



177 Real World Quantum Computing Use-Cases

Q4 2026

How leading corporations across ten industries are becoming
Quantum Ready

Preface — Quantum Computing: Closer Than You Think

For decades, quantum computing has been seen as a technology of the distant future—fascinating, but always just out of reach. Many assumed that practical applications were something for the next generation to worry about.

However, recent advancements in error correction and emerging quantum modalities have accelerated progress, with multiple vendors expected to deliver quantum advantage within the next two years. We now stand at the threshold of a new computational era.

This document offers a snapshot of how leading corporations are positioning themselves to become Quantum Ready. The transition won't happen overnight, but those preparing today will be the ones ready to capitalize when the breakthrough moment arrives.

The industries leading this shift are already mapping out potential use cases, identifying where quantum computing could provide an edge. From financial services optimizing complex risk models to automakers enhancing material science for electric vehicles, and pharmaceutical companies accelerating drug discovery—organizations are laying the groundwork for quantum-driven breakthroughs. Companies across banking, healthcare, automotive, defense, telecom, and energy are hiring quantum talent, investing in research, and actively exploring ways to integrate quantum capabilities into their long-term strategies.

Quantum computing is no longer a distant dream. It's coming sooner than most expect, and the time to get ready is now.

What is new in the Q4 2026 edition

The past 18 months have been the busiest period yet for enterprise quantum adoption, and this edition reflects it. The document now covers **177 real-world use-cases**, up from 68 — 109 new corporate entries, of which 69 were announced in 2025–2026 alone. The profile of the activity has changed as much as its volume: alongside the research collaborations that dominated earlier editions, **19 of the new entries describe systems already running in production** — vehicle sequencing at Ford Otosan, ECU design at Toyota, aircraft-maintenance planning at Japan Airlines, quantum-driven equity indices at SMBC, delivery-driver scheduling at Pattison Food Group, container-terminal optimization at the Port of Los Angeles — while railways, utilities, ports and hospitals are now piloting on real operational data rather than toy problems.

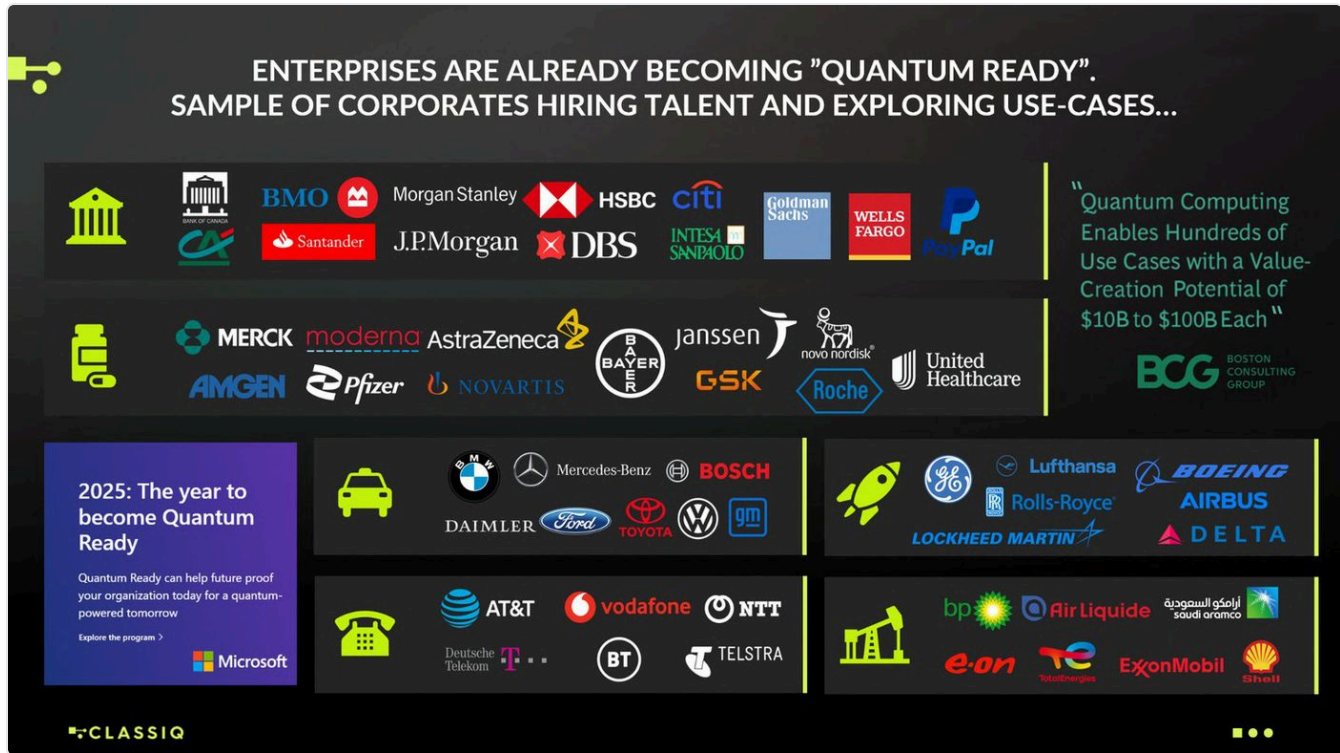
Interest is also broadening beyond the early-adopter sectors. Two new chapters, [Logistics, Supply Chain & Retail](#) and [Manufacturing, Industrial & Electronics](#), capture industries where quantum optimization has moved from experiment to daily use; a new [Insurance](#) block in Financial Services covers twelve insurers and reinsurers, from Sompo's production system to Dai-ichi Life, AXA and Munich Re; governments and hyperscale platforms have set firm quantum-safe migration deadlines; and corporates such as Aramco, EPB, Cleveland Clinic and ESA are installing quantum computers on their own premises. The direction of travel is clear: more customers, more sectors, and a steady shift from proof-of-concept toward deployment. A new page, [Which logical-qubit scale serves which use-case](#), maps all 177 entries to the hardware scale — and the year — at which each becomes runnable.

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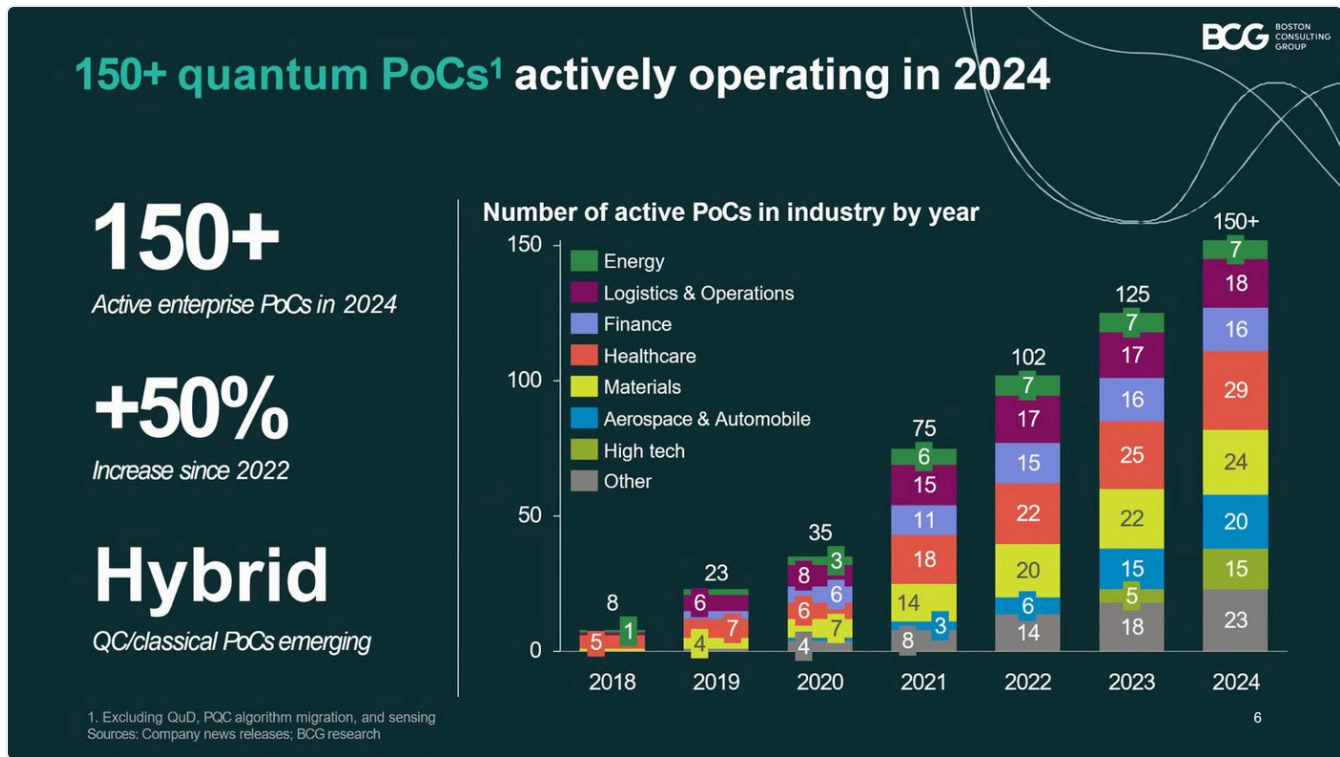
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Use-Cases — the market view

Where consultancies and vendors see the value: which industries, which problem types, and how many enterprise proofs-of-concept are already running.



