

— A STRATEGIC INTELLIGENCE BRIEFING · THE THESIS

The Intelligence *Wars*

What the **Next Arms Race** means for capital allocation,
national sovereignty, and the architecture of 21st-century
computational power.

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Global signals confirm the race is *underway*.

For more than half a century, global power was defined by nuclear deterrence. That paradigm is shifting. The next arms race is computational. Artificial intelligence defines today's visible battleground, while quantum technologies are emerging as the asymmetric layer that will shape long-term technological, economic, and national security outcomes.

This report examines the rise of the Intelligence Wars: a multi-decade competition among states, corporations, and institutions to secure dominance in advanced computation. While AI commands attention, quantum computing represents the deeper strategic inflection point, one set to redefine resilience, security, and sovereignty across defense, finance, infrastructure, healthcare, and supply chains.

Global signals confirm the race is already underway. Governments have committed tens of billions in funding, treating quantum as a sovereign imperative, while venture and corporate investment has accelerated but remains a small share of overall technology capital.

Our thesis is that near- to mid-term value will accrue not in monolithic quantum machines, but in the underfunded layers enabling quantum adoption today, software, error correction, networking, sensing, hybrid integration, and post-quantum cryptography, capital-efficient segments delivering commercial utility ahead of fault-tolerant systems.

The Sovereign Era arrives, with quantum as the *strategic differentiator*.

This analysis reflects a vantage point shaped across global capital markets, frontier technology ecosystems, and national-level economic forums. SevenTrain Ventures operates at the intersection of Wall Street market structure, Silicon Valley's most capacity-constrained deep-technology companies, and policy conversations occurring at venues such as the World Economic Forum.

That perspective is reinforced through direct investment exposure - including participation in highly selective quantum platforms such as PsiQuantum—and through hands-on involvement in helping frontier companies scale via go-to-market strategy, strategic partnerships, and investor engagement. The result is early insight into where capital, talent, and policy converge before those shifts are reflected in markets.



Stanford Research Institute March 2025

DISCLOSURE

For qualified investors only. Not investment advice. SevenTrain Ventures holds a position in PsiQuantum.

The map of *this issue*.



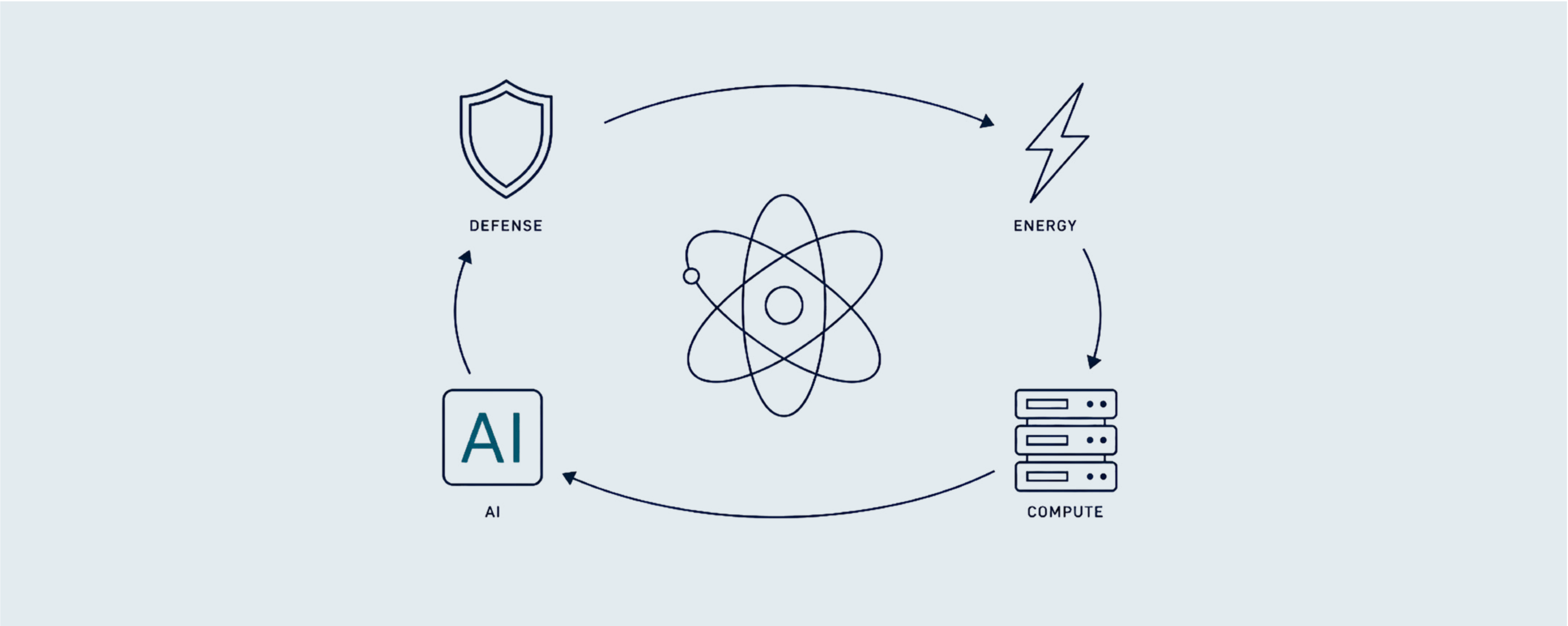
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The intelligence *pivot*.

For 75 years, global power was frozen by nuclear deterrence. **That era is ending.** We view AI as the current focal point of this competition, with quantum computing poised to emerge as a long-term strategic differentiator. Based on recent indicators, including government investments and industry milestones, we anticipate sustained momentum in this space. Our analysis draws on data from 2025, including venture capital trends and policy initiatives, to outline opportunities and risks for investors.

