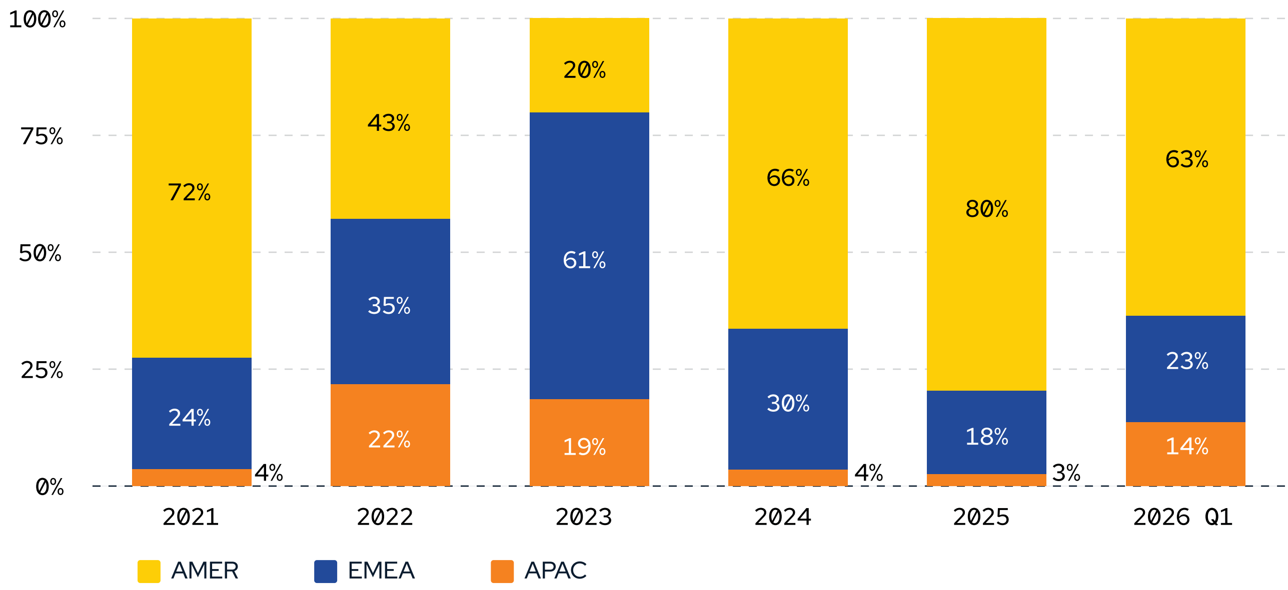


Figure 13: *Regional share of Quantum Computing capital raised by year, 2021–Q1 2026*

Quantum Computing deals perspective

Quantum computing deal volume is more evenly distributed across regions than capital figures suggest. From 2021 through Q1 2026, EMEA narrowly leads with 77 deals, or 40% of the 193 total recorded in the period, ahead of AMER with 75 deals, or 39%, and APAC with 41 deals, or 21%. The contrast with capital concentration is significant: AMER accounts for 70% of cumulative capital raised while holding less than 40% of deal volume, confirming that the headline dollar figures are driven by deal size rather than deal frequency.

The annual breakdown reveals a shifting balance. EMEA led consistently from 2021 to 2023, recording between 14 and 17 deals per year while AMER activity dipped to just four deals in 2023. AMER reasserted itself strongly in 2024 and 2025, recording 22 and 19 deals respectively, its two most active years in the dataset. APAC has shown the clearest directional trend, rising from four deals in 2021 to twelve in 2025, its strongest year on record and a signal that the region is becoming a more active participant in quantum financing activity rather than a peripheral one.

The overall picture is of a market where deal-making is genuinely global, even if the largest cheques remain concentrated in one region.

Quantum deal activity remains active across all three regions

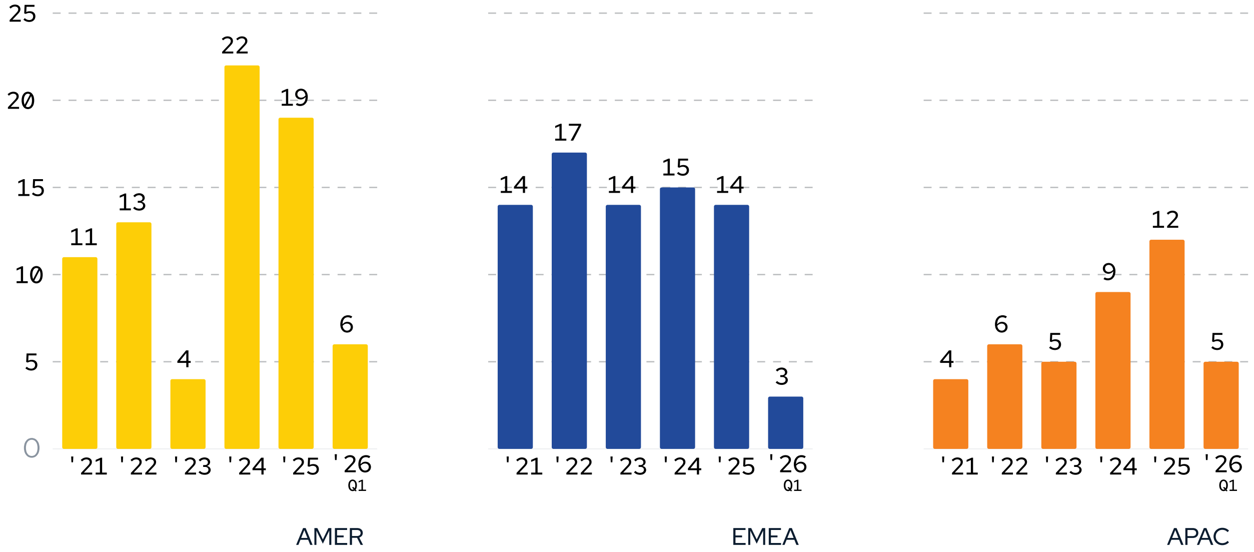


Figure 14: *Number of Quantum Computing deals by region and year, 2021–Q1 2026.*

HPC-Quantum Computing programs perspective

Since 2025, EMEA has led all regions in national HPC-quantum deployments, recording 21 quantum computer installations at national HPC centers through Q1 2026, accounting for 66% of the global total of 32 deployments. APAC follows with nine deployments, representing 28% of the total, while AMER records two, or 6%. The gap between EMEA and the other two regions is substantial: EMEA's deployment count exceeds the combined APAC and AMER total by ten installations.

EMEA's lead is anchored by the EuroHPC Joint Undertaking, the European Commission's coordinated programme for procuring and deploying quantum systems at national supercomputing centers across member states. EuroHPC provides a multi-year co-funding model shared between the EU, national governments, and federal ministries, which has enabled a structured capability ladder across facilities in Germany, Finland, Spain, France, and Italy rather than isolated one-off deployments. This procurement architecture is a primary structural reason why EMEA's deployment count is so disproportionate relative to its share of global quantum capital raised.

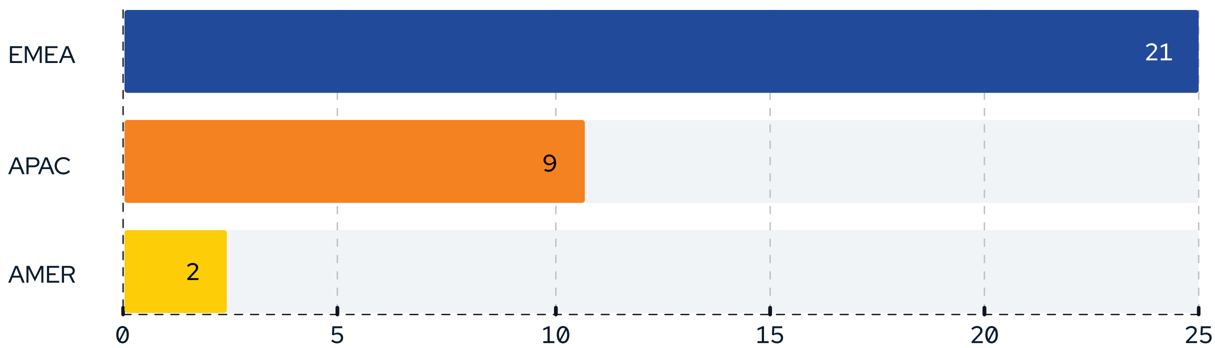


Figure 15: *Regional distribution of Quantum Computer deployments at national HPC centers since 2025*

Theme III

Current State of Customer Adoption – Procurement and Purchasing Patterns

Customer adoption in 2026 is moving at different speeds across buyer groups. Public-sector and research-infrastructure buyers are shifting from exploratory pilots to structured, multi-year capability building, shaped by sovereignty requirements, open-system access, HPC integration and workforce capacity. Industry adoption is broader but less mature: among 70 industry respondents, 89% report hands-on quantum engagement, yet most activity remains concentrated in experimentation, pilots and use-case discovery rather than production deployment. The gap is no longer explained by hardware maturity alone; it also reflects organizational barriers, skills shortages, unclear business cases and uncertainty over when quantum will deliver operational value.

Infrastructure and Public Sector

Public-sector and research-infrastructure buyers remain the main source of recorded quantum procurement activity. Over the past 18 months, their buying behavior has become more structured: buyers are no longer evaluating quantum systems only as exploratory pilots, but as part of longer-term infrastructure, sovereignty and workforce strategies. Four patterns now shape this part of the market: the balance between cloud and on-premises access, the shift from pilots to repeat buying, the rise of sovereignty requirements and the importance of open-system architecture.

1. Cloud versus on-premises is a usage decision, not just an obsolescence question

Interview evidence highlights why choosing between cloud and on-premises solutions is increasingly complex. Modern quantum hardware can become outdated and lose value quickly, making ownership hard to justify as systems continue to advance rapidly. But cloud access is not automatically cheaper at a research scale. For institutions supporting regular use by multiple researchers, reserved or dedicated cloud access can also become expensive.

> " With the current prices for accessing reserved instances on quantum computers or acquiring dedicated access, supporting just ten scientists each day for a few hours can amount to $100k per day. So, having a system on-premises is something we're still looking at. If it's not too expensive, it might be cheaper than accessing it through the cloud"
>
> **– Ugo Varetto**

The procurement implication is that cloud versus ownership is not a fixed preference. It depends on expected usage volume, required access model and the buyer's time horizon. For low-usage or exploratory customers, cloud and managed access reduce capital risk. For high-usage research institutions, on-premises ownership can become more attractive where the system supports sustained use, workforce development and local integration. Flexibility across access models therefore matters for vendors, rather than a single default route to market.

2. Procurement is moving from pilots to staged capability building

One of the clearest shifts in 2026 is that some public-sector and research-infrastructure buyers are planning procurement as staged capability building rather than isolated pilots. These purchases sit within multi-year ladders, as institutions expand from small training and test systems toward larger research infrastructure. VTT and LRZ illustrate the pattern: VTT's roadmap runs from 5 to 20, 150 and 300 qubits, while LRZ's sequence moves from 20 to 54 qubits, with a 150-qubit system planned by the end of 2026.

> // From March we started offering Euro-Q-Exa System 1, IQM's 54-qubit system, to our users. For us this was a remarkable jump, and we are going to extend the offering with a 150 qubit computer by the end of this year [2026] ”
>
> **– Luigi Iapichino**

This pattern is still concentrated in HPC and sovereign research procurement. Industry pilots have not yet been converted into structured, recurring contracts at a comparable scale. Multi-year public-sector deals are important, but they should not be read as evidence of a self-sustaining commercial revenue base for quantum hardware.

3. Sovereignty requirements are becoming procurement gates

Sovereignty is becoming a more explicit part of quantum procurement. In Europe, public quantum infrastructure programs place strong emphasis on sovereign hosting, access and control. Similar considerations are emerging in other regions, including the Gulf, where local presence can form part of how vendors are assessed.

For vendors, the implication is that market access increasingly depends on local operating capability, not just product fit. A local entity, local support capacity and host-country service capability can determine whether a vendor is taken seriously before the formal bid process begins. Geographic footprint is becoming part of quantum go-to-market strategy, not just a regional sales decision.