Source: Classiq



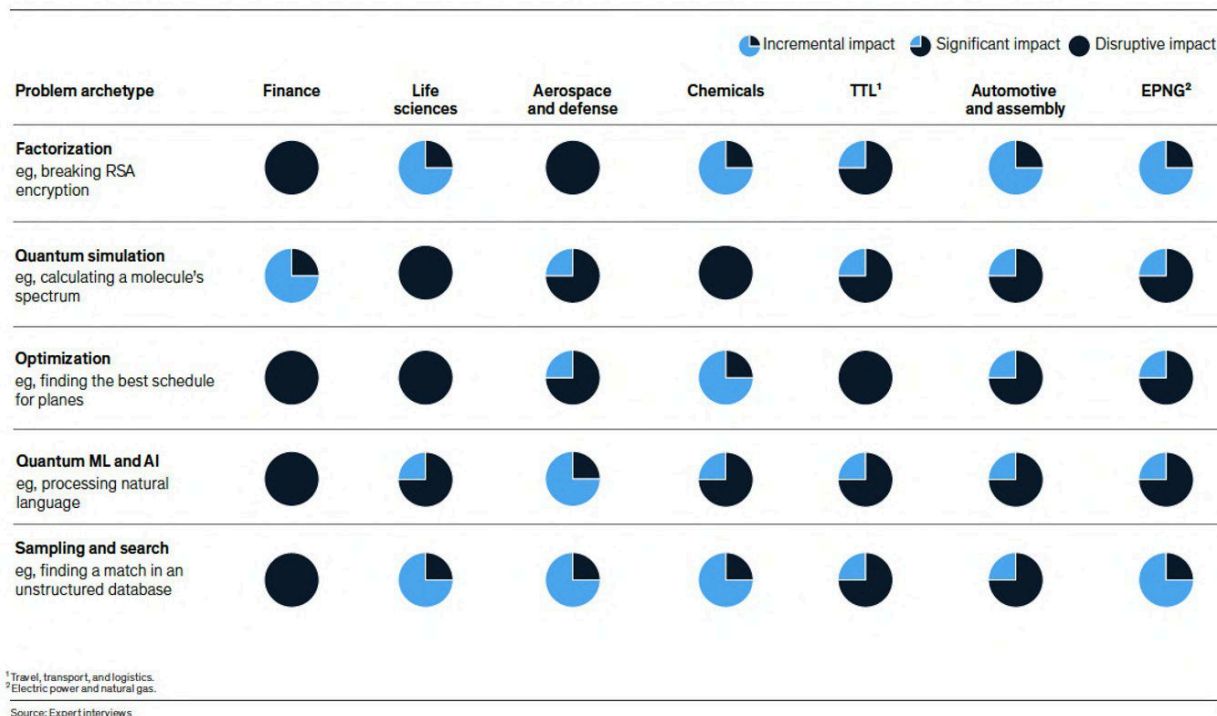
Source: BCG

QC presents a \$1T to \$2T opportunity, with rapid acceleration expected in the coming five to ten years.



Source: McKinsey & Company

The use cases most likely to have the highest value over the long term are in the finance and life sciences sectors.



Source: McKinsey & Company

Exhibit 2 - BCG's 2021 Forecast by Use Case Category

1	Quantum-advantaged mathematical function	Sparse matrix math			
4	Computational problem types	Simulation (\$175 billion–\$330 billion)	Optimization (\$100 billion–\$220 billion)	Machine learning (\$95 billion–\$250 billion)	Cryptography (\$40 billion–\$80 billion)
100+	High-value industry use cases (Sizing at tech maturity)	Pharma: Drug discovery \$40 billion–\$80 billion	Finance: Portfolio optimization \$20 billion–\$50 billion	Automotive: AV AI algorithms Up to \$10 billion	Government: Encryption and decryption \$20 billion–\$40 billion
		Aerospace: CFD \$10 billion–\$20 billion	Insurance: Risk management \$10 billion–\$20 billion	Finance: AML and anti-fraud \$20 billion–\$30 billion	
		Chemistry: Catalyst design \$20 billion–\$50 billion	Logistics: Network optimization \$50 billion–\$100 billion	Tech: Search/advertising optimization \$50 billion–\$100 billion	
		Energy: Solar conversion \$10 billion–\$30 billion	Aerospace: Route optimization \$20 billion–\$50 billion	Other use cases \$25 billion–\$110 billion	Corporate: Encryption and decryption \$20 billion–\$40 billion
		Finance: Market simulation (e.g., derivatives pricing) \$20 billion–\$35 billion			
		Other use cases \$75 billion–\$115 billion			

Sources: Industry interviews; BCG analysis.

Note: AML = anti-money laundering; AV AI = audiovisual artificial intelligence; CFD = computational fluid dynamics.

Source: BCG

Exhibit 3 - The Value Creation Potential for Quantum Computing by Problem Type at Tech Maturity

	Applications	Value creation potential ¹ (\$B)	
		Low	High
Cryptography (\$40-\$80B)	Encryption/decryption	\$40	\$80
	Aerospace: Flight route optimization	\$20	\$50
Optimization (\$100-\$220B)	Finance: Portfolio optimization	\$20	\$50
	Finance: Risk management	\$10	\$20
	Logistics: Vehicle routing/network optimization	\$50	\$100
Machine learning (\$150-\$220B)	Automotive: Automated vehicle, AI algorithms	\$0	\$10
	Finance: Fraud and money-laundering prevention	\$20	\$30
	High tech: Search and ads optimization	\$50	\$100
	Other: Varied AI applications	\$80+	\$80+
Simulation (\$160-\$330B)	Aerospace: Computational fluid dynamics	\$10	\$20
	Aerospace: Materials development	\$10	\$20
	Automotive: Computational fluid dynamics	\$0	\$10
	Automotive: Materials and structural design	\$10	\$15
	Chemistry: Catalyst and enzyme design	\$20	\$50
	Energy: Solar conversion	\$10	\$30
	Finance: Market simulation (e.g., derivatives pricing)	\$20	\$35
	High tech: Battery design	\$20	\$40
	Manufacturing: Materials design	\$20	\$30
	Pharma: Drug discovery and development	\$40	\$80

Sources: Academic research, industry interviews, BCG analysis.

¹Represents value creation opportunity of mature technology.

Source: BCG

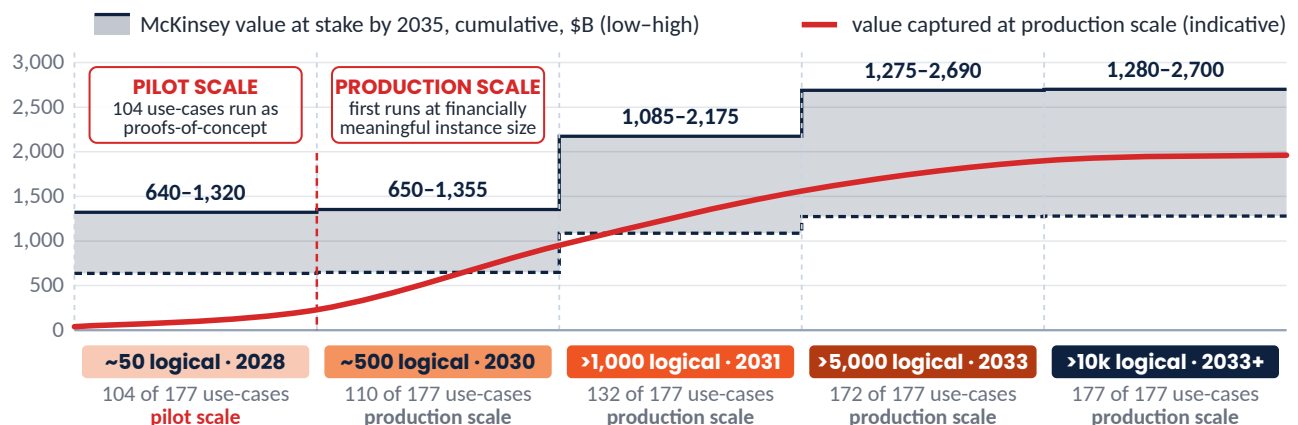
Which logical-qubit scale serves which use-case

Each of the 177 use-cases was assigned to one of eight problem families by the algorithm it relies on, and each family to the first logical-qubit scale whose budget fits it — about 50 logical qubits (expected around 2028), ~500 (2030), more than 1,000 (2031), more than 5,000 (2033) or beyond 10,000 (after 2033). Rows are the ten application domains; cell shade scales with the count. **The ~50-logical-qubit column means pilot-ready:** at that scale these use-cases run as proofs-of-concept and on-premises programmes; the same problems at production instance size start at ~500 logical qubits. Years are indicative, taken from the published roadmaps of the leading hardware vendors.