THESIS

“AI is today’s visible battlefield.
Quantum Computing is tomorrow’s asymmetric deterrent.”



THE PREMISE

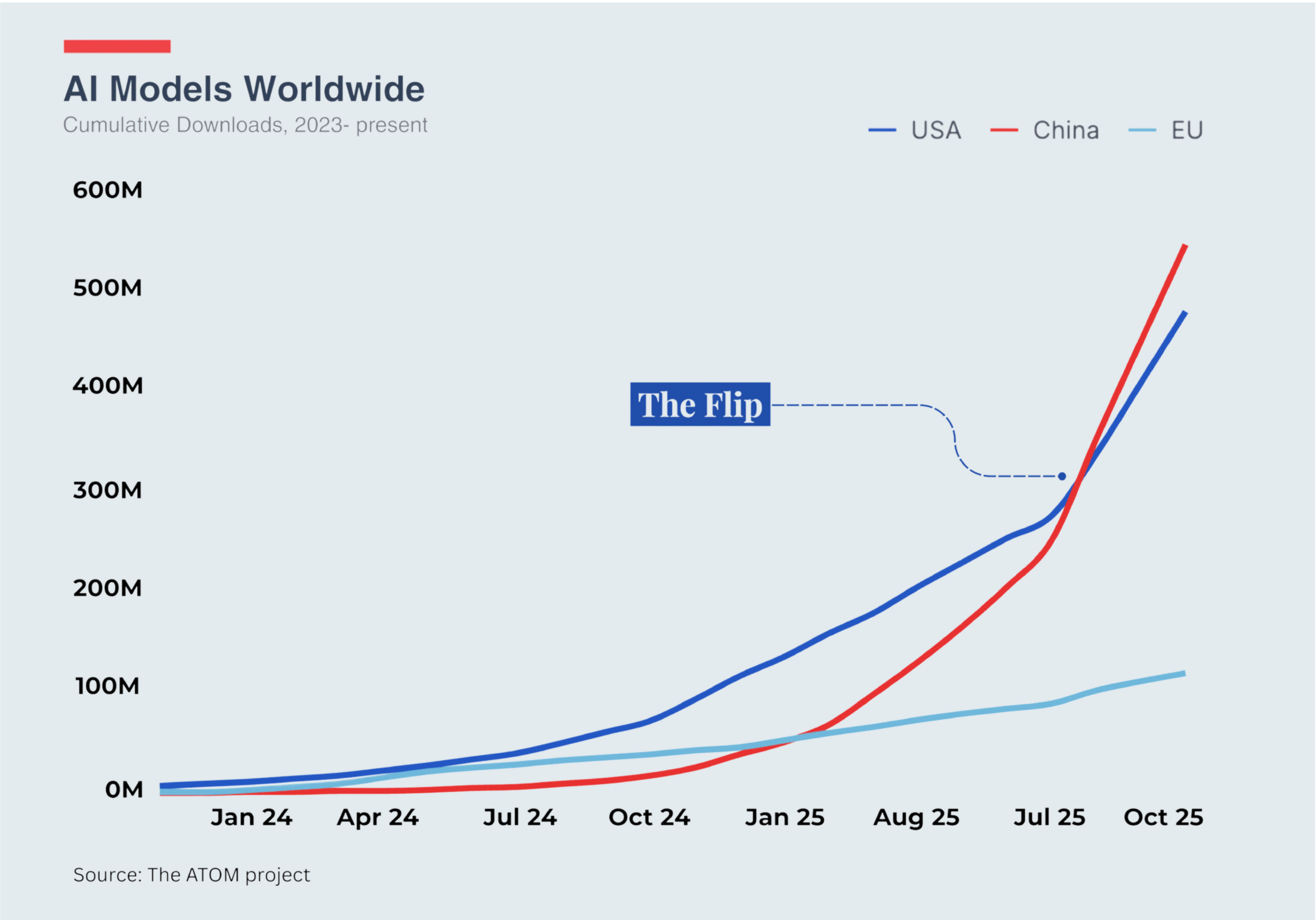
The next arms race is not nuclear. It is *computational*.

Our thesis is anchored in an emerging flywheel where sovereign urgency, scientific progress, capital formation, and commercial deployment reinforce one another. Within quantum, we focus on underfunded enablers

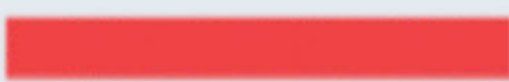
and commercially ready applications, post-quantum cryptography, sensing, networking, and hybrid systems, rather than capital-intensive full-stack hardware.

The next *arms race*.

Why did the U.S. really go to the moon? What could rally a whole nation to undertake such a feat? It was framed as scientific exploration, but in reality, it was driven by competition with the Soviet Union. Similarly, today’s technological race with China is accelerating advancements in AI and quantum. China has invested over \$130 billion in these areas, viewing them as essential to its rivalry with the West. In benchmarks, Chinese models process trillions of tokens daily at lower costs, nearing parity with U.S. leaders.