4. Open-system architecture separates research infrastructure from enterprise procurement

The preference for open rather than closed systems is not a technical detail. It is a procurement signal that matters most for HPC centers and research infrastructure buyers. Across the interviews, these buyers consistently emphasize the need to interrogate the system, understand calibration states, access low-level controls, and adapt workflows to hardware-specific characteristics. For a national supercomputing center, open-system access is what allows the institution to build internal capability, integrate quantum into its software environment, and validate experimental results. In this context, a black-box system is not just inconvenient; it can be incompatible with the buyer's research mandate.

This is not only a procurement preference. The interviews show it is also how the ecosystem improves. When HPC center have genuine access to the systems they operate, they become active contributors to the vendor's development process, surfacing bugs, identifying failures, and feeding requirements back into the product roadmap. The relationship between an open-system vendor and an engaged HPC center is not a standard customer-supplier dynamic; it is a co-development one, and the quality of that relationship directly shapes how quickly the technology matures for the wider user base.

> **"** With our first quantum computer, we helped the vendor improve their systems because we detected errors, failures, and bugs. We are the ones using it. The collaboration is very important for both sides. We can work together, articulate what we actually need, and move toward the kind of system we have in mind."
> **– Lois Orosa**

> **"** If I am purchasing a system with a few qubits, 5, 10, it would be great to have this machine fully controllable. As a researcher, I want to control the pulses and the gates and run my own experiments. I would always prefer a system with transparent walls, one that students can look inside."
> **– Alex Krasnok**

> **"** I have a strong aversion to vendors and modalities that reveal very little about how and when calibration is performed, or about the specific system on which experiments are running. The more transparency a vendor can offer about the underlying hardware, the more useful the platform becomes. Openness is always an improvement."
> **– Alexey Galda**

Enterprise Adoption

Based on survey data from 70 industry respondents, enterprise quantum activity in 2026 is widespread but still limited in depth. 89% report hands-on engagement, with pilots running across all major verticals. Yet signed contracts remain dominated by sovereign and research buyers, while most enterprise activity remains concentrated in pilots, proofs of concept and use-case exploration. The market is not short of interest; it is short of clear evidence of quantum advantage. This section examines where enterprise buyers stand today, how they access quantum systems, how they manage vendor and modality risk and what drives hardware-provider selection.

1. Commercial buyers are active, but still waiting for quantum advantage

Today's actual paid contracts still sit with sovereign rather than commercial buyers, and that distorts the apparent commercial demand picture.

> "Quantum advantage means business advantage in the end. You need to connect the theoretical idea to the actual business. We are building cars, and for us, that means translating a quantum algorithm all the way to a tangible cost saving or a better product. At BMW, we have deliberately chosen an application-first strategy, aligned with top management, to build the necessary capabilities and capture quantum's business value as it emerges."
>
> **— Ralf Nieschulz**

The survey shows that most commercial organizations are investing in quantum for strategic positioning and learning, but there is no proven business advantage yet. A large majority of frame their spend as strategic/competitive positioning and benchmarking against classical methods, while only about a third point to an early production use case, and very few lack a justification framework altogether, confirming that buyers are active but still essentially in a preparation and options-building phase rather than scaling quantified ROI.

How does your organization currently justify investment in quantum? (multiple choice)

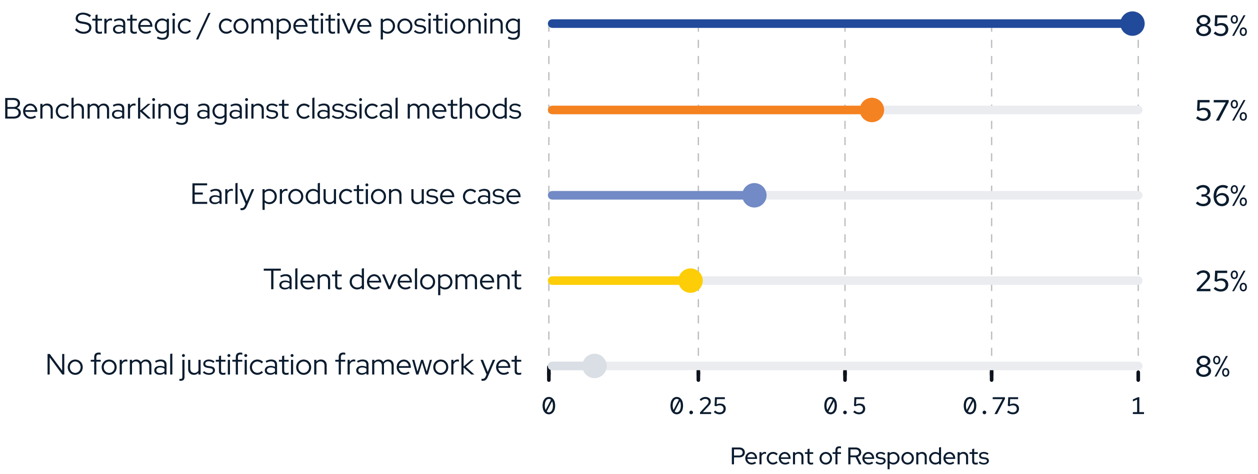


Figure 16: *Organizations' current justification for quantum investments*

High levels of enterprise engagement should not be read as evidence of scaled commercial demand. Most paid Quantum Computing contracts still sit with sovereign and research buyers, not commercial enterprises. Among industry respondents, 56% are focused on exploratory pilots or proofs of concept, and an additional 27% are managing multiple pilot programs. Only 10% report limited production use, while 3% have reached broad or scaled deployment. A further 4% are still monitoring the market without active projects.

What is your current stage of quantum adoption?

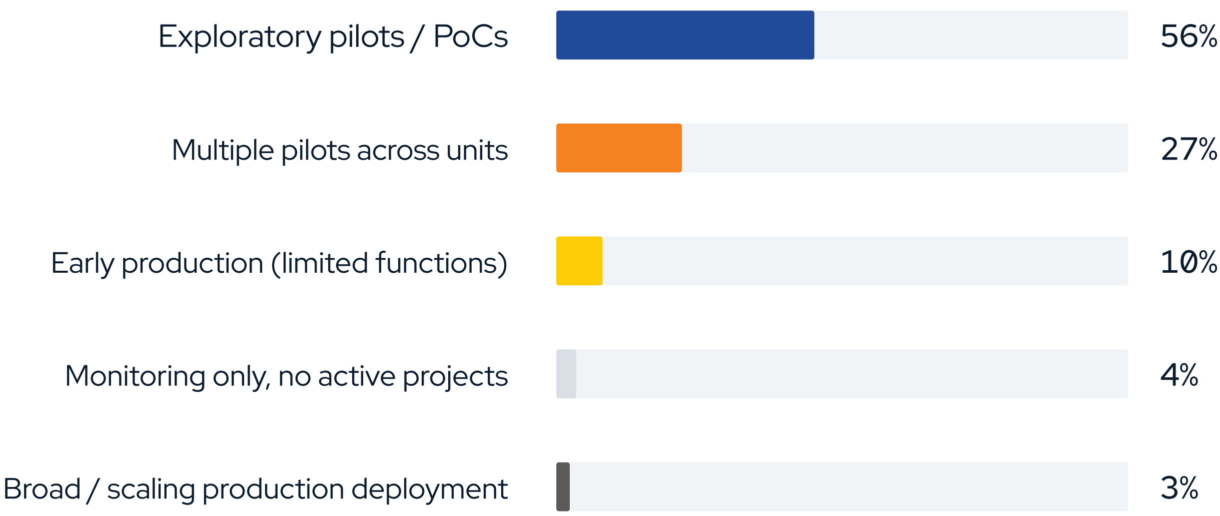


Figure 17: *Organizations' current stage of engagement with Quantum Computing (survey results)*

These multi-year capability ladders complicate the view that public procurement generates only one-off contracts. When an institution moves from a 5-qubit training system to 20-, 54-, 150-, and 300-qubit deployments with the same vendor over successive cycles, the pattern is closer to staged repeat procurement from an anchor customer than to isolated pilots, even as broad commercial recurrence across the wider market remains unproven.

> Repeatable revenue will begin to materialise when paid pilots evolve into structured, recurring contracts. Financial services, pharma, and new materials are the sectors most likely to drive that transition — they have the budgets and the use-case pressure to act."
>
> **— Manjari Chandran-Ramesh**

2. Machine learning and optimization are the most active areas of interest

Organizations are concentrating their quantum efforts primarily on machine learning/AI augmentation (79%) and optimization (66%), with security (44%) also emerging as a significant focus area. Simulation (37%) and cryptography (34%) show meaningful but comparatively lower levels of activity.

Which use case are you actively exploring or implementing? (multiple choice)

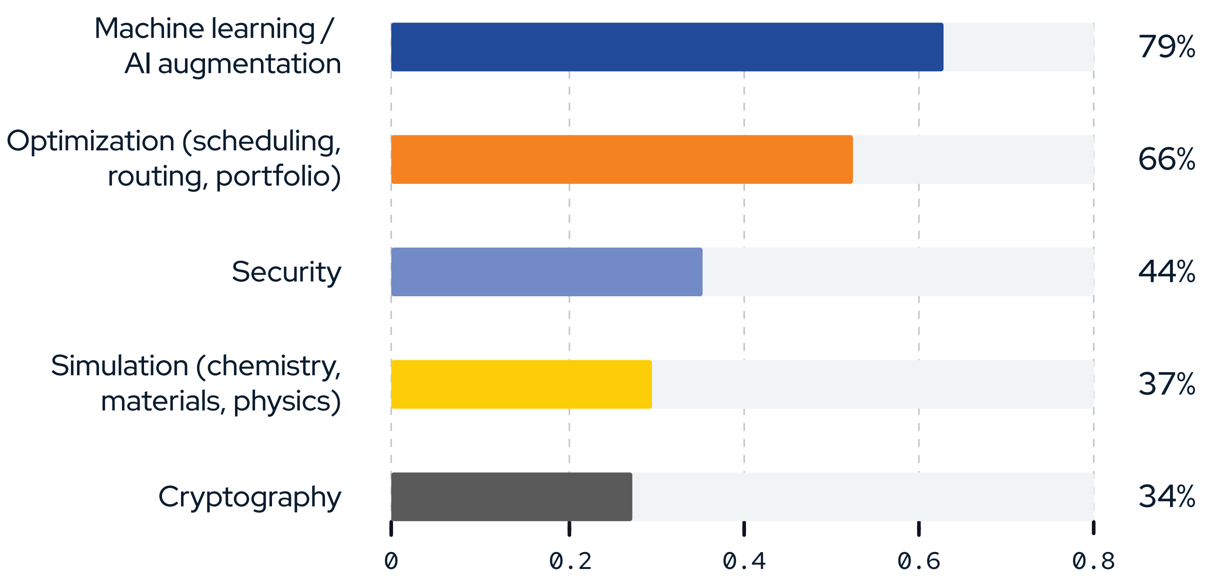


Figure 18: Quantum use case areas actively explored or implemented by respondents (% of respondents, multiple choice)

This is consistent with the broader technology investment picture, where AI/ML is also the main area in which quantum-related organizations report having dedicated budget, staff, or active pilot programs.