Logical qubits Year	~50 2028	~500 2030	>1,000 2031	>5,000 2033	>10k 2033+	Total	Mix by generation 100% stacked
Financial services	29	.	.	11	.	40	
Automotive & transport	15	1	4	.	1	21	
Healthcare & pharma	11	4	3	9	.	27	
Telecom	10	1	.	6	.	17	
Oil, gas & energy	14	.	3	1	.	18	
Chemical & materials	1	.	8	.	1	10	
Cyber security	4	.	.	13	.	17	
Defense & aerospace	13	.	1	.	2	16	
Logistics & retail	6	.	.	.	.	6	
Manufacturing & electronics	1	.	3	.	1	5	
All domains cumulative addressable	104 104 · 59%	6 110 · 62%	22 132 · 75%	40 172 · 97%	5 177 · 100%	177	

The dollars behind the count — McKinsey value at stake by 2035, cumulative by scale

McKinsey's \$1.3–2.7T value at stake by 2035 (Quantum Technology Monitor 2026, p.17), allocated to the same eight problem families and added up along the scale axis. The grey band shows what each scale can address; the red line, when value is captured. ~50 logical qubits is the pilot scale — its 104 use-cases run as proofs-of-concept; its value is quantum on the customer's premises, talent and first-mover position. ~500 logical qubits is where production-scale runs begin, the same problems at financially meaningful size plus the first fault-tolerant chemistry — so the curve turns upward there.



Use-case map

Every company in this document, by domain — one line on what it is doing with quantum. Click a name to jump to its entry; ↗ opens the primary source.

Financial Services

40 use-cases →

Bank of Canada — Crypto-adoption simulation (Multiverse); payments efficiency ↗
Itaú — Quantum ML churn model lifts retention precision 71% → 77.5% (QC Ware) ↗
HSBC — Pricing, portfolio optimization, QKD-secured trades with IBM ↗
PayPal — Fraud detection, credit risk and security with IBM ↗
Citigroup — Portfolio optimization with Classiq on Amazon Braket ↗
RBC — First quantum investment (Photonic) targeting portfolio optimization and risk modelling ↗
Wells Fargo — In-house quantum algorithms on IBM hardware since 2019 ↗
Bank of Montreal (BMO) — Quantum Monte Carlo for trading products (Xanadu) ↗
Crédit Mutuel — "Quantum Factory" for fraud and risk management on IBM Osprey/Eagle ↗
Morgan Stanley — Innovation team covering quantum; generalist research
Ally Financial — Quantum skills via Azure Quantum acceleration program ↗
Allstate — Hybrid quantum-classical insurance-portfolio optimization on IBM Heron ↗
Mastercard — Quantum-resistant payments; rewards optimization ↗
BBVA — 38-qubit distributed quantum simulation on AWS for future fault-tolerant apps ↗
Vanguard — Bond portfolio construction on IBM Heron quantum processor ↗
Truist — IBM Quantum Accelerator member exploring consumer-banking and credit-default use cases ↗
Standard Chartered — Quantum JV "Qubitra" for fraud detection and derivatives pricing (Fujitsu) ↗
SMBC — Equity indices built with Toshiba's quantum-inspired SQBM+ optimizer ↗
Bradesco — IBM Quantum Network member: portfolio optimization, derivative pricing, PQC inventory ↗
Satispay — Hybrid rewards optimizer with D-Wave (+50% uplift) ↗
Mizuho-DL FT — Quantum Monte Carlo for credit-portfolio VaR, 95% circuit compression (Classiq) ↗

Federal Reserve — Assessing the quantum threat to financial infrastructure ↗
Goldman Sachs — Quantum Monte Carlo toward advantage in finance ↗
Bank of America — "Fast follower" team scanning early-stage opportunities
Fidelity — Algorithms on Amazon Braket; quantum incubator since 2019 ↗
Nomura AM — D-Wave quantum annealing for stock-return prediction and portfolio optimization ↗
JPMorgan — Algorithms for portfolio optimization & fraud detection ↗
Crédit Agricole CIB — Pricing, risk and model-calibration research ↗
INSURANCE
WTW — Risk quantification and capital allocation with Microsoft quantum-inspired algorithms ↗
Aioi Nissay Dowa — Quantum ML driving-risk classifier on telematics data (Amazon Braket) ↗
OP Financial Group — Quantum-ready AI unit for banking and insurance risk (Qutwo) ↗
Sompo Japan — Risk retention vs. reinsurance optimized with Hitachi CMOS annealing, in production ↗
Munich Re — Dedicated quantum team; climate/flood risk and cargo-route optimization; QUTAC founder ↗
VidaCaixa — Investment-portfolio hedging on D-Wave, ~90% less compute time ↗
State Farm — Strategic investment in Entropica Labs to pursue insurance use cases ↗
Dai-ichi Life — General-account portfolio optimization (¥30tn) with Fujitsu quantum simulator ↗
IA Financial Group — First Canadian insurer on a hybrid quantum platform (PINQ²) ↗
Anthem — IBM Q Hub member for personalized treatment and real-time health prediction ↗
Ping An — Quantum neural network for fraud and suspicious-transfer detection (Origin Quantum) ↗
AXA — Reinsurance-programme optimization (Amazon) and quantum Monte Carlo for contract valuation (Fraunhofer) ↗

Automotive & Transportation

21 use-cases →

Ford Otosan — Ford Transit production sequencing in production (D-Wave) ↗
Network Rail — London Bridge train routing, record-size quantum optimization (Q-CTRL) ↗
Toyota Central R&D Labs — Hybrid classical-quantum chemistry, 1/140 compute cost (Quemix) ↗
Andretti Autosport — Race-time analytics with Zapata ↗
Deutsche Bahn — Rolling-stock scheduling with QAOA on real timetable data (IQM) ↗
Mercedes-Benz — EV battery chemistry simulation with IBM ↗
Porsche Digital Lab — Optimization, sensing, imaging to cut carbon footprint ↗
Mazda — Quantum ML surrogates for vehicle-frame design, 5x less training data (Q-CTRL) ↗
Nissan — First vehicle aerodynamic simulation with a quantum algorithm (Quemix) ↗
Ford — Congestion routing with Microsoft quantum-inspired tools ↗
BMW — Supply-chain optimization (Honeywell); 50+ use cases ↗

General Motors — Paint-shop sequencing on a real quantum computer ↗
Honda — Battery-materials computation on logical qubits, then invests (Quemix) ↗
U.S. Department of Transportation (USDOT) — EV-charging placement, logistics, sensing roadmap ↗
Volkswagen — Real-time traffic routing for Lisbon buses (D-Wave) ↗
Denso — Factory AGV routing, 15% less waiting time (D-Wave) ↗
Toyota — ECU connector-pin design automation, 20x faster (Fujitsu Digital Annealer) ↗
Daimler — Quantum initiative; next-gen lithium-sulfur batteries ↗
Hyundai — Quantum ML for road-sign/object detection and battery chemistry (IonQ) ↗
ÖBB & Hessische Landesbahn — Disruption management and timetabling on neutral atoms (planqc) ↗
Bosch — Materials science with IBM; investor in Zapata and IonQ ↗

Healthcare and Pharma

27 use-cases →

CCRM — Quantum bioprocess optimisation for cell & gene therapy manufacturing (IonQ) [↗](#)

Astex Pharmaceuticals — Protein-binding modeling with Riverlane [↗](#)

Chugai — Quantum phase estimation for drug-target interaction energies (Deloitte/Classiq) [↗](#)

Sourasky/Ichilov — First in-hospital quantum computing lab; QNNs decode speech from neural signals (Classiq/NVIDIA) [↗](#)

NYU Langone — Quantum algorithm simulates tissue response for quantitative MRI (Fermilab SQMS) [↗](#)

GSK — Genetic-algorithm workloads with D-Wave [↗](#)

NIH — Medical imaging, genomics and drug-discovery programs

Cleveland Clinic — On-site IBM quantum computer; \$2M Q4Bio prize for 100-qubit drug simulation (Algorithmiq/IBM) [↗](#)

Novo Nordisk Foundation — DKK 1.5B programme for a medicinal quantum computer [↗](#)

Roche — Task force; Alzheimer's discovery with Cambridge Quantum [↗](#)

Japan Tobacco — Quantum-hybrid LLM generates more drug-like molecules (D-Wave) [↗](#)

Vithas — Quantum-circuit Born machine designs BRAF V600E cancer drug candidates (Telefónica/UFV) [↗](#)

Merck — Quantum chemistry software with HQS Quantum Simulations [↗](#)

UnitedHealth Group — Optum patents and defensive publishing [↗](#)

AstraZeneca — Novel peptide therapeutics with ProteinQure [↗](#)

Janssen — Computational chemistry & ML for R&D with Qu&Co / Pasqal [↗](#)

National Cancer Center Japan — Fault-tolerant quantum algorithms for oncology drug discovery (PsiQuantum) [↗](#)

Mayo Clinic — Quantum ML decodes movement intent from EEG; Quantum Incubator program [↗](#)

Boehringer Ingelheim — Protein-ligand binding energies with quantum algorithms [↗](#)

Insilico Medicine — Quantum-enhanced generative AI designs lab-validated KRAS inhibitors (IBM) [↗](#)