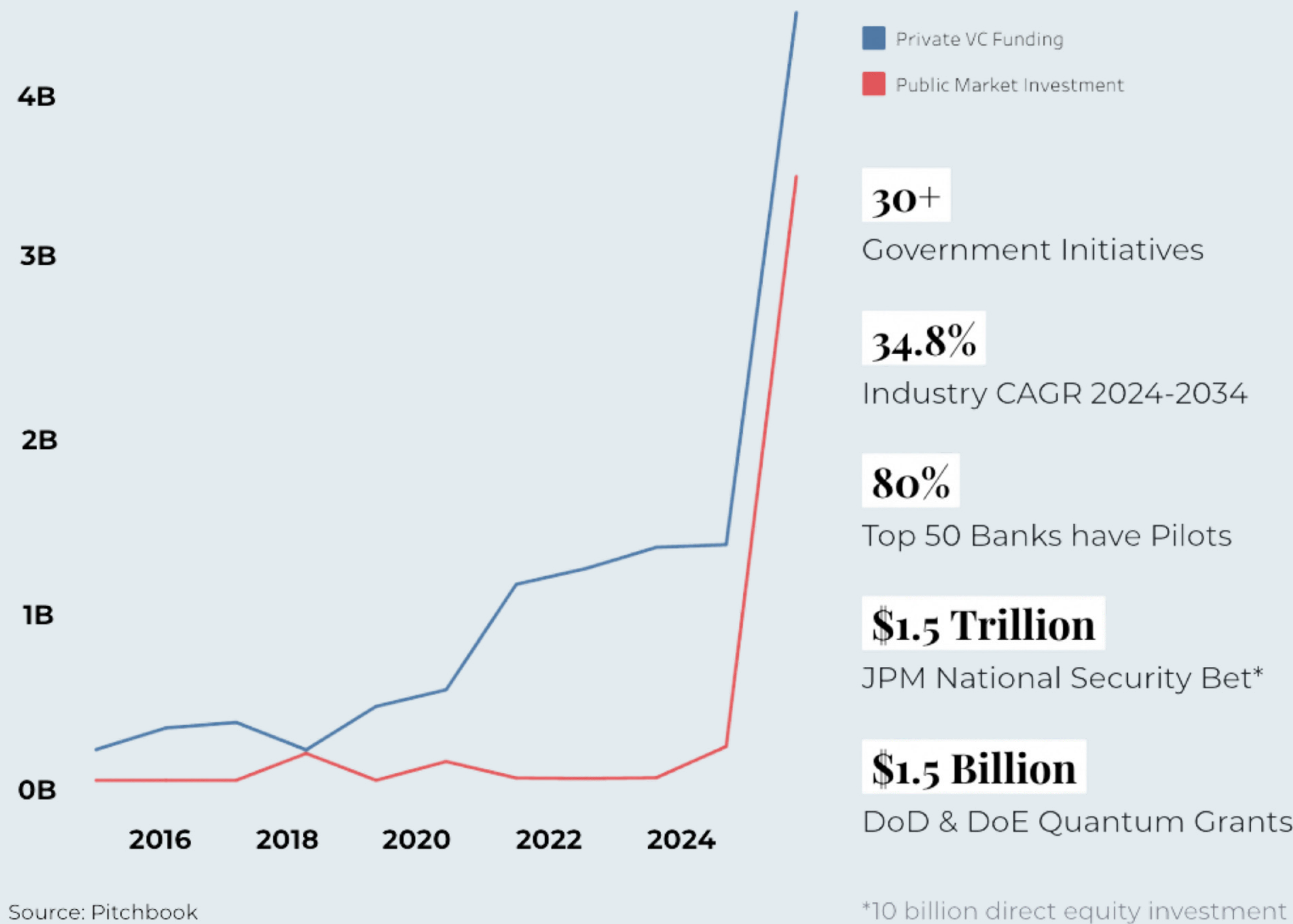


Perceived threats from China are spurring funding. The more threatened the US feels by China, the more innovation the DoD and DoE will fund within these sectors. The cycle is in motion. Falling behind could erode U.S. sovereignty through critical domains like cybersecurity and economic resilience. Quantum Computing (QC) is at the intersection of all of these converging industries. As a vital catalyst in this new landscape, it is estimated this race will drive 30-35% CAGR in quantum-related markets over the next decade, per McKinsey’s Quantum Technology Monitor 2025.



Investment in QT by Funding Type

U.S. Private Venture Capital vs Public Market Investment in USD (\$) | 2016- Present



Global *signals*.

The meteoric increase in private and public market investment signals that the quantum rush has begun. Over the past five years, valuations of leading quantum firms have skyrocketed on SPAC IPOs, fault-tolerant milestones, investor interest, and government contracts. This is the capital flywheel accelerating toward utility-scale reality.

The **\$3.8B** venture capital investment in 2025 only accounts for **1.5%** of VC investment in the US. These are real signals indicating that investors are starting to take serious notice of the transformative potential of quantum technologies with plenty of room for more investment. Beyond investors, there is clear signal that government and industry has started to take notice as well..

THE POLICY SIGNAL

The bipartisan National Quantum Initiative Reauthorization Act (reintroduced Jan 8, 2026, originally introduced Dec 2024) extends the NQI by five years to Dec 2034 and authorizes 550 billion in funding, including \$85 million annually for NIST and \$25 million for NASA for quantum R&D, along with new multidisciplinary centers, hubs, testbeds, and strategies for workforce growth and international cooperation. The Quantum Readiness & Resilience Act mandates PQC migration across federal systems by 2035 with provisions progressing via NDAA, potentially driving \$4-5 billion in annual spending through 2030.

THE INDUSTRIAL SIGNAL

The World Economic Forum’s October 2025 white paper, Quantum Technologies: Key Opportunities for Advanced Manufacturing and Supply Chains, warns that quantum will redefine resilience amid 38% more disruptions in 2024, from real-time port optimization (LA’s 40% crane savings via quantum algorithms) to QKD-secured networks at Rotterdam. It’s a “quantum imperative”: early adopters in auto, electronics, and logistics will lead, while laggards face obsolete chains.