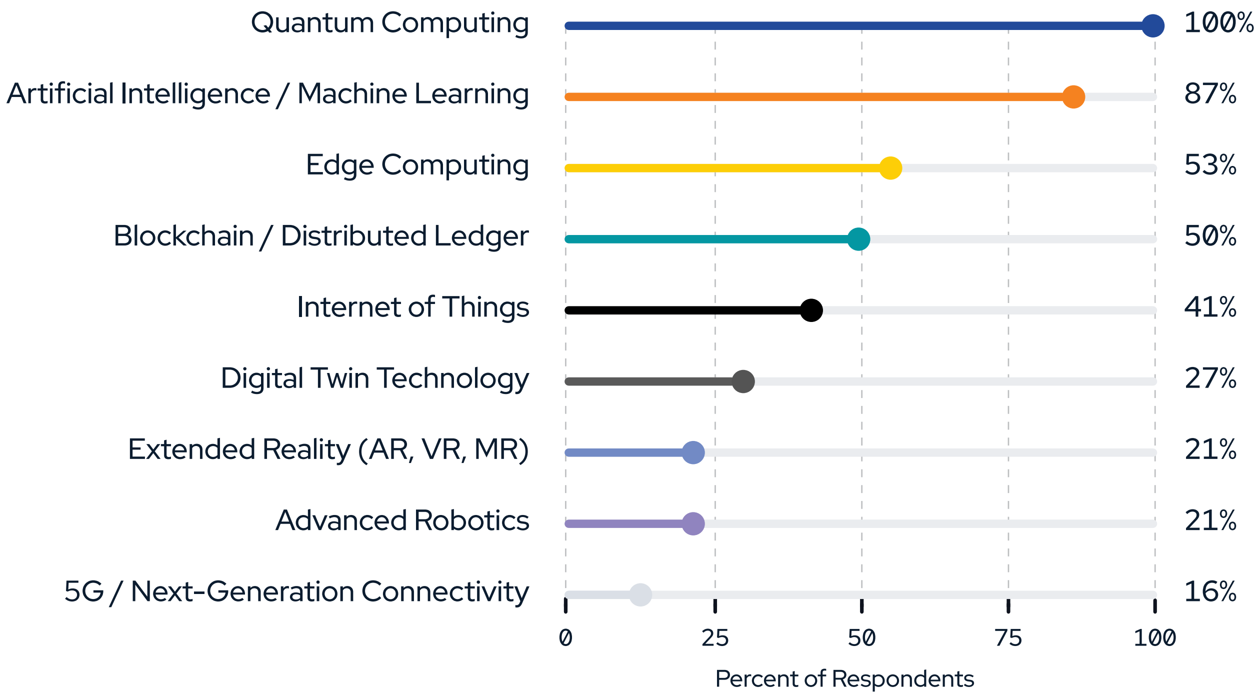


Figure 19: *Share of respondents reporting dedicated budget, staff, or active pilot programme by technology area (% of respondents, multiple choice)*

> "The most mature use case today is in materials science, particularly across batteries, fuel cells, and advanced materials. These applications combine AI and Quantum Computing, AI for pre- and post-processing, and quantum methods for core computations. This is where we are currently seeing the most concrete progress."
>
> **– Chandan Kumar**

3. Cloud access dominates today

Cloud remains the main entry point for enterprise quantum adoption. Among industry respondents, 56% rely on public cloud platforms such as IBM Quantum, Amazon Braket and Azure Quantum. At the same time, 27% already use hybrid access models, while smaller shares report on-premises or dedicated access. This suggests that most organizations still use cloud for exploration, but a subset is beginning to look for more control, deeper integration and a longer-term infrastructure capability.

From the interviews, two criteria emerge as primary determinants of cloud platform selection:

Hardware transparency:
visibility into calibration timing, qubit health, and system identity is essential for reproducible results. Some practitioners schedule job submissions around known calibration windows to optimise output quality.

Data residency and regulatory compliance:
where data is processed and stored matters, particularly for organisations subject to GDPR or sector-specific data regulations. Cloud platforms that cannot guarantee data stays within a given jurisdiction introduce compliance risk that can disqualify them from consideration entirely.

Which quantum access model(s) does your organization currently use?

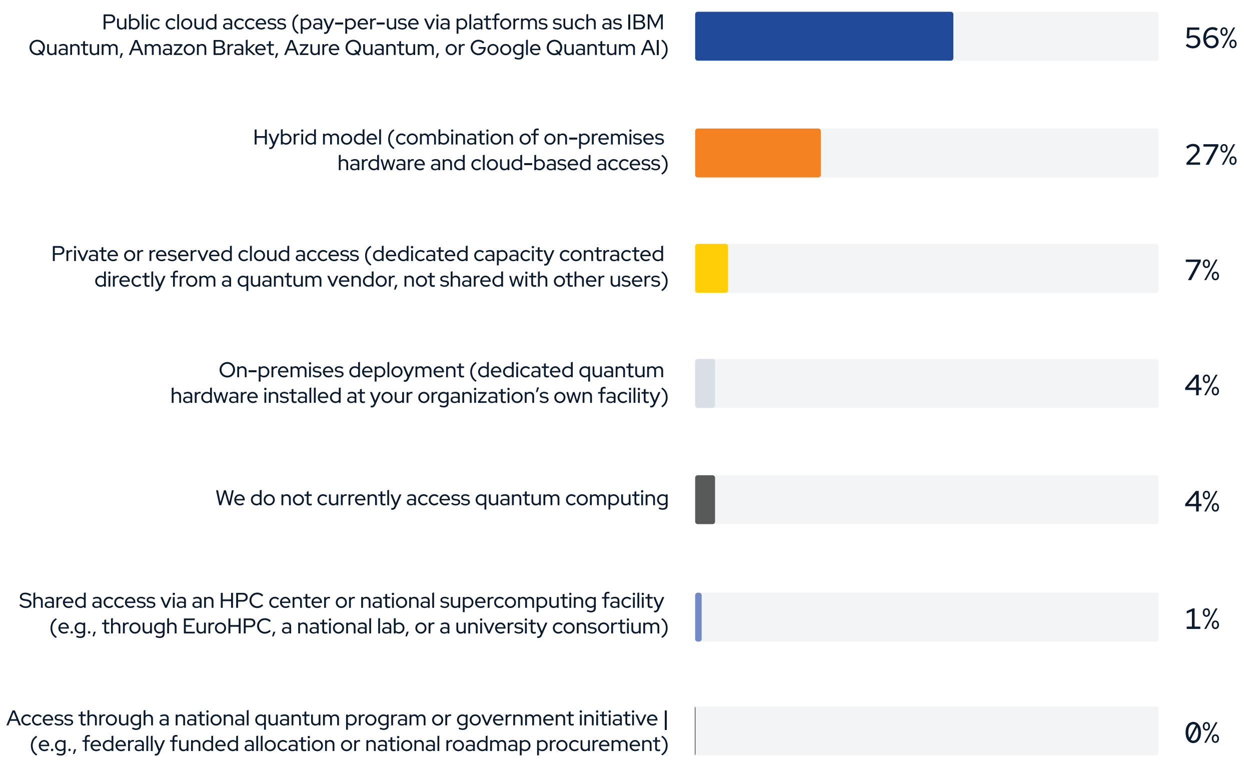


Figure 20: *Current quantum access model distribution among survey respondents (% of respondents)*

4. Obsolescence remains a real concern

Obsolescence remains a real concern, but it may not be a permanent barrier to ownership. The more important question is whether vendors can design systems that allow customers to upgrade key components over time, rather than replace the full machine at each hardware generation.

As one academic leader framed it:

> If you buy now, can you upgrade in a few years, or are you committing to a full replacement at an order of magnitude higher cost?"
>
> **— Ian Walmsley**

That design question matters beyond universities and research centers. Any organization considering sustained quantum investment needs a way to build capability without taking on the full risk of each hardware cycle.

5. Hybrid access is the preferred destination, anchored on operated infrastructure

Over the next three years, hybrid access, combining on-premises and cloud, becomes the preferred deployment model at 34%. Public cloud falls to 24%, private cloud sits at 23%, on-premises standalone at 12% and HPC-integrated access at 7%. Taken together, the two models that include on-premises infrastructure: hybrid (on-premises plus cloud) at 34% and standalone on-premises at 12%, account for roughly 46% of buyers, compared with 24% favoring public cloud alone. On-premises infrastructure, whether standalone or as the anchor of a hybrid model, remains central to how the most engaged buyers plan to deploy.

Over the next 3 years, what is your preferred primary deployment model?

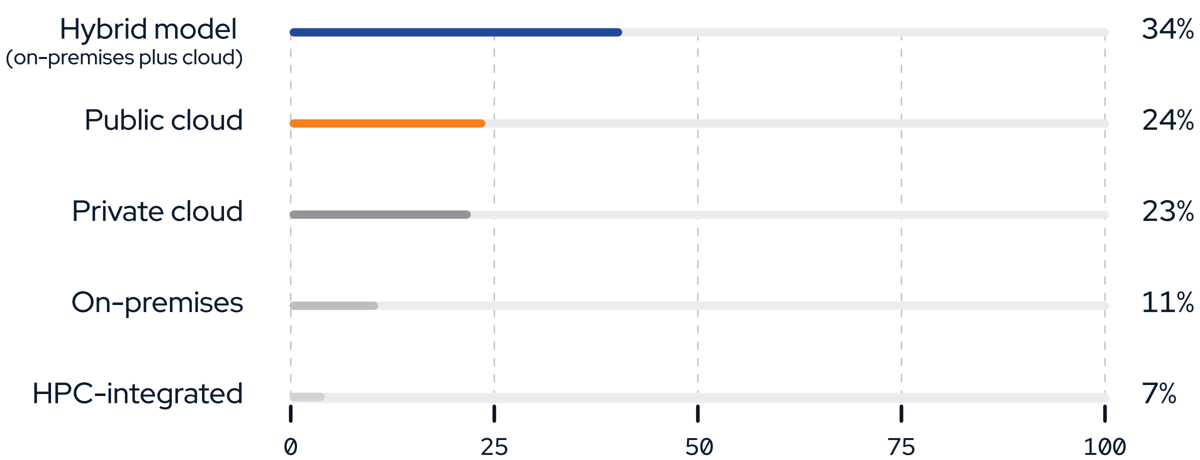


Figure 21: *Respondents' preferred primary quantum deployment model over the next three years (% of respondents)*

> On-premises deployment remains fully justified relative to cloud for a number of technical and non-technical reasons, although it will not be the only model. HPC centers will require a mix of on-premises systems, access to quantum resources at other centers through regional or national networks, and cloud-based solutions for certain users and application profiles. For portions of the user community, on-premises infrastructure is absolutely necessary. The key is to align technology profiles with user requirements and design services accordingly."
>
> **– Ian Walmsley**

6. Buyers are hedging across modalities

Survey evidence shows that buyers are still spreading their activity across multiple quantum modalities. Superconducting is the most widely evaluated or used, at 64% of respondents, consistent with its lead in recorded QPU sales. But engagement is not limited to one architecture: quantum annealing, photonic, trapped ion and neutral atom technologies all register substantial activity, with no clear winner emerging behind superconducting. Buyers are keeping multiple hardware options in play, rather than committing to a single architecture before the hardware picture becomes clearer.

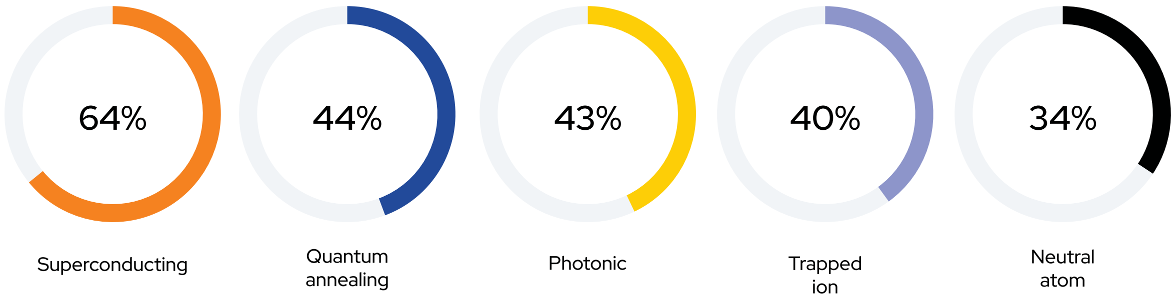


Figure 22: *Qubit modalities actively evaluated or used by respondents (% of respondents, multiple choice)*

> Our general approach is to remain as hardware-agnostic as possible, given that the competitive landscape across modalities remains genuinely open."
>
> **– Jasper Simon Krauser**

> Superconducting technology offers a credible scaling path and features prominently in roadmaps toward fault-tolerant systems. At the same time, we keep space to experiment with other technologies through cloud access, because the winner has not yet been determined."
>
> **– Jacek Michalski**

7. Vendor selection depends on performance and partnership depth

What the survey shows

QPU performance is the leading selection criterion, cited by 70% of respondents, followed by price at 53%. Access model flexibility ranks third at 46%, while vendor credibility and data sovereignty are each cited by 41%; integration support follows at 36%. On the surface, this suggests a technical and cost-led procurement process. The interviews add a further nuance: buyers are not only choosing hardware specifications (for both cloud and on-premise access), they are also assessing whether a vendor can support a sustained working relationship.