Auransa — Quantum-annealed drug design 80x faster than generative AI (POLARISqb/D-Wave) [↗](#)

Bayer — Quantum-chemistry calculations on Google Cloud TPUs [↗](#)

Wellcome Sanger Institute — Hepatitis-D genome encoded on IBM Heron for quantum pangenomics [↗](#)

Siemens Healthineers — Quantum ML for cognitive healthcare with UCL [↗](#)

Pfizer — Crystal-structure prediction for molecular 3D structure [↗](#)

Moderna — mRNA design with IBM generative AI + quantum [↗](#)

Amgen — Peptide binding-affinity classification on Quantinuum [↗](#)

Telecom

17 use-cases →

SoftBank — Anomaly/fraud detection and optical-switch materials on Quantinuum hardware [↗](#)

Telefónica — Quantum-inspired LLM compression for Movistar customer service (Multiverse) [↗](#)

TIM — Live 4.5G/5G cell-ID planning on D-Wave 2000Q, 10x faster [↗](#)

China Telecom — Operates Tianyan superconducting quantum cloud (QuantumCTek), 37M visits [↗](#)

Singtel — Commercial hybrid QKD + PQC quantum-safe network for enterprises [↗](#)

AT&T — "Quantum ready by 2025": security, edge intelligence [↗](#)

TELUS — Sovereign hybrid quantum-classical data centre with Xanadu photonic QPUs [↗](#)

Vodafone — Network optimization, anomaly detection, quantum-safe VPNs [↗](#)

NTT & NTT Data — Quantum cryptography, network optimization, optical QC [↗](#)

British Telecom (BT) — QKD, routing, signal processing and beam steering [↗](#)

LG U+ — 6G LEO satellite network link optimisation on D-Wave annealer [↗](#)

Telstra — Quantum-secure networking with Australian start-ups [↗](#)

Turkcell — QKD-secured 5G mobile backhaul PoC (Juniper, ID Quantique) [↗](#)

Ericsson — Hybrid quantum-classical tracking-area planning cuts handovers 36% [↗](#)

SK Telecom — IonQ equity swap to fuse quantum with AI agents and AI data centres [↗](#)

KDDI — Base-station configuration and call-centre shift optimisation via AI-quantum platform [↗](#)

Deutsche Telekom — Quantum-safe comms; network optimization via T-Systems [↗](#)

Oil & Gas and Energy

18 use-cases →

ExxonMobil — Problem-driven energy & manufacturing research with IBM [↗](#)

TotalEnergies — CO₂ capture algorithms with Quantinuum [↗](#)

VINCI Energies — HVAC design optimization with D-Wave and QuantumBasel [↗](#)

Shell — Molecular simulation algorithms with Leiden University [↗](#)

BP — IBM Quantum Network member; generator unit-commitment on photonic hardware (Jij/ORCA/NQCC) [↗](#)

EPRI — Quantum Challenge for the electric industry [↗](#)

US DOE — National QIS centers, testbeds and \$2.5B roadmap [↗](#)

Aramco — 200-qubit neutral-atom QPU in Dhahran for well placement and CO₂ storage (Pasqal) [↗](#)

Duke Energy — Building quantum literacy for grid optimization with IBM Quantum [↗](#)

Middle Tennessee Electric — Co-op quantum testbed for battery dispatch and outage prediction (MTSU) [↗](#)

Eaton & AFRL — Grid contingency analysis against cascading outages on neutral atoms (Infleqtion) [↗](#)

EDF — EV smart-charging demand forecasts on a 100+-qubit neutral-atom QPU (Pasqal) [↗](#)

Hydro-Québec — Demand forecasting and materials simulation on IBM Quantum System One (PINQ²) [↗](#)

EPB — Utility installs IonQ Forte Enterprise for grid load balancing and outage prediction [↗](#)

Statkraft & Statnett — Hydropower scheduling with hybrid quantum algorithms (SINTEF NeQst) [↗](#)

Iberdrola — Grid-battery siting optimized with quantum and quantum-inspired algorithms (Multiverse) [↗](#)

Eni — "EniQuantic" JV for hybrid quantum-classical optimization on its HPC6 supercomputer [↗](#)

E.ON — Energy-price and hedging simulation under weather uncertainty on IBM hardware (Qiskit) [↗](#)

Chemical & Materials

10 use-cases →

Johnson Matthey — Fuel-cell catalyst discovery with Azure Quantum; Rigetti live demo [↗](#)
BASF — Molecular structures, catalysts and battery materials [↗](#)
Covestro — Five-year quantum-algorithm programme for materials and catalysts (QC Ware) [↗](#)
Nippon Steel — Iron-lattice simulation and steel scheduling on trapped ions (Quantinuum) [↗](#)
Mitsubishi Chemical — 97% circuit compression (Classiq); EUV photoresist simulation (Xanadu, PsiQuantum) [↗](#)

Unilever — Azure Quantum Elements molecular simulation for consumer formulations (Microsoft) [↗](#)
Mitsui Chemicals — Quantum-compressed NLP model for patent search, new applications (blueqat) [↗](#)
Syngenta — Modelling crop-protection molecules with QuantumBasel's quantum hub [↗](#)
Evonik — Quantum-inspired multi-objective CFD geometry optimisation (Terra Quantum) [↗](#)
JSR — Simulating photoresist chemistry on quantum hardware (IBM, Quantinuum) [↗](#)

Cyber Security

17 use-cases →

IBM — Patent: quantum ML for attack-path threat detection [↗](#)
US Department of War — Enterprise cryptographic inventory for PQC migration (SandboxAQ) [↗](#)
Cisco — Quantum networking, QKD and quantum-safe standards
Government of Canada — Federal PQC migration roadmap with 2031/2035 deadlines [↗](#)
North Wales Police — Hybrid quantum app for officer deployment, planning cut from months to minutes (D-Wave) [↗](#)
Zoom — First UCaaS with post-quantum end-to-end encrypted meetings (Kyber-768) [↗](#)
Meta — Hyperscale PQC migration framework, PQ TLS on internal traffic [↗](#)
Cloudflare — Post-quantum encryption on 65% of human web traffic [↗](#)
Singapore CSA — Critical infrastructure ordered quantum-safe by end-2031 [↗](#)

US Federal Government — Executive Order mandates PQC migration by 2030–2031 [↗](#)
Australia ASD — Cease RSA/ECC by 2030, national PQC planning guide [↗](#)
UK NCSC — National three-phase PQC migration roadmap to 2035 [↗](#)
European Commission — EU-wide coordinated PQC transition roadmap (2030 high-risk) [↗](#)
Signal — Quantum-safe group-messaging metadata with modified ML-DSA (IBM) [↗](#)
EPRI — AI-enhanced cybersecurity for utilities [↗](#)
Defence Cyber Marvel 3 (DCM3) — Secure distributed-data circuits (Inflection / OQC)
Apple — PQ3 post-quantum protocol protecting iMessage end-to-end [↗](#)

Defense & Aerospace

16 use-cases →

Japan Airlines — Quantum/optimisation tool for aircraft-maintenance planning in production (A*Quantum) [↗](#)
Davidson Technologies — On-prem D-Wave Advantage2 for missile-defence and military-logistics optimisation [↗](#)
Rolls-Royce — Hybrid CFD for jet engines with Classiq and NVIDIA [↗](#)
Thales — Satellite mission planning and radar-antenna simulation on quantum hardware (Pasqal, Alice & Bob) [↗](#)
ESA — On-premises quantum computer for Earth-observation data processing (Equal1 Bell-1) [↗](#)
GE — Risk aggregation and aviation service optimization with IonQ [↗](#)
Lockheed Martin — USC-Lockheed Martin Quantum Computing Center [↗](#)
Boeing — Corrosion chemistry and composite ply-stacking optimization [↗](#)

Vueling — Aircraft-to-flight-schedule assignment with hybrid quantum annealing (D-Wave) [↗](#)
AFRL — On-premises trapped-ion quantum system for quantum-networking research (IonQ) [↗](#)
Airbus — Fuel-cell modeling, flight-path optimization, aircraft loading [↗](#)
Delta Air Lines — Multi-year IBM Quantum Network contract [↗](#)
DARPA — Quantum Benchmarking Initiative vetting utility-scale quantum computers by 2033 [↗](#)
Lufthansa — Airport scheduling, routing and gate assignment [↗](#)
NASA — Photonic optimisation solver for radar phase unwrapping and LiDAR de-noising (QCi) [↗](#)
HENSOLDT — Quantum optimisation of radar resource management (DLR Quantum Computing Initiative) [↗](#)

Logistics, Supply Chain & Retail

6 use-cases →

CMA CGM — Container management and ship-loading optimization (Pasqal) [↗](#)
DP World — Port logistics, fleet and traffic optimization exploration (D-Wave) [↗](#)
Fenix Marine Services — Container-terminal crane and yard optimization at Pier 300 (D-Wave) [↗](#)

Pattison Food Group — Weekly e-commerce driver scheduling in production (D-Wave) [↗](#)
Einride — Electric/autonomous freight fleet orchestration (IonQ) [↗](#)
Amerijet — Air-cargo load planning boosting payload up to 30% (Quantum-South) [↗](#)

Manufacturing, Industrial & Electronics

5 use-cases →

POSCO Holdings — Quantum AI for green steelmaking and battery-material design (Pasqal, Qunova) [↗](#)
Siemens Digital Industries — Quantum multiphysics simulation for digital twins (Pasqal) [↗](#)
LG Electronics — Multiphysics simulation, optimization and materials discovery (Pasqal) [↗](#)

Samsung SAIT — Quantum-inspired simulation of 14 OLED emitter materials (OTI Lumionics) [↗](#)
Kobe Steel — Joint Quantum Center of Excellence for alloy design and production scheduling (Jij) [↗](#)

The financial services sector has historically been an early adopter of advanced computing technologies to gain a competitive edge. From mainframes in the 20th century to high performance computing for algorithmic trading, the industry has consistently embraced cutting-edge solutions. Quantum computing is the next frontier, offering transformative potential for optimization, risk analysis, and real-time data processing. Early investments in quantum research by banks and investment firms signal their commitment to leveraging this technology. By [exploring its capabilities](#) early, financial institutions aim to solve previously intractable problems, enhance efficiency, and stay ahead in an increasingly complex and competitive market.