THE WALL STREET SIGNAL

JPMorgan’s \$1.5 trillion, decade-long Security and Resiliency Initiative, announced in october 2025, focuses on bolstering U.S. economic and national security. The initiative spans 27 sub-sectors, with quantum computing as a vital segment in “frontier technologies” alongside AI and cyber. This Initiative directly validates our overarching thesis of increased focus on the quantum industry.

THE SCIENCE SIGNAL

The 2025 Nobel Prize in Physics was awarded to John Clarke, Michel Devoret, and John Martinis for discovering macroscopic quantum tunneling in superconducting circuits; the bedrock of qubit tech for giants like Google and IBM. Last year’s prize went to AI neural networks; this year, it’s quantum’s turn, cementing its status as the next tech frontier.

THE DEFENSE SIGNAL

Defense primes are betting billions on quantum’s edge in simulation and sensing. Lockheed Martin’s expanded 2025 MoU with PsiQuantum targets fault-tolerant algorithms for aerospace, modeling hypersonic flows or unbreakable comms that classical supercomputers can’t touch. Additionally, DARPA is working closely with the top QC players and together with other DoD and DoE initiatives have invested \$4B+in 2025.

THE INDUSTRY SIGNAL

Just as NVIDIA’s CUDA ignited the AI boom by packaging GPUs with developer tools, its 2025 NVQLink and CUDA-Q launches are doing the same for quantum. Seamlessly linking QPUs to GPUs, for hybrid error-corrected workflows at microsecond latency. Adopted by 17 builders and nine U.S. labs, as the infrastructure backbone for scalable quantum AI-supercomputing.

Quantum *technologies*.

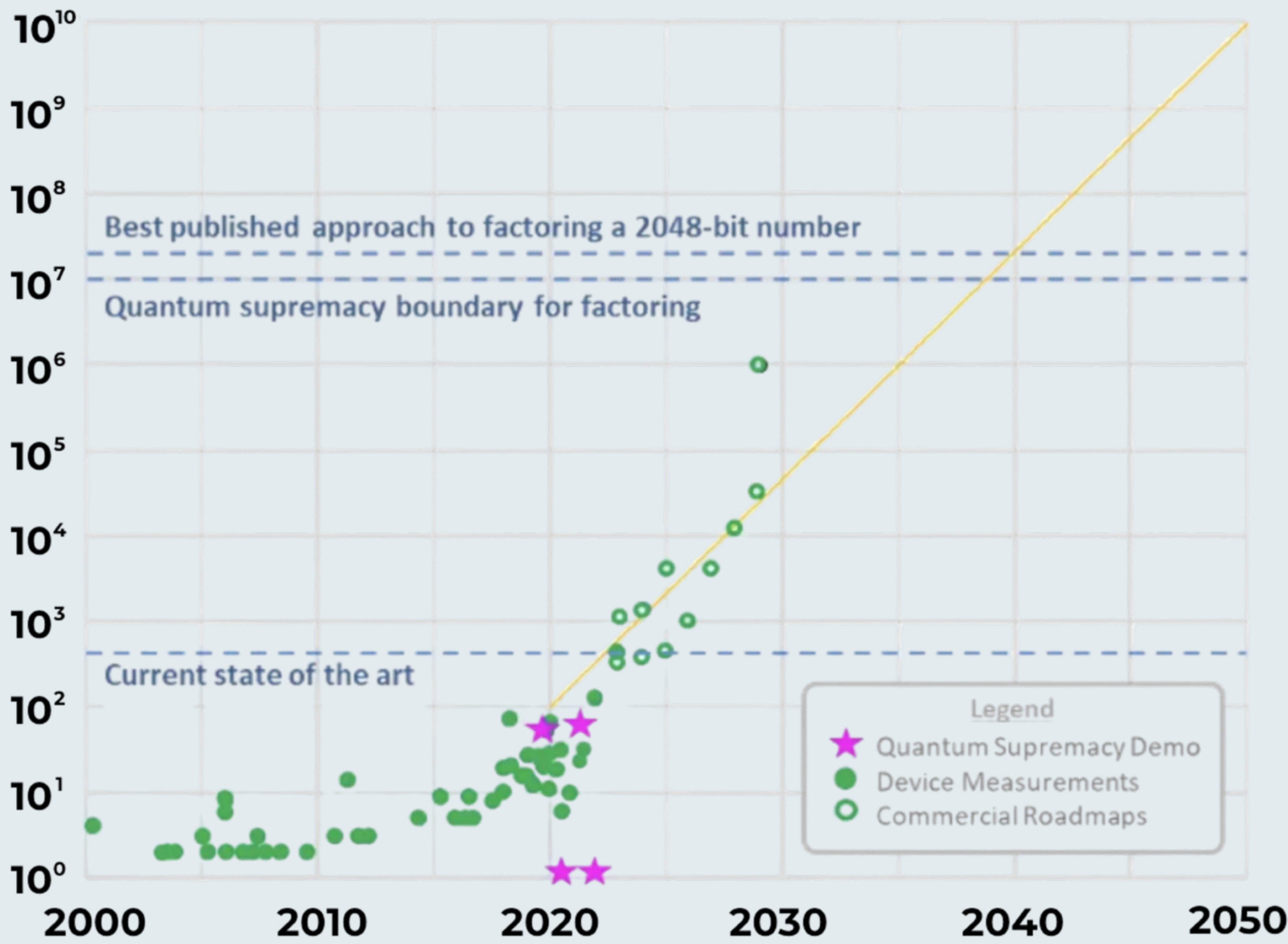
Investor interest in quantum technologies is at an all-time high, with the United Nations designating 2025 as the International Year of Quantum Science and Technology. However, capital allocation remains imbalanced, with about 80% of investments directed towards building large-scale Quantum Computers (QCs), often overlooking more lucrative near-term opportunities in supporting layers. Quantum is not a monolithic technology; it encompasses a multi-layered ecosystem across industry, academia, and government. As in the early AI era, picks-and-shovels providers are overshadowed by hardware giants.