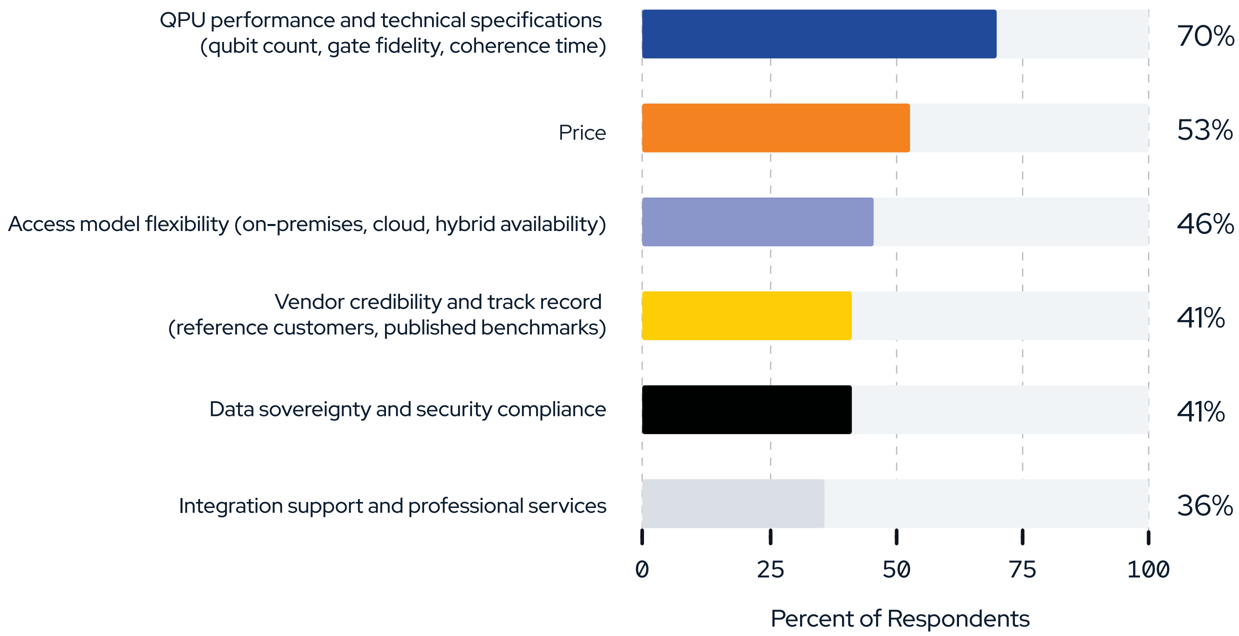


Figure 23: *Top criteria driving quantum hardware provider selection (% of respondents, multiple choice)*

What the interviews show

Across 19 interviews, a consistent theme emerges that the survey alone does not fully capture: buyers do not treat quantum procurement as a standard technology purchase. They see it as the start of a joint development relationship. This is especially true while the market remains in pilot mode. Buyers are evaluating multiple modalities, and the investment case is still being made more on strategic positioning than measurable near-term return: 85% of respondents cite strategic positioning as a primary investment justification, compared with 36% who cite an early production use case. In this context, buyers are looking for co-engineering support rather than an appliance-style sale. Sovereignty also remains a procurement consideration, particularly for public-sector and research-infrastructure buyers.

Three procurement priorities emerge from the combined survey and interview evidence:

1. **Technical fit is the entry point.** QPU performance and price dominate the survey because buyers use them as first-order screening criteria. Vendors that do not meet these thresholds are unlikely to reach deeper technical or partnership discussions.

2. **Openness is becoming a differentiator.** Access to calibration data, lower-level system controls, circuit compilation visibility and system behavior is no longer only a niche academic request. For research and technically advanced buyers, it can shape whether a vendor is seen as a credible development partner.

3. **Partnership depth drives continued engagement.** Buyers value the ability to build internal knowledge and IP through collaboration and the quality of the joint development relationship. Vendors that treat the initial contract as a one-off transaction are less well placed to secure follow-on work.

> // I want to make the black box transparent. Even if I cannot change every parameter, I want to at least look inside. As a researcher, I would prefer a five-qubit system I can fully control over a hundred-qubit machine that is a black box."
>
> **— Alex Krasnok**

> // Selecting a hardware provider first and then attempting to build a working relationship is the wrong sequence. It risks locking you into a performance framework that may not be the right one for your needs."
>
> **— Alexey Galda**

Barriers to Adoption

The survey and interview evidence point to a market where adoption barriers are not only technical.

What the survey shows

Skills shortages are the most consistent barrier across buyer types. Budget and ROI uncertainty are concentrated among commercial buyers, while hardware immaturity is most acute for technically advanced users such as supercomputing centers. The key finding is that barriers differ materially by buyer type, which means no single vendor or policy response will address them all.

Barriers to adoption by buyer type

% of respondents citing each barrier as a significant constraint to quantum adoption.

Barrier	Large Enterprise	Small & Medium Businesses	University	Gov & Nat. Lab	Super-computing
Skills / talent shortage	66%	71%	80%	70%	25%
Hardware immaturity	36%	28%	50%	60%	75%
Budget / ROI uncertainty	36%	41%	30%	10%	12%
Regulatory / compliance	21%	24%	0%	30%	38%
Organisational buy-in	19%	6%	10%	0%	12%
Absence of use cases	13%	6%	20%	20%	0%

Figure 24: *Quantum adoption barriers by buyer type (% of respondents citing each barrier as a significant constraint)*

The chart shows that adoption barriers vary significantly by buyer type. Three patterns stand out:

1. **Skills and talent shortages** are the most consistent barrier, cited by 66% or more of large enterprises, small and medium businesses, and universities. HPC Centers and Public Research Infrastructure are the exception at 50%, reflecting their more specialized technical workforce.

2. **Hardware immaturity** becomes more prominent among technically advanced buyers. It is cited by 29% to 36% of commercial buyers, but rises to 67% for HPC Centers and Public Research Infrastructure, whose workloads are more likely to test the limits of current systems.

3. **Budget and ROI uncertainty** is concentrated in commercial buyers and universities, at 36% for large enterprises, 41% for small and medium businesses and 30% for universities. It is much lower among HPC Centers and Public Research Infrastructure, where sovereign mandates and grant funding reduce the pressure for near-term ROI.

What the interviews show

Organizational barriers: workforce dominates, but decision-making also matters

Organizational barriers are the most frequently cited category overall. Two distinct constraints emerge from the interviews: a shortage of quantum-capable talent that limits what organizations can do with access they already have, and a fragmentation of internal decision-making that delays procurement even when funding and technical readiness are in place.

1. **The first is the quantum skills and workforce gap.** Most commercial organizations lack the internal capability to translate QPU access into research progress. The issue is not only headcount but training depth: engineers without quantum backgrounds face a significant ramp-up before they can contribute meaningfully, and the pipeline of practitioners who bridge physics and engineering remains thin.

> // Most engineers lack quantum training. If you ask an engineer to contribute to a quantum project today, they face a significant learning curve — typically two years to reach a working level of proficiency. That needs to change. For this field to mature into a true engineering discipline, you need physicists and engineers working together from the outset."
>
> **— Arnab Banerjee**

2. **The second is fragmented decision-making.** The interviews surface an organizational limitation not fully captured in the survey: procurement authority is often distributed across multiple internal stakeholders with different mandates and risk tolerances. This structural fragmentation can stall decisions even when the technical case and the budget are both available, creating delays that compound over procurement cycles.

> // The main obstacle is highly fragmented decision-making. One group decides what should be bought. Another group decides whether the solution should be bought at all. And yet another decides whether it will actually be paid for ... the biggest barrier is a lack of courage among the decision-makers."
>
> **— Jacek Michalski**

> // The greatest returns from additional investment would come from education and workforce development, not hardware access. Ten times as much QPU time would not move us significantly further forward. I would take that money, build a stronger team, and invest in education."
>
> **— Alexey Galda**

Technical barriers: less about qubits, more about software, algorithms, standards, and accessibility

Hardware immaturity is the second most frequently cited barrier overall, at 41%. The interviews show that the practical constraints are not qubit count or error rates alone. Three distinct technical barriers emerge consistently across the 2026 cohort.

1. **The first is algorithm design and software accessibility.** For most research and enterprise teams, the binding constraint is not the hardware platform but the absence of efficient algorithms and the difficulty of mapping real-world problems to qubits. The software stack remains too physics-intensive for non-specialists to use effectively, and the gap between simulation and hardware performance consumes significant time before any procurement decision can be meaningfully evaluated.

> Hardware is widely assumed to be the primary constraint on quantum progress. That assumption is misplaced. Our biggest bottleneck is coming up with efficient algorithms and an efficient mapping to qubits. Algorithm design is what needs to catch up."
>
> **– Alexey Galda**

> The primary technical barrier is the absence of standards, which compounds every other constraint on the list. The skills shortage follows closely in second. Cost ranks third."
>
> **– Ugo Varetto**

2. **The second is the absence of cross-vendor standards and the fragmentation it creates.** Without a portability layer comparable to MPI or OpenACC in classical computing, each vendor integration requires bespoke engineering effort. Algorithms do not transfer seamlessly between platforms, APIs and Software Development Kits (SDKs) remain proprietary, and buyers who commit to a non-interoperable vendor face rising switching costs over time. This challenge is particularly acute for HPC centers, where the software maturity timeline mismatches the hardware release cycle.

> The technology is still evolving; at the same time, building an environment that users can effectively utilize requires a mature software ecosystem. Software ecosystems naturally take longer to develop and stabilize, often requiring five to seven years to reach operational maturity. This creates an inherent tension between the pace of technological, business, and service-model evolution and the slower maturation cycle of supporting software environments. We saw the same dynamic emerge in AI, where the technology advanced faster than the software ecosystem could sustainably support."
>
> **– Laura Schulz**

3. **The third is production-grade reliability.** This was not a prominent theme in the 2025 edition but emerged clearly across the 2026 enterprise interviews. Industrial buyers expect any technology entering their operational stack to meet cloud-grade uptime and availability standards. For quantum vendors, this raises the bar beyond experimental performance: systems must become reliable enough to support production workflows continuously, not just short experimental runs.

> What we need at the end from the quantum vendors is a 24/7 system to use it in production. When you see the cloud vendors, they offer a system with an availability of 99.98%. That is what we need from the quantum vendors as well. Otherwise you can use it only for short experiments, but you cannot use it in production."
>
> **– Manfred Rieck**

> A quantum computer can only serve one user at a time – a significant constraint relative to a supercomputer, where many users run workloads in parallel. That is precisely why having more than one system makes sense, and why distributed quantum computing has become one of our active research directions."
>
> **– Lois Orosa**

Economic barriers: the harder problem is proving ROI

Budget and ROI uncertainty is the third-most-cited barrier overall, at 32%, but it matters most for commercial buyers. Two structural problems compound the challenge.

1. **The first is competition for the same budget as Gen AI:** Quantum is being evaluated alongside technologies that already deliver demonstrable business returns. For CFOs weighing a four-year horizon against tools that produce value today, the trade-off is difficult to justify. Current systems may also be overtaken within 18 to 24 months, which further weakens the case for capital commitment.