The Bank of Canada uses quantum computing for complex financial challenges, including simulating cryptocurrency adoption among non-financial companies in a ten-person network, partnering with Multiverse Computing to model various outcomes. The researchers' model can complete in half an hour what would take a regular PC longer than a human lifetime.

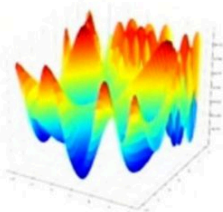
- [Bank of Canada Using Quantum Computing to Simulate Crypto Adoption Scenarios](#)
- [Improving the Efficiency of Payments Systems Using Quantum Computing - Bank of Canada](#)

Itaú Unibanco gave QC Ware two years of anonymized data (~180,000 data points) to build a quantum machine-learning customer-retention model using determinant sampling; the quantum-derived method raised model precision from 71% to 77.5% and detected 2% more customer withdrawals, running today on classical hardware and ready for future quantum machines (2022).

- [QC Ware Applies Quantum Computing Principles to Increase Customer Retention at Itaú Unibanco](#)

HSBC collaborates with IBM and other partners to explore quantum computing's potential for pricing, portfolio optimization, achieving net-zero goals, and addressing fraud. The bank has tested quantum key distribution for secure trades, joined a quantum secure metro network, and is enhancing cybersecurity by connecting its global headquarters using quantum key distribution.

QC to Solve Hard FS Problems



Optimisation Models

- Portfolio Optimisation
- Collateral Optimisation
- Transaction Settlement
- Arbitrage Opportunities
- Stress Testing
- Asset Pricing
- ATM Replenishment



Machine Learning

- Fraud Detection
- Credit Scoring
- Financial Time Series
- Data Augmentation
- ML Training



Simulation Models

- Pricing Instruments
- Credit Value Adjustment
- Risk Analysis & Management
- LPDE Simulation & Monte Carlo
- Arbitrage Opportunities

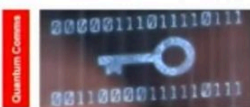


Improved Security

- Quantum Key Encryption
- Quantum Blockchain
- Quantum Currency

Quantum could result in quadratic to exponential speedup

Projects In Motion / Under Scoping



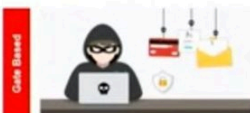
Quantum Key Distribution

Sponsors: Cyber

Telecoms Services:

US National Institute for Standards and Technologies (NIST) have published a document showing that quantum computers present an increasing risk to common methods of secure key exchange.

The trial with telecom company will allow us to experiment QKD based security protocols from one location to another location. Alongside Post Quantum Cryptography, we expect this to be a necessary capability to protect bank and customer data against future quantum computing attacks.



Transactional Fraud Detection

Sponsor: WPB

Financial fraud and unauthorised payments result in millions of pounds of lost revenue each year. For example in the UK ~£600m was lost in 2019 on a card transaction total of £829bn [UK Finance, Fraud the Fact 2020 report]. The UK market experiences the most fraud, but solutions are globally applicable.

The use case being progressed with IBM is to develop quantum computing protocols for improved anomaly detection. This aim is to significantly reduce fraud losses and improve customer experiences by leveraging Quantum Machine Learning models.

Initiated (internal / IBM)



Pricing Optimisation

Sponsor: GTRF

Dynamic transactional pricing creates the opportunity to respond to current market conditions and provide flexible pricing options to customers.

Transaction pricing at HSBC is static relying on historical data and fixed for a specific period of time. The computational speed of the annealing platform will transition HSBC from static to dynamic transaction pricing.

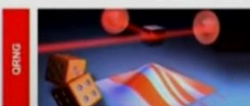


Collateral Optimisation

Sponsor: MSS

Around \$5 of inventory is to be allocated to manage, substitute and pledge eligible collateral assets in the most cost effective way to meet liquidity and risk management demands.

A POC is being developed with — to assess whether a hybrid quantum-classical solution using their tech stack is able to better optimise for basis point savings, impacting P&L and increased usage of triparty agents. Company has demonstrated a 6 basis point improvement with another FI.



QRNG for Monte Carlo Simulation

Sponsor: MSS

Many models within the bank

The project aims to demonstrate the advantages of using quantum random number generators (QRNGs) instead of pseudo- or quasi-random numbers for stochastic modelling. The quality of the randomness of the numbers used in techniques such as Monte Carlo methods affects properties such as accuracy and time to convergence which are key to the effective application of modelling.

Project commences in October (with Quantum Dice and Hartree)

INTERNAL

6

PayPal and IBM partnered to explore quantum computing for improving fraud detection, credit risk, and security. PayPal's emerging tech division includes quantum computing and cryptography among its focuses.

➤ [Inside PayPal's partnership with IBM to use quantum computing to improve how it detects fraud](#)

Citigroup identified quantum computing's potential in finance in 2019, emphasizing its benefits. Their increased research investment in quantum computing in 2020 was noted but undisclosed in detail.

➤ [Citi and Classiq advance quantum solutions for portfolio optimization using Amazon Braket](#)

Royal Bank of Canada (RBC)

RBC made its first quantum-computing investment by joining Photonic Inc.'s C\$180 million round (first close), citing potential financial-sector applications "ranging from security through to portfolio optimization and risk modelling" (January 2026). RBC also funds quantum-safe cryptography research with the University of Waterloo.

➤ [RBC makes first quantum computing investment in Photonic](#)

Wells Fargo has been building partnerships and [even creating quantum algorithms](#) for years.

For example, the company joined the [IBM Quantum Network](#) in 2019 and has dedicated a team of quantum researchers and programmers through the [partnership with IBM](#). Wells Fargo published six papers on quantum algorithms in 2022 — and more are coming.

"We're building quantum-friendly algorithms and we test them on IBM's infrastructure," Mehta said. "[What we're saying is], as the value and usefulness of quantum computers starts to emerge, these are the kind of algorithms we want to execute."

Recently, Wells Fargo researchers have started exploring the larger systems IBM is developing, including the 433-qubit IBM Osprey processor, the most recent and largest to-date quantum processor IBM has deployed.

➤ [Q2B 2022 SV | Quantum Computing at Wells Fargo | Constantin Gonciulea | Wells Fargo](#)

The Bank of Montreal (BMO) is exploring QC's potential to enhance trading product accuracy. Teaming up with Xanadu, BMO aims to leverage Xanadu's quantum Monte Carlo algorithm for computational speedups and improved trading product accuracy.

➤ [BMO Financial Group Partner with Xanadu on Quantum Speedups for Trading Products](#)

Crédit Mutuel Alliance Fédérale (Euro-Information) and its IT arm Euro-Information moved their IBM Quantum collaboration from a 2022 pilot phase into a scaling phase, standing up a "Quantum Factory" of multidisciplinary teams to industrialize use cases in fraud management, risk management and customer experience using IBM's 433-qubit Osprey and 127-qubit Eagle systems with Qiskit Runtime error mitigation (2023).

➤ [Crédit Mutuel Alliance Fédérale and Euro-Information Collaborating with IBM to Shape the Bank's Quantum Future](#)

Morgan Stanley has an innovation and tech team. One of their responsibilities is to cover quantum computing. The business has also put out several generalist articles covering the potential of the technology.

Ally Financial leverages Microsoft's Azure tools to develop quantum skills, collaborating in the Enterprise Acceleration Program to explore use cases and build expertise while forming partnerships in the quantum ecosystem.

➤ [Ally Financial joins Azure Quantum to transform customer experiences](#)

Allstate, a corporate partner of the Chicago Quantum Exchange since 2025, worked with IBM on hybrid quantum-classical workflows that optimize insurance risk portfolios, running the quantum sub-problems on IBM Heron processors (June 2026). It is the first insurer in this document and a candidate anchor for an insurance sub-section.

➤ [Allstate and IBM Deploy Hybrid Quantum-Classical Workflows to Optimize Insurance Risk Portfolios — Quantum Computing Report](#)

Mastercard advances quantum-resistant technology for contactless payments, explores quantum computing's potential in banking services like rewards programs, and participates in QCoir to unify Ireland's quantum research groups.