These enablers can be adopted in today’s NISQ era, with emphasis on hybrid workflows and provide an understanding of the shifting paradigms, positioning its customers to capture the value of Quantum as the technology commercializes. Some of these enablers are already delivering viable use cases, and thus positioned to generate returns first. Large quantum computing firms stand to benefit from the sector’s projected 30-35% CAGR through 2035, but profitability remains distant for most, likely extending another decade or more amid high capital requirements and hurdles. requirements and technical hurdles.



Commercial QC Roadmap

Number of Interacting Physical Qubits over Time | 2000- 2050



QUBIT COUNT

This metric is far from the only metric utilized in evaluating useful quantum computers, however it paints a picture of where we currently stand in the technology lifecycle.

COHERENCE TIME

How long quantum states can remain stable

SCALABILITY

How easily larger systems can be networked

GATE FIDELITY

How often the gates make errors

GATE SPEED

How long it takes to do an operation

Why we are Cautious

We remain cautious around pure-play quantum computers and timelines assuming fault-tolerant systems scale faster than current engineering allows. Some enablers (software, error correction, hybrids) circumvent roadblocks for near-term value, but non-trivial engineering challenges within noise, coherence, and reliability remain. It is vital to distinguish physical qubits (real hardware performing operations are

noisy/error-prone) from logical qubits (error-corrected abstractions encoding reliable info across many physical qubits). Physical qubits execute raw gates/superposition/entanglement; logical qubits enable fault-tolerant, long computations. Scaling logical (not just physical) qubits is key, capital chasing raw counts misses this.

Commercial Applicability Metrics

These metrics for measuring commercial applicability, and how different modalities (types of quantum computers) fare in them will be further explored in future issues. For instance the superconducting modality, employed by leaders like Google and IBM, typically achieves coherence times on the order of 50-100 microseconds as of late 2025, with recent lab breakthroughs pushing toward 1 millisecond (e.g., Princeton's tantalum-based transmon in November 2025).

However, these durations remain far too short for running commercially useful algorithms without advanced error correction, let alone enabling groundbreaking discoveries at scale. For now, superconducting systems lag in full commercialization despite attracting a disproportionate

share of industry funding; reflecting investor confidence in their manufacturability amid ongoing challenges like noise and cryogenic requirements.

To ease navigation of this generally complex ecosystem – lacking universal measures of progress – DARPA established the Quantum Benchmarking Initiative (QBI) in 2024. The program aims to determine if it's possible to build an industrially useful quantum computer much faster than conventional predictions. It includes established modalities like superconducting and trapped ion, as well as Underexplored Systems for Utility-Scale Quantum Computing (US2QC), which has selected PsiQuantum and Microsoft to evaluate photonic and topological modalities, respectively.

Why it Matters

When investors hear “quantum,” they often envision massive, capital-intensive quantum computers. Hardware developers building large-scale quantum computers remain highly capital-intensive, with profitability timelines likely extending well into the 2030s or beyond. This mirrors gold mining operations during a gold rush: massive upfront investment with returns dependent on eventual production-scale success.

In contrast, the companies selling shovels achieve profitability before even the first gold nugget hits the market. Similarly,

quantum supply-chain enablers, providing critical components, software, consulting, and infrastructure, are positioned for earlier revenue recognition and positive cash-flows.

The enablers currently capture less than 20% of total quantum investment flows, leaving it underfunded and offering more attractive risk-adjusted opportunities than its full stack counterparts. Realistic exit timelines and returns are therefore more readily achievable in these supporting layers and already commercial sub-industries.

Supply chain *sub industries*.

These are examples of picks-and-shovels that are less capital intensive and constantly devising new innovative approaches to either position its customers to capture quantum's value, or circumventing QCs developmental bottlenecks.