> The challenge is convincing your CFO to invest in something that will not deliver for another three to four years, when at the same time Gen AI is already here and already competing for the same budget. A lot of money is moving in that direction because it brings a business advantage today. That is the real issue for quantum right now."
>
> **– Manfred Rieck**

> Making the case to decision-makers focused on near-term returns requires framing quantum against the trajectories of semiconductors and AI. Once you present the full picture, you begin to gain serious attention."
>
> **– Saad A. Alowayyed**

2. **The second barrier is ROI uncertainty at the commitment threshold.** Organizations are not questioning whether quantum will deliver value, they are navigating the timing of when to scale beyond exploration. Pilots are underway and early use cases are developing, but the step from experimental engagement to production investment requires a clearer line of sight to returns that most commercial buyers are not yet able to draw. The barrier is not the technology; it is the absence of a shared framework for measuring quantum value against classical benchmarks.

Theme IV

Quantum Readiness Index (QRI)

The Quantum Readiness Index (QRI) measures how prepared customer organizations are to engage with Quantum Computing as the technology matures.

It does not measure quantum advantage, hardware performance, or near-term commercial value. It measures organizational readiness: whether customers have the skills, budgets, partnerships, activity, and adoption pathways needed to make use of quantum technologies.

The QRI is computed from 15 survey questions grouped across four dimensions. Each question is scored on a numeric scale based on the respondent's answer, and dimension scores are calculated as the sum of average question scores divided by the maximum possible score for that dimension. The four dimensions are then combined into a composite QRI using a weighted average, with Workforce carrying the highest weight (30%) as the most cited barrier to quantum adoption, Innovation and Investment each weighted at 25%, and Adoption at 20%, reflecting the early stage of the market. The composite score is mapped to one of five readiness tiers: Aware (0–19), Exploring (20–39), Developing (40–59), Advancing (60–79), and Leading (80–100). Scores are reported at the cohort, segment, and regional level; no individual organization is identified or ranked.

The index should be read as a maturity score, not as a literal percentage. A score of 100 describes an organization that has built a dedicated quantum workforce, holds an active and resourced IP strategy, commits a substantial and growing budget with full executive backing, and has moved beyond pilots into production deployment with established vendor relationships. A score of 0 describes an organization with no meaningful activity across any of those dimensions.

An overall score of 58 out of 100 places the surveyed customer base in the middle of the readiness curve, in the Developing tier. It shows a market that has moved beyond awareness and early exploration but is not yet prepared for scaled adoption. The 2026 scores represent a baseline, not a verdict: what matters is not where buyers stand today but how quickly readiness builds across segments over time, making future editions the true measure of market progress. The QRI is therefore used to identify where readiness is forming, where it remains thin, and which gaps could slow the transition from experimentation to practical use.

Refer to the Appendix for more details.

QRI Framework Overview

The four customer organizations

The QRI covers four types of customer organizations, each representing a distinct profile in terms of resources, mandate, and quantum maturity.

- **HPC Centers and Public Research Infrastructure** encompasses national laboratories, supercomputing centers, and government-backed research programs, with mandates to evaluate and deploy emerging technologies supported by sovereign funding and established vendor and academic partnerships.
- **Large enterprises** are large-scale private-sector organizations with more than 1,000 employees, dedicated technology functions, and internal capital to run structured quantum programs, typically approaching quantum through a combination of hiring, vendor engagement, and pilot activity.
- **Small and medium businesses** are commercially active firms with fewer than 1,000 employees, where quantum is a direct C-Suite agenda item rather than a delegated program, with access driven predominantly through public cloud platforms and a financial bottleneck that is slowing the translation from pilot activity into production deployment.
- **Universities** are academic institutions whose quantum activity tends to be concentrated in specific research groups rather than embedded across the organization, shaped by grant funding cycles and collaboration with national programs rather than commercial procurement.

The four dimensions

Table 6: *Dimensions of the quantum readiness framework*

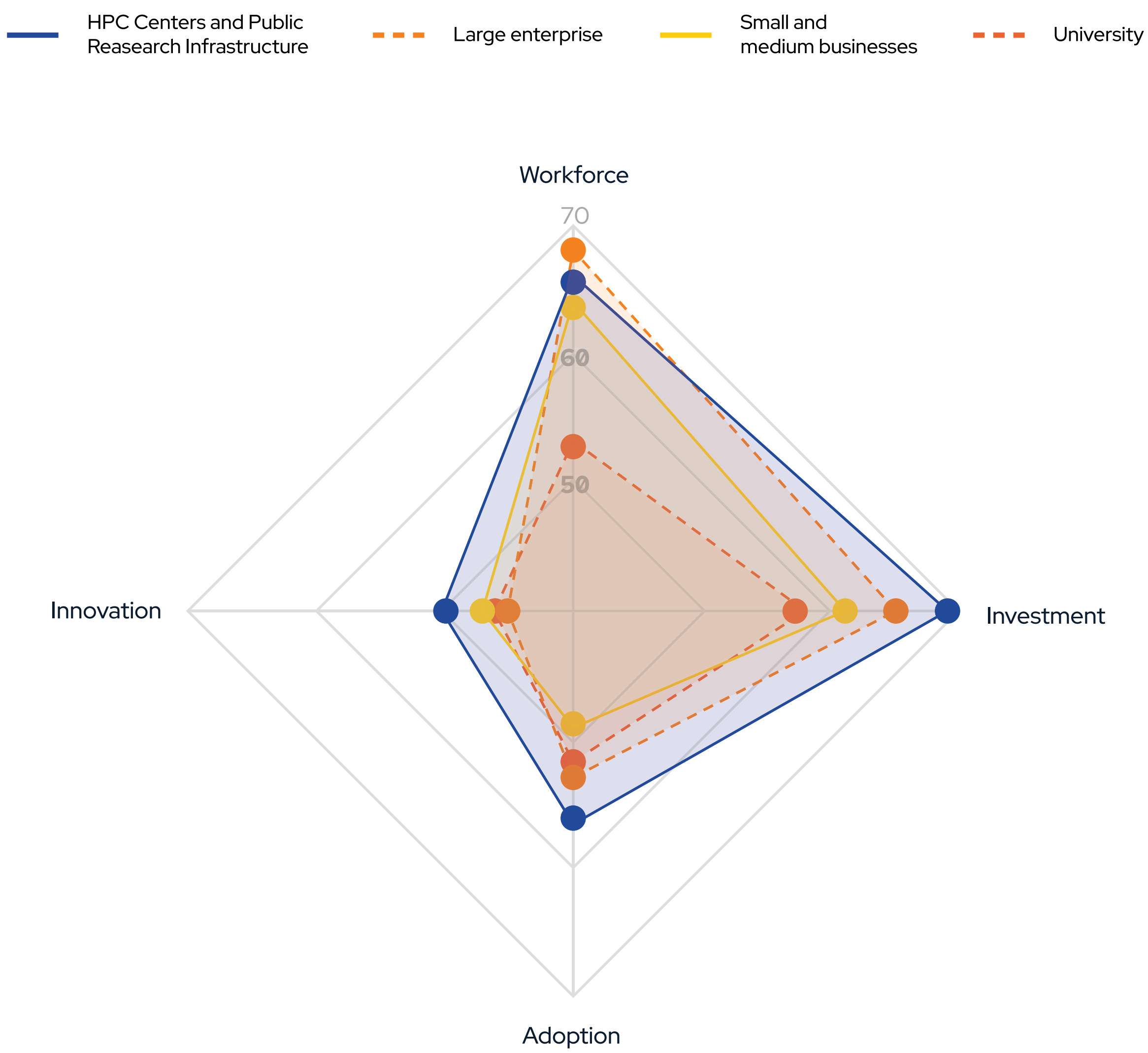
Dimension	What it measure	Why it matters	Score of 0	Score of 100
Workforce	Measures the extent to which an organization is building internal quantum capability. This includes the number of dedicated quantum roles, the training and upskilling programs in place, the trajectory of skills investmentw over the next three years, and active recruitment for quantum expertise.	Workforce is the foundation for long-term readiness. Organizations scoring highly here are moving beyond informal interest and building the people base needed to evaluate and use Quantum Computing.	No dedicated quantum roles, no training activity, no hiring, and an expected decrease or flat trajectory in quantum skills investment.	More than ten dedicated quantum FTEs, formal external training programs in place, three or more new hires in the past 12 months, and a significant planned increase in skills investment.
Innovation	Measures the organization's capacity to generate proprietary quantum output. This covers the maturity of its quantum IP strategy, active R&D collaborations with universities or national labs, and patent filing activity.	Innovation shows whether quantum activity is producing organizational learning. High scores indicate that users are not only observing the field, but developing knowledge that could support future advantage.	No IP strategy, no R&D collaborations, and no patents filed or under consideration.	An active and fully resourced IP development program, multiple formal R&D partnerships with universities or national laboratories, and three or more patents filed or granted.
Investment and Budget Intent	Measures financial commitment to Quantum Computing. This covers the current dedicated quantum budget, the expected trajectory of that budget over the next 12 to 24 months, and the level of executive or board-level support behind quantum investment.	Investment separates resourced activity from aspiration. A high score indicates that quantum has moved into planning and budget processes, not only informal exploration.	No dedicated quantum budget, no expected change in spending, and no executive or board-level awareness.	A dedicated quantum budget above $1M per year, an expected increase of more than 50% over the next 12 to 24 months, and strong multi-year executive or board-level backing.
Adoption	Measures market-facing quantum activity beyond the lab. This includes the current state of adoption, the maturity of pilot and proof-of-concept programs, the depth of engagement with quantum hardware and software vendors, procurement history, and procurement plans.	Adoption shows how far organizations have moved from internal exploration to practical engagement. High scores indicate visible activity through pilots, vendor relationships, procurement, or integration planning.	Monitoring only, with no pilots planned or underway, no vendor engagement, no procurement history, and no procurement plans.	Active scaling beyond early production, multiple formal vendor engagements, on-premises or multi-year contracted procurement history, and approved procurement plans already in place.

QRI Results: Customer Type and Regional Insights

By Customer Type

Table 7: Quantum Readiness By Customer Type

	Workforce	Investment	Adoption	Innovation	QRI	Tier
HPC Centers and Public Reasearch Infrastructure	66	69	57	50	61	Advancing
Large enterprise	68	65	53	45	59	Developing
Small and medium businesses	64	61	49	47	56	Developing
University	53	58	52	46	52	Developing



HPC Centers and Public Research Infrastructure (score: 61)

Investment (69/100)

is the highest across all buyer types. 67% have budgets of $250K or above: 50% in the $250K-$1M band and 17% above $1M. 67% expect budget growth over the next 12 to 24 months, and every respondent who answered the executive support question has at least formal backing, with 33% reporting strong multi-year commitment.

Adoption (57/100)

is the highest across all buyer types. No respondent is in monitoring-only mode. 72% have at least one active pilot, 50% have multiple, and 50% maintain multiple formal vendor engagements. 44% have procured or plan to within 12 months, and 22% are already in early production.

Workforce (66/100)

65% have four or more dedicated quantum FTEs, and 35% have more than ten, the highest rate in the cohort. 61% hired quantum talent in the past 12 months, though 28% explored the market without success.

Innovation (50/100)

is the highest in the cohort. No respondent lacks an IP strategy entirely. 56% have multiple formal R&D partnerships. However, 50% have filed no patents and only 11% have an active, resourced IP development programme.

Large enterprises (score: 59)

Workforce (68/100)

is the highest across all buyer types. 61% have four or more dedicated quantum FTEs, 27% have more than ten, and 66% hired quantum talent in the past 12 months. 49% expect a significant skills increase over the next three years and 96% expect any increase.

Investment (65/100)

55% have budgets of $250K or above, with 34% in the $250K-$1M band and 21% above $1M. 83% expect budget growth, and 75% have at least formal executive support.

Adoption (53/100)

70% have at least one active pilot, 96% have some vendor engagement, and 28% have procured or plan to within 12 months. Only 15% have reached production deployment, and 49% remain at the exploratory pilot stage.

Innovation (45/100)

47% have filed no patents, only 9% have an active resourced IP programme, and just 19% maintain multiple formal R&D collaborations. 45% have a defined strategy without active development behind it.

Small and medium businesses (score: 56)

Workforce (64/100)

62% have only one to three dedicated FTEs and just 38% have four or more. 65% recruited quantum talent in the past 12 months, but 35% explored the market without hiring. 53% expect a significant skills increase, the highest of any segment.