➤ [How Mastercard is preparing for a quantum future](#)

BBVA, with VASS's quantum team and AWS, completed a pilot distributing Qiskit quantum-algorithm execution across many classical servers in the AWS cloud, scaling noise-free simulation to 38 qubits so the bank can test financial algorithms as they would run on a fault-tolerant quantum computer (2024). BBVA is also a founding member of Europol's Quantum Safe Financial Forum.

➤ [BBVA runs successful trial of distributed quantum simulation in the cloud](#)

Vanguard and IBM developed hybrid quantum-classical algorithms for constrained bond-portfolio construction (liquidity, transaction cost and regulatory limits) and ran them on the IBM Quantum Heron r1 processor, building realistic portfolios at a scale Vanguard says "far exceeded" its expectations and matching or beating classical methods on some instances (research, September 2025).

➤ [Vanguard, IBM explore quantum computing in portfolios | Vanguard](#)

Truist joined the IBM Quantum Accelerator program and installed IBM "Innovators in Residence" on site to reach a "quantum-ready state," prioritizing quantum use cases in consumer banking, payments, credit-default prediction and cyber defense with cloud access to IBM quantum systems (2023).

➤ [Truist and IBM Collaborate on Emerging Technology Innovation and Quantum Computing](#)

Standard Chartered (SC Ventures)'s venture arm SC Ventures and Fujitsu launched Qubitra Technologies, a London-based joint venture building quantum and quantum-inspired applications (on Fujitsu's Digital Annealer and quantum hardware) for fraud detection, derivatives pricing and markets trading, with Standard Chartered Bank as the initial implementation partner. The roadmap published in January 2026 targets a first client go-live in early 2026 and a marketplace MVP pilot during the year.

➤ [Fujitsu and SC Ventures announce roadmap for Qubitra Technologies, a new joint venture for quantum-powered applications and platform | Standard Chartered](#)

Sumitomo Mitsui Banking Corporation (SMBC)

SMBC and Toshiba launched the "SMBC/TOSHIBA Quantum Driven Diversified" Japan and U.S. equity indices, whose constituents are selected quarterly by Toshiba's Simulated Bifurcation Machine (SQBM+) to solve the large-scale combinatorial problem of building low-correlation portfolios. Index calculation has started (S&P Dow Jones Indices calculates and distributes daily) and SMBC is pitching index funds and ETFs based on them to asset managers (2026).

➤ [SMBC and Toshiba Jointly Develop New Equity Indices Using Advanced Quantum-Driven Technologies | Toshiba](#)

Bradesco

Brazil's Bradesco joined the IBM Quantum Network to run experiments in portfolio optimization and cash distribution, macroeconomic forecasting and European option pricing, while in parallel using IBM Quantum Safe Explorer to build a cryptographic bill of materials, piloted on its Open Finance application (2023). The bank expects practical quantum applications within 5–10 years.

➤ [Bradesco inicia jornada de criptografia pós-quântica com a IBM](#)

Satispay and D-Wave Quantum are partnering to develop a quantum-hybrid application that enhances customer rewards programs by 50% with the same budget. The application will be utilized weekly by Satispay's internal teams as it transitions into production, supporting the fintech's increasing adoption in Italy and France.

➤ [D-Wave and Satispay Aim to Accelerate Growth of Leading European Payment Network through Quantum-Fueled Customer Rewards Program](#)

Mizuho-DL Financial Technology (Mizuho Financial Group) with Sumitomo Corporation,

the quant subsidiary of Mizuho and Dai-ichi Life, supplied quantum Monte Carlo algorithms for credit-portfolio risk / Value-at-Risk calculations, which Sumitomo Corporation implemented on Classiq's platform; the circuits were compressed by up to 95% in depth without materially increasing qubit count, a step toward running risk simulations on near-term hardware (2025).

➤ [Classiq Powers Quantum Breakthrough with Sumitomo Corporation and Mizuho-DL Financial Technology](#)

Federal Reserve prioritizes fostering an innovative environment and protecting the nation's financial infrastructure, including the development and implementation of quantum computing technologies.

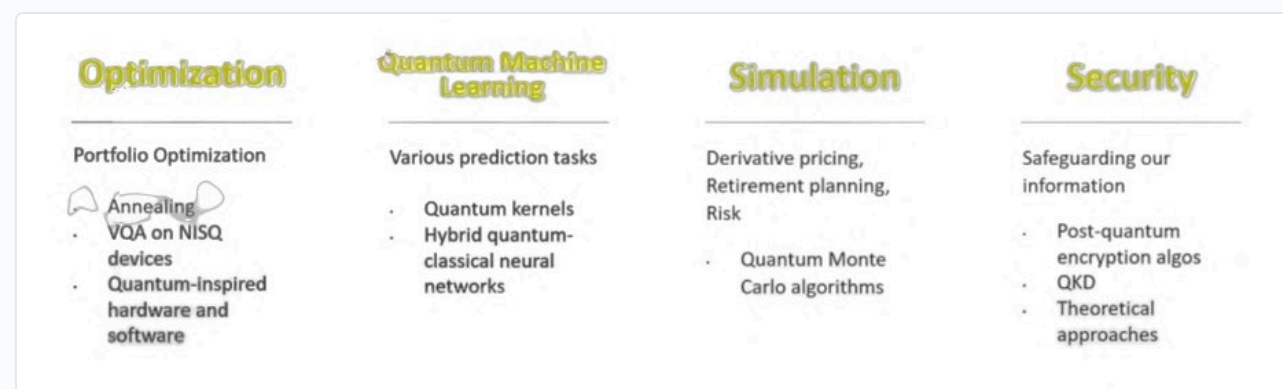
➤ [Federal Reserve - Assessing The Quantum Threat By The Numbers-Finally](#)

Goldman Sachs substantial research team aims to demonstrate quantum advantage in finance problems by leveraging superior quantum algorithms for Monte Carlo simulations, tailored for near-term quantum hardware.

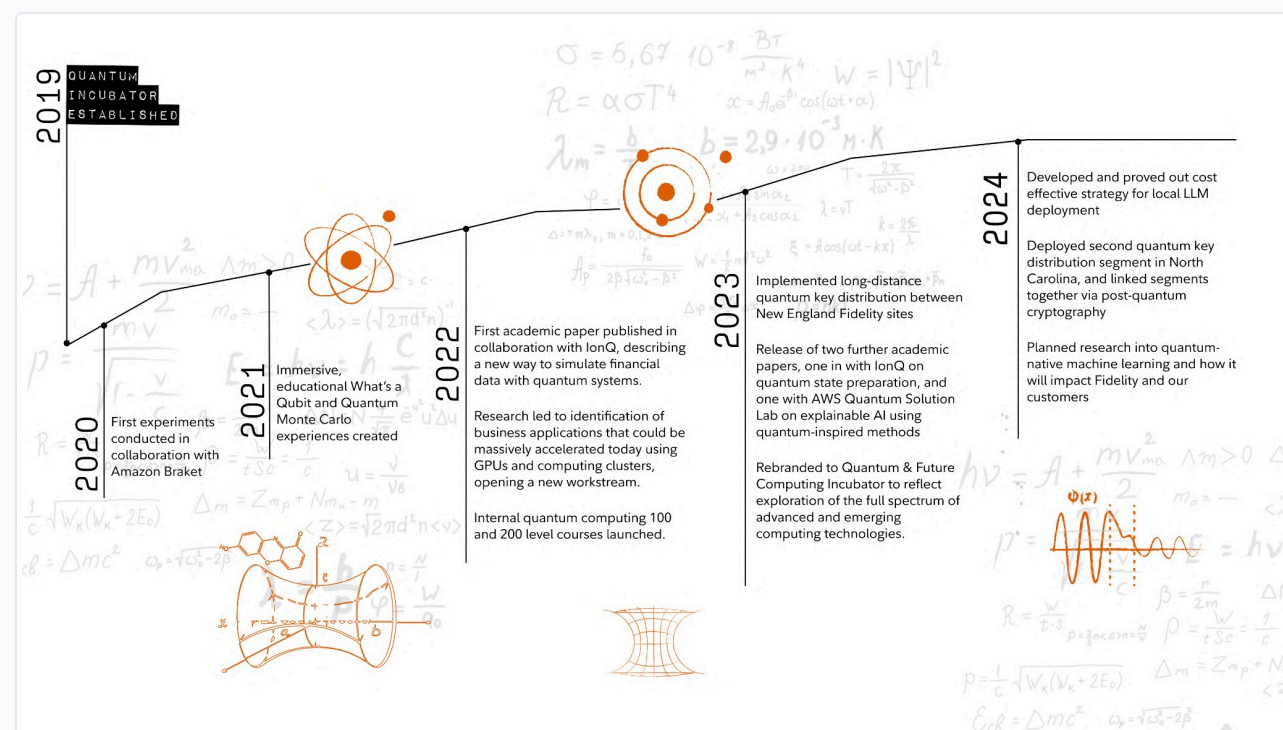
➤ [Engineering Quantum Algorithms | Goldman Sachs](#)

Bank of America is gradually engaging in quantum tech through webinars and events with a small dedicated team, adopting a "fast follower" approach. Their investment banking division actively explores early-stage opportunities in this realm.