Algorithms, Software & Applications

NOVEL ALGORITHM & SOFTWARE PLATFORMS



PQC CHIP IP & HARDWARE



PQC PLATFORM & MIGRATION SOFTWARE



QUANTUM KEY DISTRIBUTION

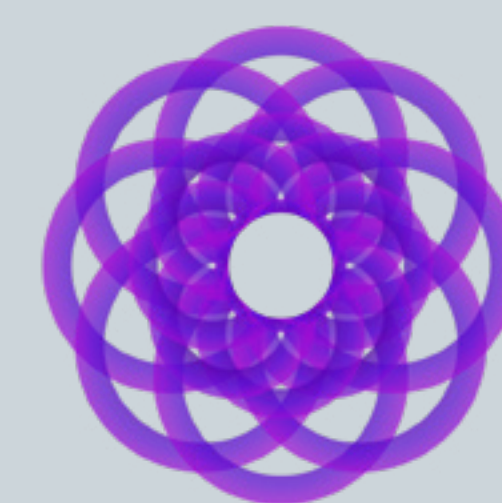


QUANTUM RANDOM NUMBER GENERATORS



QUANTUM ERROR CORRECTION & CONTROL SOFTWARE

**river
lane**



Q-CTRL

Hardware

QUANTUM COMPUTING HARDWARE - PHOTONIC

QUANDELA



CRYOGENICS & VACUUM TECHNOLOGY

**BLUE
FORS**



kiutra

QUBIT FABRICATION & MATERIALS



**OXFORD
INSTRUMENTS**

Control, Measurement & Test

QUANTUM CONTROL ELECTRONIC



MEASUREMENT & LASER CONTROL SYSTEMS

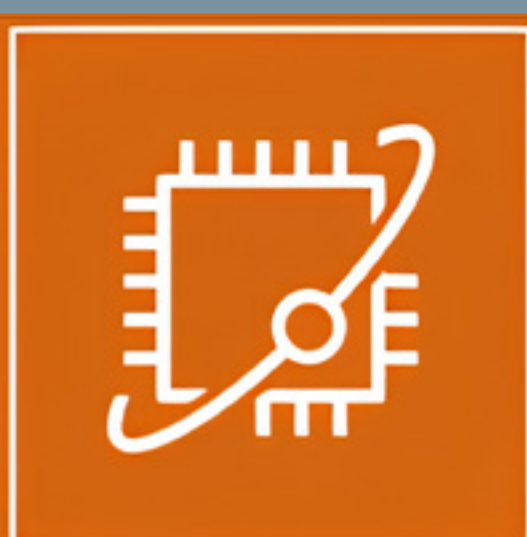


TEST & CHARACTERIZATION

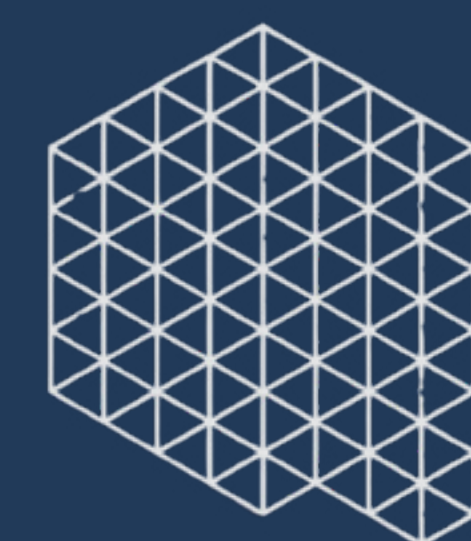


Cloud, Networking & Integration

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Commercially ready *applications*.

Beyond the picks and shovels, quantum technologies are already delivering value in areas outside full-scale computing, leveraging quantum principles for immediate, revenue-generating use cases.

Post-Quantum Cryptography Migration

Shor's algorithm poses a future threat to RSA encryption, but "Store Now, Decrypt Later" (SNDL) attacks are active today, adversaries harvest encrypted data for quantum decryption once Shor's algorithm can be scalably deployed. This urgency is amplified by the U.S. Quantum Readiness and Resilience Act, mandating federal PQC adoption by 2028 and \$500M+ in grants for migration. Companies like Light Rider, leverage quantum entropy for real-time USB-based encryption in IoT devices, while SEALSQ delivers hardware-secured chips (e.g., VaultIC for automotive), and PQShield provides software libraries integrated in AWS for cloud-scale protection. Once enforced, PQC demand will explode, securing \$1T+ in annual data flows.

Quantum Navigation (PNT without GPS)

Quantum sensors are deployed today, offering drift-free positioning in denied environments. In a GPS-vulnerable world, they enable resilient navigation for submarines and drones, while offensively detecting stealth assets via atomic clocks and magnetometers, rendering \$100B+ in legacy systems obsolete, amid rising jamming threats. Backed by DoD's \$200M+ PNT resilience program, companies like Infleqtion power Royal Australian Navy trials (144+ hours of continuous navigation) and satellite gyroscopes for Space Force, while Q-CTRL's Black Opal suppresses noise for Network Rail's 6x larger infrastructure monitoring pilots. By 2028, this will underpin autonomous warfare, with markets hitting \$10B annually.

Quantum Lidar & Imaging

Quantum entanglement boosts lidar resolution 10x over classical systems, penetrating fog, walls, or water for unprecedented visibility. Amid \$50B+ annual disruptions from weather/obscured ops, this tech transforms defense (anti-submarine hunts) and autonomy (AVs navigating urban haze). Supported by DARPA's \$50M Quantum-Assisted Sensing and Imaging program, companies like Sense Photonics deploy flash lidar in industrial robots for 3D mapping at 100m range, while Quantum Spatial's aerial pilots (e.g., floodplain mapping with 99% accuracy) aid FEMA disaster response, and YellowScan's drone systems integrate for underwater archaeology. Commercial rollout by 2027 could save \$20B in logistics alone, enabling "invisible" supply chains.

Quantum-Enhanced MRI & Biomagnetic Sensing

Quantum magnetometers detect biomagnetic signals at picotesla sensitivity, slashing MRI scan times by 50% and enabling non-invasive brain mapping. With 1.5B global scans yearly strained by 30–60 minute durations, this addresses \$100B+ healthcare bottlenecks amid aging populations. Fueled by NIH's \$150M Quantum for Health program, companies like Foqus Technologies pilot AI-quantum software at Waterloo hospitals (reducing knee scans to 10 minutes), while QuSpin's QuMag sensors enhance Muquans' portable biomagnetic devices for early Alzheimer's detection in Boston medtech trials, and Infleqtion's Rydberg arrays boost PET-MRI hybrids for oncology. By 2030, this will cut diagnostics costs 40%, revolutionizing precision medicine.

The Quantum *Ecosystem*.

The true economic engine of quantum computing lies not in the machines themselves, but in the end-customers who will deploy them to solve intractable problems across industries. Already in 2025, forward-thinking corporations are launching pilot programs and forging strategic partnerships to harness quantum's advantages in simulation, optimization, quantum machine learning, and beyond. These initiatives demonstrate tangible value. As fault-tolerant systems emerge, these pilots will scale into production, unlocking trillions in value. Below, we spotlight key examples by domain, highlighting the collaborations driving this transition.