Investment (61/100)

29% have budgets in the $250K–$1M band and no respondent exceeds $1M. 70% have no formal budget, are under discussion, or remain below $250K. 82% expect budget growth, and 41% expect increases exceeding 50%, the highest rate of any segment.

Adoption (49/100)

is the segment's primary constraint. 76% remain at the exploratory pilot stage, with only 12% running multiple pilots and 6% in early production. 53% have procured or plan to within 12 months, but 12% have no procurement plan in place.

Innovation (47/100)

53% report a defined IP strategy, the highest of any segment, and 47% maintain multiple formal R&D collaborations. Yet 59% have filed no patents and only 6% have an active resourced IP programme.

Universities (score: 52)

Investment (58/100)

80% have no formal budget, are under discussion, or remain below $250K, and 10% have no dedicated quantum budget at all. The maximum budget tier reached is $250K–$1M, by only 20% of respondents. 90% expect some budget growth, and the one respondent with an executive support response reports formal backing.

Adoption (52/100)

90% have at least one active pilot and all have some vendor engagement, but no university respondent has reached production deployment. 50% remain at the exploratory pilot stage, and 50% have procured or plan to within 12 months.

Workforce (53/100)

50% have four or more dedicated FTEs, but no respondent has more than ten. Only 30% hired quantum talent in the past 12 months, and 60% explored hiring without success, the highest rate in the cohort.

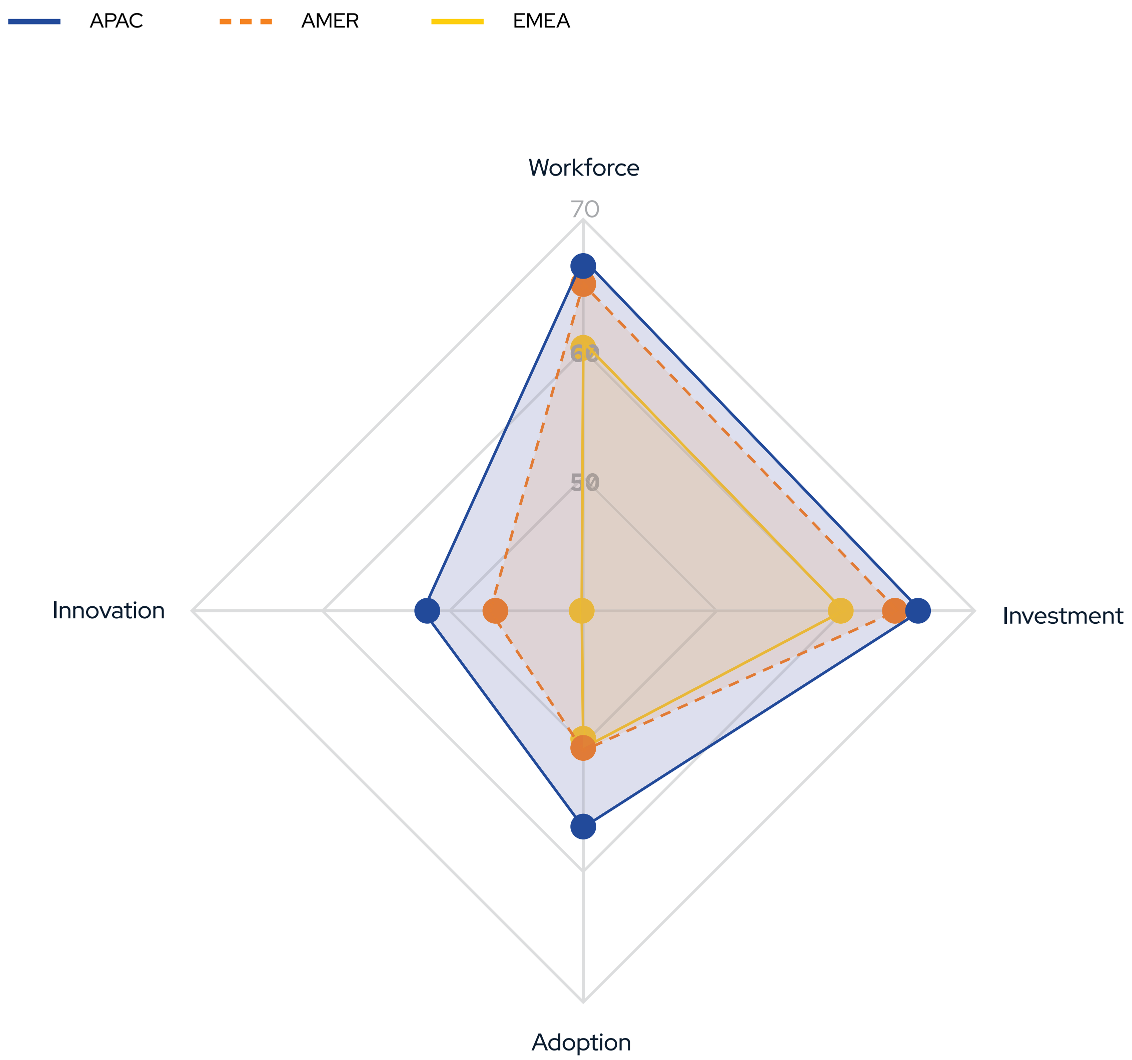
Innovation (46/100)

Only 10% have filed patents, none has three or more, and 50% have no filings. All respondents have some form of R&D collaboration, and 40% maintain multiple formal partnerships, though proprietary output remains largely absent.

By Region

Table 8: *Quantum Readiness By Region*

	Workforce	Investment	Adoption	Innovation	QRI	Tier
APAC	67	66	57	52	61	Advancing
AMER	66	65	52	47	59	Developing
EMEA	61	60	51	40	54	Developing



APAC (score: 61)

Workforce (67/100)

57% have four or more dedicated quantum FTEs, 24% have more than ten, and 68% hired quantum talent in the past 12 months. Every APAC respondent expects skills investment to grow.

Investment (66/100)

55% have budgets of $250K or above, with 32% in the $250K-$1M band and 23% above $1M. Every respondent has a dedicated quantum budget. 50% of those who answered the executive support question report strong multi-year backing, more than double the rate of AMER or EMEA.

Adoption (57/100)

is the strongest regionally. 82% have at least one active pilot, 64% have multiple, and all have some vendor engagement. 55% have procured or plan to within 12 months, the highest of any region.

Innovation (52/100)

is the sharpest regional differentiator. 18% have active resourced IP programmes, 45% maintain multiple formal R&D collaborations, and only 36% have filed no patents. All three figures are the highest in the cohort.

AMER (score: 59)

Workforce (66/100)

56% have four or more dedicated FTEs, 26% have more than ten, and 69% hired quantum talent in the past 12 months. 95% expect any increase in quantum skills investment.

Investment (65/100)

55% have budgets of $250K or above, with 38% in the $250K-$1M band and 17% above $1M. 81% expect budget growth, and 82% of those who answered the executive support question have at least formal backing.

Adoption (52/100)

69% have active pilots, 95% have some vendor engagement, and 36% have procured or plan to within 12 months. The gap versus APAC is most visible in multiple-pilot activity: 38% versus 64%.

Innovation (47/100)

48% have filed no patents, only 7% have active resourced IP programmes, and 29% maintain multiple formal R&D collaborations.

EMEA (score: 54)

Workforce (61/100)

55% have four or more dedicated FTEs, but only 46% hired quantum talent in the past 12 months. 46% explored the market without hiring, the highest rate of any region. 51% expect a significant skills increase, indicating intent that hiring activity has not yet matched.

Adoption (51/100)

66% have at least one active pilot and 97% have some vendor engagement. 29% have procured or plan to within 12 months, and no respondent has reached the scaling stage.

Investment (60/100)

37% have budgets of $250K or above, the lowest of any region. 43% operate below $250K, and only 6% exceed $1M. 80% expect budget growth, but only 11% of those who answered the executive support question report strong multi-year commitment, versus 50% in APAC.

Innovation (40/100)

is the region’s defining deficit. 63% have filed no patents, the highest rate in the cohort. Only 6% have an active resourced IP programme, only 40% maintain any formal R&D collaboration, and only 37% have a defined IP strategy.

Theme V

What Come Next – From Readiness to Impact

The findings across Themes I to IV converge on a single conclusion: quantum progress is no longer only a hardware question.

The constraint is increasingly organizational, whether customers, institutions, policymakers, universities, and investors can convert technical progress into capability they own and can use. The QRI makes the gap concrete: intent and budget are in place, but proprietary output and deployment depth lag. This section sets out the practical implications for each audience, and the choices that matter most as the market moves from experimentation toward structured deployment.

For Solution Providers

Accelerating the hardware roadmap is not enough to close the procurement gap. Procurement decisions are increasingly shaped by openness, integration depth, local support, and the ability to co-develop with customers over time.

1. **Openness is becoming a procurement baseline.**
   Buyers across HPC centers, enterprises, and research institutions expect visibility into system architecture, calibration, controls, and integration pathways. Closed-stack access is less attractive where customers need to build internal capability or integrate quantum into existing compute environments. Treating openness as optional is increasingly out of step with institutional procurement.

2. **Domain-specific evidence matters more than broad claims.**
   Buyers need to see where quantum can outperform or complement classical workflows on recognizable problems. Credible benchmark libraries around specific domains are more useful in procurement than broad market projections.

3. **Local presence is increasingly part of market access.**
   In several major markets, national presence, data residency, and host-country rules are becoming formal procurement conditions. Vendors without a local entity, in-country support, or a credible service model may not reach technical evaluation, regardless of hardware performance.

4. **Commercial models need to support long-term engagement.**
   A sale is rarely the end of the engagement; for many customers it begins a joint roadmap spanning co-engineering, support, training, application development, and IP arrangements. Buyers increasingly value co-development capacity alongside raw performance.

5. **System integrators can strengthen access to institutional buyers.**
   Quantum solution providers selling directly to HPC centers and national labs are entering procurement processes designed for mature, whole-stack computational solutions. System integrators can help position quantum within a broait didder compute environment, connect it to existing infrastructure and navigate established procurement processes. For many quantum solution providers, this may provide a more credible route into institutional accounts than trying to work around established buying systems.

For HPC Centers and National Labs

HPC centers and national labs are among the most advanced customer groups in the market. Early deployment has given them real advantages in institutional learning, user-community development, vendor management, and software integration. The challenge is shifting from procurement to utilization: for many facilities the limiting factor is not hardware or budget but the depth of the internal user base and the availability of well-defined workloads.

1. **First procurements should remain technology-agnostic.**
   No modality has proven decisively superior. For newcomers to quantum, an open tender across hardware reduces the risk of early commitment. The initial procurement should serve as a learning tool to assess vendor maturity, integration needs, user demand, and constraints. Based on this, more informed choices can be made in future procurements.

2. **User demand needs to be developed before the next procurement cycle.**
   Outreach programs, training workshops, and co-development projects with research communities should run in parallel with hardware planning, rather than after deployment. Institutions that have built deeper user bases have generally done so through sustained, low-key engagement over time, not through event-driven launches.

3. **Build the translation layer, not only the infrastructure layer.**
   The bottleneck in many programs is converting access into workflows that domain scientists can use. Institutions need application teams, co-designed projects on real workloads, and published benchmarks, plus residency and curriculum partnerships that turn deployments into workforce assets.

4. **Treat vendor selection as an integration decision**.
   The value of a system depends on how well it connects to existing compute infrastructure, software stacks, and user workflows. Procurement criteria should include hybrid classical-quantum connectivity, open interfaces compatible with HPC environments, and embedded engineering support after installation. Buyers who assess vendors on integration readiness build usable capability rather than isolated compute capacity.

5. **Design quantum services around user needs, not hardware specifications**.
   A quantum system will serve different users in different ways. Many researchers will want simple access through familiar workflows, without needing to understand the hardware in detail. Others will need more direct control over the system, including parameters, topology, and experimental settings. The service model should reflect both needs. Institutions that understand their user base before designing the access model are more likely to see regular use than those that start with the hardware specification.