Fidelity has been working on developing quantum algorithms and running them through [Amazon's Braket](#), a cloud service that utilizes quantum computers from D-Wave, [IonQ](#), and [Rigetti](#).



- [Q2B 2022 SV | Quantum Computing - Fidelity Center for Applied Technology](#)
- [Fidelity Center for Applied Technology - Quantum Incubator and Future Computing](#)



Nomura Asset Management

Nomura Holdings and Nomura Asset Management have run a joint research programme with Tohoku University on D-Wave's quantum annealer since 2018, using its ability to draw ~800,000 samples at once for stock-return prediction, portfolio optimization and risk simulation; a related deep-learning return-prediction model has been incorporated into live fund strategies, while the annealer work remains research-stage.

- [Nomura tests a quantum approach to asset management](#)

JPMorgan delves into quantum algorithms for AI and optimization, [publishing experiments](#) and exploring use cases like portfolio optimization and fraud detection. They collaborate with Q-NEXT to advance quantum technology.

Advancements in Quantum Algorithms – Portfolio Optimization

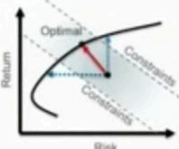
arXiv

NISQ-HHL: Portfolio Optimization for Near-Term Quantum Hardware

- First formulation of HHL suitable for the **end-to-end execution** of small-scale portfolio-optimization problems on NISQ devices
- Extends HHL with HW capabilities: **mid-circuit measurement, qubit reset and reuse, Quantum Conditional Logic (QCL)**
- First algorithm to incorporate a **QCL-enhanced version of Phase Estimation** executed on real hardware

arXiv

Portfolio Optimization via Quantum Zeno Dynamics on a Quantum Processor



- Restricts evolution of a quantum system to the subspace defined by repeated measurements
- **Transitions outside of this subspace are suppressed**
- Solution for **constrained optimization** with support for **inequality constraints**
- **Applicable to NPO class** (only restriction we impose on a constraint is the existence of an oracle)
- **Broad applicability**, integrated into QAOA
- Analytical demonstration that achieving a constant minimum success probability in QAOA requires a number of measurements independent of the problem size for a specific choice of mixer operator

arXiv

Universal Quantum Speedup for Branch-and-Bound, Branch-and-Cut, and Tree-Search Algorithms

- Solving MIPs is NP-Hard in general, but several solvers, e.g., Branch-and-Cut solvers, can obtain near-optimal solutions for problems of intermediate size
- Montanaro proposed a quantum algorithm with a near-quadratic speedup in the worst case, when every optimal solution is desired
- In practice, however, a single near-optimal solution is satisfactory and can perform much better than the worst-case guarantee
- **Incremental-Quantum-Branch-and-Bound** has **universal near-quadratic speedup** over classical Branch-and-Bound algorithms for every input, i.e., if a classical Branch-and-Bound algorithm has complexity Q on an instance that leads to solution depth d , Incremental-Quantum-Branch-and-Bound offers the same guarantees with a complexity of $O(\sqrt{Qd})$
- **Guaranteed near-quadratic speedup** whenever $Q \gg d$.

JPMORGAN CHASE & CO.

➤ [Q2B 2022 SV](#) | [Quantum Technology at JP Morgan Chase](#) | [Marco Pistoia](#) | [JP Morgan Chase & Co.](#)

Crédit Agricole CIB

Quantum Computing in Finance

Daily computations

- Banks run a lot of computations on a daily basis to solve different types of problems :
 - **Pricing financial instruments** : Calculating the price of tailor-made payoffs accurately
 - **Portfolio optimization under constraints** : Asset allocation, optimal hedging
 - **Risk estimation and forecast** : Tail risk, sensitivities to risk factors, scenario-based stress tests
 - **Other model calibration** : Rating models, asset dependent LGDs, correlation and volatility models etc.

→ Computation **Accuracy** and **Speed** are **key to perform in the financial industry**

Failing to deliver fast and accurate calculations generates commercial and financial losses

8 décembre 2022 11

➤ [Q2B 2022 SV](#) | [Credit Agricole CIB at the Forefront of Quantum Computing](#) | [Achraf Seddik](#) | [CIB](#)

WTW (Willis Towers Watson)

Broker and advisor Willis Towers Watson announced an exclusive collaboration with Microsoft to build quantum applications for risk quantification, capital allocation and insurer modelling, starting with quantum-inspired algorithms on Azure (2019). No public follow-up has been found since.

➤ [Willis Towers Watson and Microsoft announce quantum computing collaboration to transform risk management](#)

Aioi Nissay Dowa Insurance (MS&AD)

Aioi Insurance Services USA, part of MS&AD's Aioi Nissay Dowa, built a quantum neural-network binary classifier for "safe/fail" driving-risk scores from telematics data of SAE Level 1-2 vehicles, as an exploratory proof of concept on Amazon Braket (2021).

➤ [Using Quantum Machine Learning with Amazon Braket to Create a Binary Classifier — AWS Quantum Computing Blog](#)

OP Financial Group

Finland's OP Financial Group, a bank-insurer, formed a joint unit of some 60 specialists with Helsinki start-up Qutwo to bring "quantum-ready" hybrid AI tooling to risk management, investment optimization and fraud detection across its banking and insurance businesses (July 2026).

➤ [OP and Qutwo Debut Quantum Computing Partnership — Global Finance](#)

Sompo Japan Insurance and Sompo Risk Management use Hitachi's CMOS Annealing machine — a quantum-inspired Ising solver — to optimize the non-life insurance portfolio, deciding how much natural-catastrophe risk to retain and how much to transfer to reinsurers, a problem of roughly 22 million spins. Described as the first use of a pseudo-quantum computer in an insurer's core operations, the system went into production use from April 2022.

➤ [Sompo Japan Insurance Begins Using Quantum Inspired Computer in Insurance Underwriting Operations | Hitachi](#)

Munich Re has run a dedicated quantum computing team since 2020, exploring building-level flood and climate vulnerability probabilities, cargo-route risk for its Transportation Cover (a travelling-salesman-type optimization) and pandemic scenario modelling, and is a founding member of the German industry consortium QUTAC alongside BASF, BMW, Bosch, SAP and Siemens (2021). Its 2026 Tech Trend Radar still classes quantum computing as a longer-term bet.

➤ [Munich Re: Understanding, calculating and hedging complex risks — QUTAC](#)

➤ [Additional source: munichre.com](#)

VidaCaixa (CaixaBank Group), CaixaBank Group's life insurer and pension manager, worked with D-Wave to calculate the hedging of its investment portfolio with a quantum-hybrid application on the Advantage annealer via the Leap cloud, cutting computation time by about 90% (from hours to minutes) in what the group called the first application of quantum computing to investment hedging in the insurance sector (2022).

➤ [CaixaBank Group, D-Wave Collaborate on Innovative New Quantum Applications for Finance Industry](#)

State Farm Ventures joined a US\$5.5M extension of quantum error-correction software company Entropica Labs' Series A, with the stated intent of testing its tools on insurance use cases (September 2024).

➤ [Entropica Labs Secures \\$5.5M Investment from State Farm Ventures to Advance Quantum Error Correction and Pursue Insurance Use Cases](#)

Dai-ichi Life Group and Fujitsu launched a joint research programme (April 2026–March 2027) applying quantum algorithms to multi-asset portfolio optimization of Dai-ichi Life's roughly ¥30 trillion general account — equities, bonds and alternatives allocated against the insurer's liability profile — on Fujitsu's 40-qubit quantum simulator, with verification on real quantum hardware. The company notes that a 1 basis-point improvement in return is worth about ¥3 billion a year. Dai-ichi Life also co-owns Mizuho-DL Financial Technology, whose quantum Monte Carlo work with Classiq appears above.

➤ [Fujitsu and Daiichi Life Group Launch Joint Research to Advance Asset Management with Quantum Technology | Fujitsu Global](#)

iA Financial Group, the Québec-based life, health and wealth insurer, formed a strategic partnership with PINQ² and the AlgoLab at Université de Sherbrooke's Institut quantique to run financial-model optimization, portfolio management, risk analysis and client-experience personalization on PINQ²'s hybrid quantum-classical platform, describing itself as the first Canadian insurer to do so (April 2026).

➤ [iA Financial Group Forms Strategic Partnership with PINQ² and Algotab to Pioneer Quantum Computing in the Canadian Insurance Industry](#)

Anthem (Elevance Health)

Health insurer Anthem (now Elevance Health) joined NC State University's IBM Q Hub to explore quantum computing for personalized treatment options and real-time prediction of health conditions, gaining access to IBM's quantum fleet (2020).

➤ [Health Care Company Anthem Joins NC State's IBM Q Hub — NC State News](#)

Ping An Insurance

Ping An Technology's Lambda Lab developed a quantum neural-network model for detecting suspicious transfers and fraud on Origin Quantum's superconducting hardware in Hefei, reporting faster response in its financial services (2023).