Simulation (Drug & Materials)

20× speedup

Partnership

Quantum algorithms delivered a 20× speedup on reaction pathway simulation in a live three-organisation collaboration.

► AstraZeneca · IonQ · NVIDIA

Classically impossible

Partnership

First exact simulation of Cytochrome P450, a result no classical supercomputer can reproduce.

► Boehringer Ingelheim · Google Quantum AI

Scaling now

Pilot

AI-quantum force fields now scaling from proof of concept to active battery and catalyst discovery pipelines.

► Pfizer · XtalPi

<\$50/ton

Pilot

Quantum optimization running live catalysis pilots toward a sub-\$50/ton CO₂-to-chemicals target.

► BASF · IBM

Secure Communications (Revenue-Generating)

Commercial backbone

Live

The world's first commercial QKD backbone, live across active 5G infrastructure.

► SK Telecom · ID Quantique

In production

Live

QKD systems actively protecting Japanese and European bank networks against current and future threats.

► Toshiba

Optimization (Industrial + Finance)

15–20% less congestion

Pilot

D-Wave quantum routing cut urban traffic congestion by up to 20% in a live city deployment.

► Volkswagen · D-Wave

10–15% cost reduction

Partnership

Over 1,200 European routes re-optimised with quantum algorithms, achieving up to 15% cost reduction.

► DHL · IBM

144+ hrs GPS-denied

Live

Infleqtion quantum navigation guided submarines for 144+ hours with no GPS dependency.

► Royal Australian Navy · Infleqtion

Live in markets

Live

Quantinuum quantum processors running live derivative pricing and tail-risk hedging on active trading books.

► JPMorgan Chase · Quantinuum

5× faster

Partnership

5× speedup on Monte-Carlo simulations with direct implications for live trading book risk management.

► Goldman Sachs · IBM

Sensing & Navigation (Deployed Today)

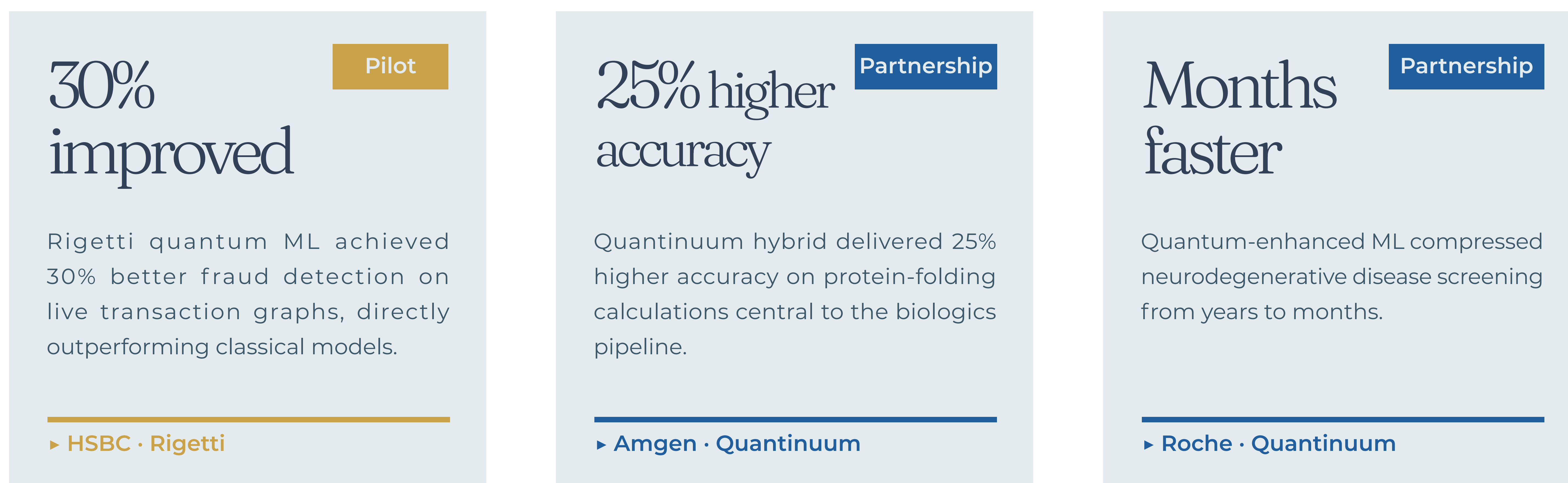
6× scale

Live

Q-CTRL quantum sensing solving infrastructure monitoring problems 6× beyond classical reach, now in active operation.

► Network Rail · Q-CTRL

Quantum ML Hybrids (Beating Classical ML)



Innovation Clusters: Research and Start-Ups

Quantum start-ups are increasingly emerging from innovation clusters; dense ecosystems that integrate accelerators, academia, research labs, and investors to turbocharge commercialization. These hubs, often co-funded by governments and industry leaders or VCs, feature greenfield facilities for Qubit fabrication and testbeds, slashing development timelines.

In Asia, Abu Dhabi's Masdar City Quantum Hub (backed by \$500M UAE funding) hosts 20+ startups focusing on photonic computing, while Tel Aviv's QuantumIL ecosystem (ILS 200M investment) leverages Israel's 1,000+ quantum patents for sensing apps, and Tokyo's Q-Leap program (\$7.4B national strategy) drives neutral-atom R&D with Rigetti collaborations.