> You can have a fantastic quantum technology, but if it's developed in isolation as a fully self-contained stack that's simply delivered through the cloud, that approach will only take you so far and will only be useful for a subset of the community. If you're an HPC center aiming to support a range of users, including those with more complex, integrated hybrid workflows, you need to work with a quantum company that has interoperability and integration at the forefront of its model."
>
> **— Laura Schulz**

For Enterprise and Industry Leaders

Enterprise quantum leads face a different challenge from HPC centers and labs. They are usually not buying systems as infrastructure; they are deciding when quantum is mature enough to justify budget, vendor engagement, and integration into existing compute plans. This mirrors how the OECD characterizes quantum readiness in its 2026 analysis: an exploratory, capability-building process rather than a single procurement decision. Capability compounds with engagement, which is why the timing of entry matters as much as the choice of vendor.

The path forward is sustained, practical engagement: building quantum literacy in technical teams, testing multiple vendors, publishing internal use-case challenges, partnering with universities, and developing a hybrid-compute view from the start.

1. **Build quantum literacy at the engineering level.**
   The survey and interviews identify workforce as the leading obstacle, ahead of technical or procurement constraints. Roadmaps are becoming clearer; the talent pipeline is not. Enterprises should build literacy among engineers now rather than wait for the hardware case to settle.

2. **Move from monitoring to active pilots, even on current NISQ hardware.**
   Most survey respondents are already hands-on. At this stage, the value of pilots is not mainly computational output. It is organizational learning: building vendor relationships, internal credibility, and practical experience before procurement decisions become urgent. Organizations that remain in observation mode risk falling behind peers that are already building institutional knowledge.

3. **Use external partnerships to extend internal capability.**
   Challenge programs, joint development agreements, published use cases, and university partnerships extend the effective size of the enterprise team. They also generate IP and test use cases without placing all the technical and financial risk inside the organization.

4. **Diversify across vendors and modalities.**
   Hardware uncertainty makes portfolio diversification the safer procurement strategy. Enterprises should keep access open across multiple vendors and modalities, especially through cloud platforms, while aligning any on-premises investment with the problem classes most relevant to the business.

> "We would redistribute the financial commitment more evenly across different platforms rather than betting on a single vendor. The situation has changed -- now for a company entering this market, I would advise taking more time to investigate options and work with different providers to see what algorithms you want to run and what hardware you want to run them on.
>
> **– Alexey Galda**

For Policymakers and National Program Owners

National quantum programs have moved from policy ambition to operational reality. As these programs mature, the focus shifts from funding research alone to converting public investment into sustainable commercial capability and a talent pipeline ready before the fault-tolerance window opens.

1. **Rebalance funding toward operational capacity.**
   Research grants remain essential, but national programs also need funding models that support deployment and use. Multi-year managed-service contracts, operational support, and outcome-based grants tied to user-community growth can help move quantum programs from research activity toward HPC-style service models. Mission-oriented contracting models, in which governments set outcome targets and fund sustained delivery against them, can also address the structural gap between one-off pilots and sustained programmes. An approach with precedent in DARPA-style programme structures, where agencies fund multi-year delivery against defined technical goals rather than discrete project outputs.

2. **Use procurement to support standards.**
   The absence of cross-vendor standards is a recurring technical barrier. Governments can make interoperability, open APIs and SDK's, and data portability conditions of nationally funded procurement, giving vendors a commercial reason to solve coordination problems that individual buyers cannot. These standards could also support the feedback loop between user experience and hardware improvement: when workloads are portable across platforms, performance gaps become more visible and easier to address.

3. **Treat the workforce pipeline as strategic infrastructure.**
   Workforce programs should be designed around the roles the market needs and measured by placement in quantum-relevant roles, closing the gap between research training and the applied skills enterprises, vendors, and labs require.

> "For IT procurement conversations to change, two things need to happen: a clear national strategy with a long-term infrastructure roadmap, and a strong local ecosystem, hardware accessible in the region, joint labs with industry, and a portfolio of reference use cases that demonstrate business value."
>
> **– Jacek Michalski**

For Universities and Academic Institutions

Universities sit at the center of the quantum ecosystem. They train much of the workforce, buy some of the early hardware, and drive foundational research in error correction, algorithms and new modalities. The challenge is to keep curricula, facilities, and industry engagement aligned with a field where hardware roadmaps, software tools and skills requirements are changing quickly.

1. **Reform master's and engineering curricula.**
   The main workforce constraint is not only PhD supply. It is the shortage of practitioners who can build, integrate and apply quantum systems. Cross-department programs that combine physics, software engineering and domain applications are better suited to this need than narrow disciplinary pathways. Universities should also recruit more actively from computer science and engineering, not only from physics, so that more software and systems engineers develop a working understanding of quantum.

2. **Use shared access models for quantum hardware.**
   Most universities will gain more from proposal-based access to shared national or regional systems than from owning machines that may be expensive to maintain and quickly superseded. This mirrors the model used for large scientific facilities such as telescopes and neutron sources. Early participation in national lab partnerships and consortia can build institutional knowledge while broadening access as hardware scales.

3. **Build industry pathways before graduation.**
   The strongest pipelines run through structured internships, fellowships, and joint research agreements with industry, giving students applied experience before they graduate.

> The engineers do not learn quantum. If you are trying to get an engineer to do a quantum job, they have a significant learning curve to really get there. If this field needs to evolve as an engineering discipline, you need physicists working with engineers."
>
> **— Arnab Banerjee**

For Investors

Vendors are increasingly evaluated on demonstrated results rather than roadmap commitments, and institutional capital is becoming more selective. Four areas warrant attention.

1. **Build the investment thesis around verifiable technical milestones.** Market size estimates for quantum vary too widely to support investment decisions on their own. Investors should focus on measurable engineering progress, including logical qubit count, gate fidelity at scale, and error-correction overhead, and assess whether vendors are delivering against their published roadmaps.

2. **Look beyond hardware to software, algorithms and enabling technologies** Software, algorithms, photonics, control systems, and cryogenics are structurally important to the quantum stack. They may also offer exposure to quantum growth with less dependence on any single hardware roadmap.

3. **Assess sovereign-program positioning.** Vendors with national lab contracts or sovereign-program roles may have more predictable revenue in the pre-commercialization period. This does not replace technical diligence, but it should be weighed alongside roadmap progress, customer traction, and product maturity.

4. **Bring geopolitical and regulatory risk into the investment screen early.** Export controls, national-security rules, and data-sovereignty requirements shape where a company can sell, with whom it can partner, and who can acquire it. These factors are especially important in quantum, where strategic buyers are a likely exit route.

Afterword from OpenOcean

In 2019, OpenOcean invested in IQM Quantum Computers when it was still an ambitious laboratory spin-out. Underpinning that conviction was our belief that IQM possessed a world-class team with a unique IP portfolio, and that quantum would become the foundational computing technology of the 21st century.

As IQM now is about to go public as Europe's Quantum Computing leader, the first part of our thesis has played out, while the technology's societal impact remains to be seen. Tracking this progress is exactly what has motivated us to support the State of Quantum project since its inception.

Capital is now tracking tangible development, not speculation. Driven by genuine procurement, 2025 capital raised hit a record $8.3 billion, about five times that of 2024. As investment scales, evaluation frameworks are maturing alongside it. With hardware roadmaps converging on a 2029 to 2031 fault-tolerance window, investors now reward delivery over ambition, backing the companies that can actually demonstrate logical qubit counts, realistic error correction, and successfully delivered systems.

We would also urge investors and founders to look beyond the QPU. Less than 10% of quantum companies founded in 2025 were Quantum Computer companies, and we expect this to continue as the new barriers to scale are now found in the hardware components and interoperability software around the qubits. Meanwhile, the ongoing fragmentation of the Quantum Computing market supports our view that these "picks and shovels" act as a smart hedge against single-modality risks.

While today's paid contracts remain concentrated in sovereign programs and HPC centers, commercial applications will be unlocked by algorithms that massively outperform classical models. We expect this tipping point in scientific computing and optimization across materials and life sciences, finance, and logistics. To realize this potential, we will need orchestration middleware that lets IT treat QPUs like standard compute, but also a mature supply chain where hardware-agnostic enablers"picks and shovels", such as cryogenics and interconnects, scale regardless of the modality race.

The future is bright. While the Quantum Readiness Index points to a global customer base that is developing but not yet converting, students of technological revolutions have seen this pattern before. Those who missed the equivalent window in AI are now paying a premium for positions that earlier participants built from scratch. We are finally entering the era of true quantum value creation, and we're incredibly excited to back the teams building it.

Tom Henriksson

Tom Henriksson,
General Partner, OpenOcean

Conclusion

Market tension

Quantum computing is entering a more demanding phase. The market is no longer defined only by whether organizations can access quantum systems, but by whether they can build useful capability around them. Engagement is broadening, investment is rising and public infrastructure programs are expanding, showing that the foundations for future adoption are being built. Commercial adoption nevertheless remains early. Among industry respondents, 89% report hands-on quantum engagement, while only 10% report limited production use and 3% have reached broad or scaled deployment. This tension between rising momentum and early commercial maturity defines the market in 2026. The market is not short of activity. It is still short of proven, repeatable commercial advantage.

From access to capability

Capability now means more than experimentation. Cloud access remains an important route into the technology, but buyers seeking sustained value are focused on what they can build around quantum systems: integration with existing compute environments, workforce development, operational know-how and intellectual property. This is a positive sign of market maturation. Buyers are moving from passive access toward deeper engagement with the systems, vendors and workflows that could shape future advantage.

Procurement expectations are changing as a result. Openness, calibration access, low-level system visibility and co-development capacity are becoming more important because buyers increasingly need to understand and integrate the systems they use. The strategic question is no longer only whether an organization can access quantum hardware, but whether it can convert that access into capability it can use and retain.

Readiness and sovereignty

The Quantum Readiness Index makes the capability gap visible. The global cohort scores 58 out of 100, placing it in the Developing tier, while APAC is the only region to reach the Advancing tier, supported by coordinated national programs. EMEA leads in company formation and public infrastructure investment, while AMER's capital base positions it strongly for commercialization. Workforce and Investment are stronger than Innovation and Adoption, showing that hiring, budget allocation and pilots are more advanced than proprietary output or scaled deployment. Only 9% of surveyed organizations report having a resourced IP program. Readiness is real, but not yet deep enough: many organizations are engaged with quantum, but fewer have converted that engagement into owned capability.

At national level, the same capability logic is becoming a sovereignty question, particularly in Europe and the Gulf. The European Commission's European Technological Sovereignty Package, presented on 3 June 2026, aims to reduce structural dependencies and make sure Europe can develop, deploy and secure the technologies Europeans rely on across semiconductors, AI, cloud, and open source.[20] Saudi Arabia frames quantum as a matter of national sovereignty through its National Quantum Alliance.

[20] *European Commission, press release IP/26/1187, 3 June 2026, https://ec.europa.eu/commission/presscorner/detail/en/ip_26_1187*

The Alliance unites Saudi government, academic, and industry institutions to build up the Kingdom's research, infrastructure, and talent base in quantum science and technology. Its stated aim is to enable national quantum sovereignty and establish Saudi Arabia as a leader in the global quantum economy.[21] In the US, the Department of Commerce announced in May 2026 over $2 billion in funding for nine quantum companies stating that a strong domestic quantum ecosystem is essential for U.S. national security, technological resilience and long-term strategic leadership. [22] As such, governments, HPC centers and public research institutions are not only funding quantum hardware. They are funding the ability to build, operate and retain quantum competence within their own ecosystems. Local presence, data residency and host-country capability are therefore becoming more important in procurement, especially where quantum systems are linked to national infrastructure, supercomputing capacity and long-term strategic capability. This suggests that quantum investment is increasingly being treated as a long-term capability-building agenda, not only as technology procurement.