In the U.S., Illinois' Chicago Quantum Exchange (CQE, \$200M+ from DOE/NSF) anchors 50 firms in hybrid platforms, and Maryland's Quantum Valley (via \$100M state grants) powers IonQ's trapped-ion scaling near NSA facilities. Europe counters with Munich's Quantum Valley Lower Saxony (€300M) and the UK's NQCC (£670M acceleration). These clusters are a vital incubators operating as sovereign tech fortresses, generating 40% of 2025's 15,000+ quantum patents. It should be noted that the number of patents does not necessarily represent an advantage, as the innovative nature of the patents and its contribution to the path towards fault-tolerant commercial application is the most important aspect. Additionally trade secrets are obscuring the rate of technological advancements.

Funding

The quantum industry is dual-natured: anchored by deep-pocket incumbents (Google, IBM, Amazon, Nvidia, Microsoft) and propelled by nimble, venture-backed startups innovating in engineering, software, and applications. Beyond funding, these companies provide essential infrastructure for designing and operating quantum systems, from qubit control to hybrid clouds. A larger portion of investment is going to emerging

companies (less than 4 years old), rising from 25% in 2021 to 37% in 2025, betting on novel modalities like neutral atoms over proven superconductors. On the established side, the market is concentrating its bets: 50% of all venture funding this year went to a handful of established leaders, including IonQ, Oxford Ionics, and PsiQuantum

Venture Capital

Strategic bets provides crucial funding, rivaling public investment, while connecting the ecosystem through M&A and supplier-builder linkages. Although pure venture funds include:

BlackRock

As a lead investor in PsiQuantum's \$1 billion Series E round, BlackRock's involvement signaled a major validation from mainstream finance, moving quantum from a purely venture play to a strategic, long-term infrastructure-class asset.

SoftBank Vision Fund

As a lead investor in QuEra's \$230 million dollar round. This move indicates a strong bet on the neutral-atom modality as a potentially scalable path.

Corporate VC

The incumbents are placing strategic bets via their venture arms. NVIDIA's NVentures has bet across all three major hardware modalities (QuEra, Quantinuum, PsiQuantum). Microsoft's M12, Google Ventures, and Intel Capital are similarly active, with Google Quantum AI joining the QuEra round and Intel investing in Quantum Machines in a round led by PSG Capital

Academia

The ecosystem extends beyond companies; there is a deeply symbiotic, revolving door between academia and industry. The most prominent startups are spin-outs from university labs, QuEra from Harvard, Quantinuum (via Cambridge Quantum) from Cambridge, and PsiQuantum from Bristol. Additional, leading researches come and go from positions at the likes

of Caltech and MIT to Google and IBM. The U.S. government is also fueling this engine directly. The Department of Energy (DOE) recently awarded a \$625 million grant to Caltech to act as a hub for "advancing critical R&D," a move explicitly designed to seed the next generation of commercial startups.

Government

As with all major technological breakthroughs, government agencies are crucial for funding, regulation, and ecosystem-building, treating quantum as a sovereign imperative in the AI arms race. With 33 countries now running initiatives and

\$44.5B in cumulative public investments, these programs de-risk R&D while mandating adoption in defense and critical infrastructure.

China

Remains the largest global investor. While its total \$15B commitment is cumulative, China announced a new \$138B national venture fund in 2025 specifically to accelerate investment in quantum, AI, and other critical deep-tech sectors.

United Kingdom

The UK's 10-year, £2.5B (over \$3B) National Quantum Strategy is in full swing, with significant funds being actively deployed in 2025 to build out quantum hubs and secure sovereign capabilities.

United States

Public investment now totals over \$5B, driven by the National Quantum Initiative Act (\$1.8B) and a new \$2.5B proposal for the Department of Energy's quantum programs. This is separate from the \$3.8B in private VC funding raised by U.S. startups in 2025.

Japan

In a major 2025 announcement, Japan committed \$7.4B to its national quantum strategy, focusing on building a domestic supplychain and fostering commercial applications.

European Union

The EU's collective investment has surpassed \$10B. Germany is the primary driver, treating quantum as central to its industrial and economic future.

The race is *underway*.

The year of 2025 was not the year quantum arrived, it was the year markets recognized the race has been underway. We have mapped the quantum gold rush, from trillion-dollar policy bets to shovel-selling startups positioned for near-term commercialization.

While many investors remain oblivious, or focused on Qubit milestones or distant fault-tolerant horizons, early advantages are compounding in less visible layers: startups delivering revenue from quantum sensors and secure communications, PQC migration consultants, corporates securing pilot-to-production contracts, institutions deploying billion-dollar commitments, and governments allocating tens of billions in strategic funding. These players understand that lags in computational intelligence density now implicate national security and sovereignty, beyond mere economic impact.

The ecosystem has matured sufficiently: demand pull from end-users is evident, hybrid applications are generating value today, and the strategic deterrent is shifting from theoretical to operational. This marks not merely the start of a quantum era, but the point at which prior paradigms become structurally obsolete.

Welcome to the *Intelligence Wars*

2025 was not the year quantum arrived. It was the year markets recognized the race has been underway.

Future issues will examine technology maturity, application verticals, industry convergence, and broader implications in greater depth. Next: the synergies emerging at the AI-quantum intersection, where hybrid systems elevate large language models toward oracle-like capabilities.

PUBLICATION

The Intelligence Wars • Issue I of XII
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DISCLOSURES

For informational purposes only. Does not constitute investment advice. SevenTrain Ventures holds a position in PsiQuantum, one of the companies discussed in this series. For qualified investors only.

FORWARD

Issue II examines what the Iran conflict revealed about quantum gaps in modern warfare, and where sovereign and private defense capital will travel in the decade ahead.

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All factual claims, statistics, and company-specific data cited in this report are sourced from the references listed. SevenTrain Ventures' analysis represents its independent assessment of QT and investment implications and does not constitute financial or investment advice.

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