What this means

The next phase of the market will not be determined by hardware progress alone. Vendor roadmaps now converge around a projected 2029 to 2031 window for fault-tolerant quantum computing, but the timing of useful quantum advantage remains uncertain. Organizations that use the intervening years to build talent, infrastructure, partnerships, integration experience and proprietary learning will be better placed if the technology reaches commercial utility. These capabilities cannot be acquired instantly when the technology matures. How organizations use this period will shape how much of the future advantage they capture. That is the central message of the State of Quantum 2026: the market is still early in commercial deployment, but the capability race has already begun.

> "For IT procurement conversations to change, two things need to happen: a clear national strategy with a long-term infrastructure roadmap, and a strong local ecosystem, hardware accessible in the region, joint labs with industry, and a portfolio of reference use cases that demonstrate business value."
>
> **— Jacek Michalski**

Unlike most capital infrastructure, a quantum computer does not deliver value at the point of installation. Its value is built incrementally through the workforce trained to use it, the algorithms developed for specific problem classes, and the operational experience accumulated across successive experimental cycles. The organizations that build that capability first will carry an advantage that later entrants, however well-resourced, will find structurally difficult to close.

21 *Research, Development and Innovation Authority (RDIA), Kingdom of Saudi Arabia, "National Quantum Hub" –* https://rdia.gov.sa/en/programs/infrastructure/national-quantum

22 *U.S. Department of Commerce / NIST, "Department of Commerce Announces Letters of Intent With 9 Companies for $2 Billion to Accelerate U.S. Leadership in Quantum Computing," May 2026 –* https://www.nist.gov/news-events/news/2026/05/department-commerce-announces-letters-intent-9-companies-2-billion

Appendix

Survey methodology and profile

Overview and survey scope

The quantitative survey supporting this report was conducted by Resonance in March-May 2026, targeting senior practitioners from two main groups: enterprise and end-user organizations active in Quantum Computing (n=98), and investment professionals with direct quantum experience (n=9). We received 107 complete and validated responses from three regions and six types of organizations.

The survey explores five key areas: current quantum adoption stage and deployment methods; procurement criteria and purchasing habits; obstacles to adoption; investment focus and project budgets; and a self-assessment of quantum readiness across the four QRI dimensions (Workforce, Innovation, Investment, and Adoption).

The methodology, scoring framework, and dimension weights for the Quantum Readiness Index are detailed in the following section of this Appendix. All responses are anonymized, with no individual organization identified or ranked in the report.

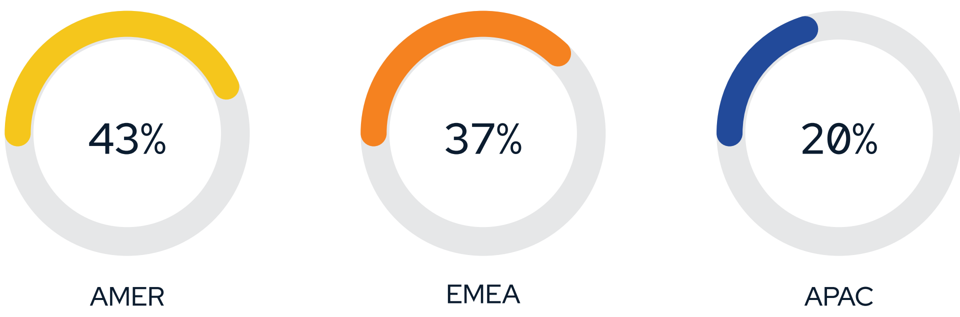
Validation and quality assurance

Particular care was taken to ensure the integrity of the respondent base. Every submission was individually reviewed to verify that respondents matched the target profile: senior practitioners with direct or influential roles in Quantum Computing investment, procurement, or research. Responses were cross-checked for consistency across stated seniority, organizational type, and role. Incomplete, internally contradictory, or unverifiable submissions were excluded from the final dataset.

The 107 responses included in this report represent validated, complete submissions from identifiable practitioners. A qualification screen required all respondents to confirm active engagement with Quantum Computing through a dedicated budget, staff, or an active pilot program, ensuring that findings reflect hands-on practitioners rather than passive market observers.

Geographic distribution

Table 9: *Geographic Distribution*



Note: Middle East respondents are consolidated into the EMEA region throughout the report.

Organizational type

Supercomputing Centers, National Labs, and Government Agencies are consolidated into a single HPC Center and Public Research Infrastructure segment in the report, reflecting the significant operational and procurement overlap between these institution types.

Table 10: *Organizational Type*

Organizational type	Respondents	Share
Large Enterprise (>1,000 employees)	53 Respondents	50%
HPC Centers and Public Research Infrastructure	18 Respondents	17%
Small and Medium Businesses (<1,000 employees)	17 Respondents	16%
University	10 Respondents	9%
VC / PE / Institutional Investor	9 Respondents	8%

Sector Coverage

Table 11: *Sector Coverage*

Sector	Respondents	Share
Financial services	36 Respondents	52%
ICT and telecom	17 Respondents	24%
Materials and manufacturing	5 Respondents	7%
Energy and utilities	5 Respondents	7%
Pharma and biotech	5 Respondents	7%
Logistics and transportation	2 Respondents	3%

Seniority

Table 12: Seniority

Head of Division, Group, or Product	46 Respondents	43%
C-Suite	38 Respondents	35%
Team Lead	9 Respondents	8%
Manager	7 Respondents	7%
Investment Professional	6 Respondents	6%
Other		1%

Note: 79% of respondents hold C-Suite or Head-level positions.

Quantum decision-making authority

Table 13: Quantum Decision-Making Authority

Direct decision-making authority over quantum budget or procurement	57 Respondents	53%
Influence or formally recommend quantum investment decisions	38 Respondents	36%
Lead or manage a quantum programme, research initiative, or pilot	11 Respondents	10%
Technical practitioner or researcher within a quantum programme	1 Respondents	1%

Note: Almost 90% of respondents hold direct decision-making authority or formally influence quantum-related investment and procurement decisions within their organization.

Expected impact timeframe

Table 14: Expected Impact Timeframe

81%

expect quantum impact within 1 to 3 years

The Quantum Readiness Index (QRI) Methodology

The QRI is built in three steps that move from survey responses to a single composite score.

Step 0. Define the QRI sample.

The QRI is computed on the subset of survey respondents who are quantum-buying organizations, not quantum-investing organizations.

Table 15: Step 0 - Define the QRI Sample

Raw survey
All validated respondents

107
respondents

Exclude investors
Remove VC / PE / Institutional

9
respondents

QRI sample
Quantum-buying organizations

98
respondents

Step 1. Each survey answer is converted to an ordinal score on the scale below.

Table 16: *Step 1 - Each survey answer is converted to an ordinal score*

Dimension	Question & Topic	Scale
Workforce	1. Dedicated quantum FTEs	0–3
Workforce	2. Training & upskilling (multi-select; highest level wins)	0–3
Workforce	3. Skills investment trajectory (next 3 yrs)	0–3
Workforce	4. Recruitment activity (past 12 mo)	0–3
Innovation	5. Proprietary IP strategy	0–3
Innovation	6. R&D collaborations	0–3
Innovation	7. Patents filed or granted	0–3
Investment	8. Dedicated quantum budget	0–4
Investment	9. Expected budget change (next 12–24 mo)	0–3
Investment	10 Executive / board support	0–3
Adoption	11. Current stage of quantum adoption	0–4
Adoption	12. Pilot projects / PoCs	0–3
Adoption	13. Vendor engagement	0–3
Adoption	14. Procurement history (past 2 yrs)	0–3
Adoption	15. Procurement plans (next 2 yrs)	0–3

Step 2. Dimension score = Σ(question averages) ÷ Σ(question maxes) × 100. Dimension scores are averaged with weights into the composite QRI

Table 17: *Step 2 - Dimension Score*

30% Workforce	25% Innovation	25% Investment	20% Adoption

Workforce (30%) is weighted above baseline as talent is the most cited barrier to quantum adoption across the surveyed cohort.

Innovation (25%) is held at baseline as it reflects the depth of quantum engagement rather than a gating factor.

Investment (25%) is held at baseline as budget commitment is a necessary but not sufficient condition for readiness.

Adoption (20%) is weighted below baseline as the market is still early-stage, making current deployment activity a limited proxy for long-term readiness.

Step 3. Composite QRI is mapped to tiers.

Table 18: *Step 3 - Composite QRI is mapped to tiers*

Level 1 Aware	*Level 2* Exploring	*Level 3* Developing	*Level 4* Advancing	*Level 5* Leading
0-19	20-39	40-59	60-79	80-100

- Level 1 — Aware (0–19):
  Quantum is on the radar but no formal program, budget, or dedicated resource is in place.
- Level 2 — Exploring (20–39):
  Initial pilots and early budget discussions are underway but activity remains informal and unstructured.
- Level 3 — Developing (40–59):
  A structured quantum program exists with dedicated headcount and allocated budget, though scaled deployment has not yet begun.
- Level 4 — Advancing (60–79):
  Multi-year investment is committed, formal partnerships are active, and the organization is moving toward production deployment.
- Level 5 — Leading (80–100):
  Quantum is embedded in core workflows, IP is being generated, and the organization is scaling deployments with established vendor relationships.

Taxonomy

- **Quantum Computers:** QPU manufacturers and developers, classified by qubit modality: superconducting, trapped ion, neutral atoms, silicon, photonics, topological, NV diamond, electrons on helium, cavity QED, NMR, and annealing.
- **Software:** Companies offering quantum software layers: applications, algorithms, cloud/development platforms, firmware, and enablers that sit above the hardware stack.
- **Hardware Components:** Suppliers of quantum-enabling physical components: cooling systems, lasers, processors/chips, control hardware, vacuum systems, diamond/NV components, and quantum sensing components.
- **Quantum Communications & Security:** Companies focused on secure quantum data transmission: encryption solutions, QKD hardware, post-quantum cryptography (PQC), and multi-solution security providers.
- **Quantum Sensing & Imaging:** Companies building quantum-enhanced sensing products: quantum dots, quantum wells, imaging/detection hardware, measurement devices, NV diamond sensing, and multi-sensor platforms.
- **Other Quantum:** Catch-all for adjacent players: consultancies, private research companies, and education-focused entities that support the ecosystem without fitting the above categories.

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About The Quantum Insider

The Quantum Insider is the leading provider of media and market intelligence on the quantum technology industry. The business provides daily business journalism, analysis, and interviews through its media site. Through its proprietary intelligence platform, which combines advanced AI capabilities with human industry expertise, it delivers real-time, data-driven insights to its customers across startups, academia, governments, and corporations.

The Quantum Insider is part of Resonance, which owns and operates a portfolio of specialized publications across the industries that will define the next century of innovation: quantum, space, and AI/ML. Powered by a global team of more than 60 analysts, engineers, and industry experts, Resonance has supported over 200 clients, including top-tier corporations, national governments, and leading academic institutions. Resonance is headquartered in Toronto, Canada, with teams globally.

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About IQM Quantum Computers

IQM Quantum Computers is a global leader in superconducting quantum computers, delivering full-stack quantum computers and cloud platform access to research institutions, universities, high-performance computing centers, national laboratories and enterprises worldwide. IQM's on-premises deployment model gives customers direct ownership and control of their quantum infrastructure. Founded in 2018, headquartered in Finland with major operations in Munich, it has over 400 employees. IQM operates across Europe, Asia, and North America. IQM filed an F-4 registration statement with the SEC, which has since been declared effective, with the intention to become the first publicly listed European quantum company on Nasdaq Global Exchange in the U.S by merging with Real Asset Acquisition Corp. (Nasdaq: RAAQ).

OpenOcean

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About OpenOcean

OpenOcean is a pan-European early-stage venture capital firm partnering with technical founders at Seed and Series A. We lead or co-lead Seed and early Series A rounds, investing up to €5m tickets initially, in European-founded companies reshaping knowledge work and the systems required to scale it, across AI-native software, automation, and data-intensive technology.

Our founding team includes key individuals behind MySQL AB, which was acquired by Sun Microsystems for $1bn in 2008. Following that, the team went on to jointly build MariaDB Corporation into a category leader, listed on the NYSE in 2022. With deep technical understanding and operator-level experience, we work closely with founders through critical technical and strategic decisions, helping turn durable, data-driven advantage into globally scalable businesses.