➤ [Chinese financial industry banks on quantum computing to help combat fraud — South China Morning Post](#)

AXA runs a dedicated quantum computing lead inside Group Operations' R&D and has published two workstreams: with the Amazon Advanced Solutions Lab, a study of reinsurance-programme optimization comparing simulated annealing with quantum branch-and-bound, which concludes that substantial hardware and algorithmic advances are still needed before quantum advantage (2025); and with Fraunhofer ITWM, a pre-study of quantum amplitude estimation for valuing insurance contracts with dynamic lapse behaviour, tested on simulators and real quantum hardware (2022).

➤ [Modern Computational Methods in Reinsurance Optimization: From Simulated Annealing to Quantum Branch & Bound \(arXiv 2504.16530\)](#)

➤ [Additional source: arxiv.org](#)

The age of quantum computing is fast approaching, and the financial services industry is already [preparing now](#). Increased capital investments and patent filings for hardware technology indicates spending on quantum-related capabilities will likely grow quickly over the next few years. Globally, the financial services industry’s spending on quantum computing capabilities is expected to grow 233x from just US\$80 million in 2022 to US\$19 billion in 2032, growing at a 10-year CAGR of 72%. Firms that are working on developing quantum-related capabilities now could enjoy a competitive advantage as these capabilities mature. ([Quantum computing in financial services | Deloitte Insights](#))

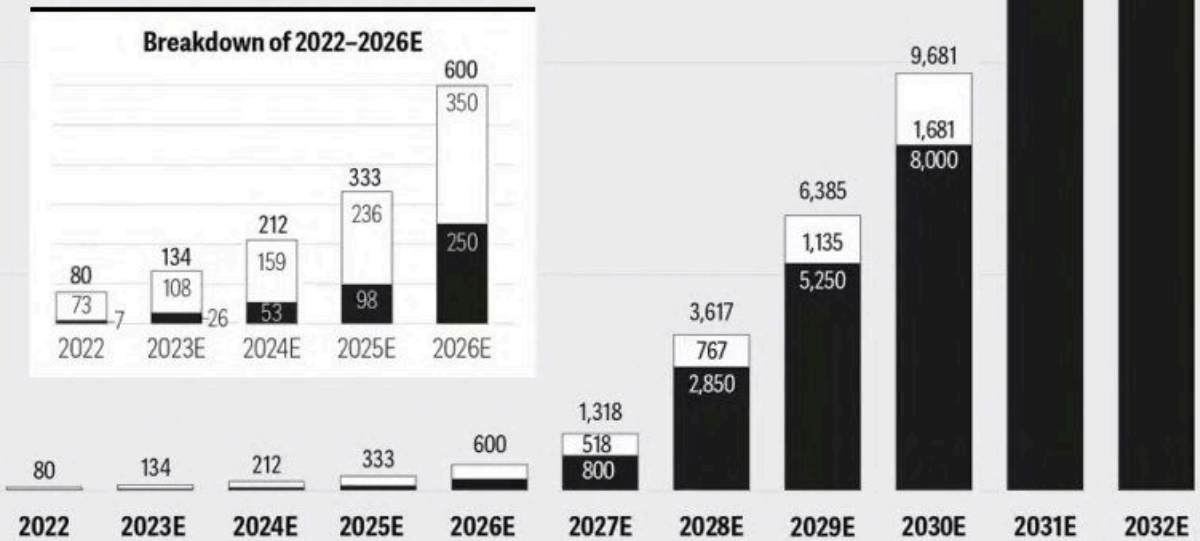
The financial services industry’s spending on quantum computing is expected to rise significantly

FSI spending on quantum computing capabilities (US\$ million), 2022–2032

☐ Spending on defensive capabilities ☒ Spending on offensive capabilities

We calculated defensive spending using the median quantum cryptography market size estimates of multiple market research reports with adjustments to get the share of the FSI spending. The offensive spending is a summation of the estimated spending on quantum computing talent and hardware by FSIs.

Deloitte Insights | deloitte.com/insights



Try it — Classiq library examples

- [Classiq > Applications > Finance > Credit card fraud detection](#)
- [Classiq > Applications > Finance > Estimating European Option Price Using Amplitude Estimation](#)
- [Classiq > Applications > Finance > Portfolio Optimization with QAOA](#)
- [Quantum Finance | Classiq](#)

The automotive sector will see significant QC impacts by 2025-2030, continuing through 2030-2035. QC can enhance [materials science](#) for lighter, stronger materials, optimize manufacturing processes, and improve autonomous vehicle algorithms.

- [Quantum Computing In The Automotive Industry What's Next](#)
- [Automotive Industry Challenges Addressed](#)
- [Autonomous Vehicles Enhanced Safety](#)
- [Current State Of Quantum Adoption](#)
- [Supply Chain Optimization Strategies](#)
- [Optimizing Vehicle Design Processes](#)
- [Automotive Quantum Computing Market Projected to Grow to \\$5B](#)
- [Predictive Maintenance Revolutionized](#)
- [Material Science Breakthroughs Expected](#)
- [Electric Vehicle Battery Innovations](#)
- [Cybersecurity Threats Mitigated Effectively](#)

Ford Otosan (the Ford-Koç Holding joint venture in Turkey) deployed a hybrid quantum application built on D-Wave's annealing quantum computers to sequence production of the Ford Transit line, which has more than 1,500 variants. The application cut scheduling time for 1,000 vehicles per run from 30 minutes to under five and is in production at the Kocaeli body shop, with expansion planned to paint shop and assembly (2025).

➤ [In Production: Ford Otosan Deploys Vehicle Manufacturing Application Built with D-Wave Technology](#)

Network Rail / UK Department for Transport and the UK Department for Transport worked with Q-CTRL, under the UK SBRI Quantum Catalyst Fund, on train routing and timetabling at London Bridge station (26 trains over 18 minutes). Running on IBM hardware with Q-CTRL's error-suppression software, the study solved 6x larger problems than unaided hardware, set a record for the largest constrained quantum optimization executed, and projects practical quantum advantage for transport logistics around 2028 (2025).

➤ [Q-CTRL and Leading UK Rail Organizations Optimize Train Scheduling Efficiency with Quantum Software](#)

Toyota Central R&D Labs

Quemix, Toyota Motor, Toyota Central R&D Labs and the University of Tokyo demonstrated how to split quantum-chemistry ground-state calculations between classical DMRG and Quemix's PITE quantum algorithm, cutting the required computational cost to roughly 1/140 of the conventional approach on a 16-spin Heisenberg model. The proof-of-concept sets guidelines for allocating work to quantum hardware in Toyota's materials research (2026).

➤ [Quemix, Toyota, Toyota Central R&D Labs., and The University of Tokyo Demonstrate Efficient Classical-Quantum Task Allocation](#)

Andretti Autosport has teamed up with Zapata to explore using quantum computing in their race-time analytics setup. This collaboration aims to use advanced algorithms to boost performance, refine strategies, and gain a competitive advantage in racing.

➤ [Zapata & Andretti build Race-Time Analytics Infrastructure for Quantum-Readiness](#)

Deutsche Bahn (DB Systel)'s IT subsidiary DB Systel and IQM executed a hybrid quantum-classical rolling-stock scheduling pipeline end-to-end on IQM superconducting hardware, using QAOA for sub-problems inside a classical decomposition framework, on real DB data covering 190 train trips across five German cities (about 98,500 possible rolling-stock cycles). The system produced feasible, good-quality schedules on today's hardware and showed solution quality improving with quantum sub-problem size; real-time disruption management is the next target (2026). DB InfraGO also participates in the DLR-funded QCMobility rail project with planqc.

➤ [IQM and Deutsche Bahn Demonstrate Quantum Algorithm for Railway Scheduling on Real Operational Data](#)

➤ [Additional source: quantumcomputingreport.com](#)

Mercedes-Benz is partnering with quantum-computing leaders like IBM to utilize quantum computing for accurate simulations of internal processes in electric car batteries. The objective is to improve battery performance and drive increased adoption of electric vehicles.

➤ [Mercedes-Benz bets on quantum to craft the future of electric vehicles](#)

Porsche Digital Lab is actively researching quantum computing to reduce the company's carbon footprint. The focus includes quantum sensing, imaging, and computation, with a particular emphasis on optimization within the realm of quantum computing.

➤ [Taking a quantum leap - Porsche Newsroom](#)

Mazda partnered with Q-CTRL to replace costly finite-element simulations in vehicle-frame strength-to-weight optimization with quantum support-vector-machine surrogate models run on IBM hardware with Fire Opal error suppression. The quantum models needed 5x less training data than classical models in low-data regimes and hardware results matched ideal simulation, though a classical RL baseline still found larger design gains (proof-of-concept, case study published 2026).

➤ [Tackling a costly bottleneck in automotive design | Q-CTRL](#)

Nissan and Quemix ran what they describe as the world's first vehicle aerodynamic (fluid dynamics) simulation using a hybrid quantum-classical algorithm, with the quantum side handling the core computation. On a quantum simulator the results matched conventional CFD accuracy, with a projected runtime reduction from about one day to minutes; the partners filed a joint patent and are also exploring quantum for materials, mobility services and EV energy management (2026).

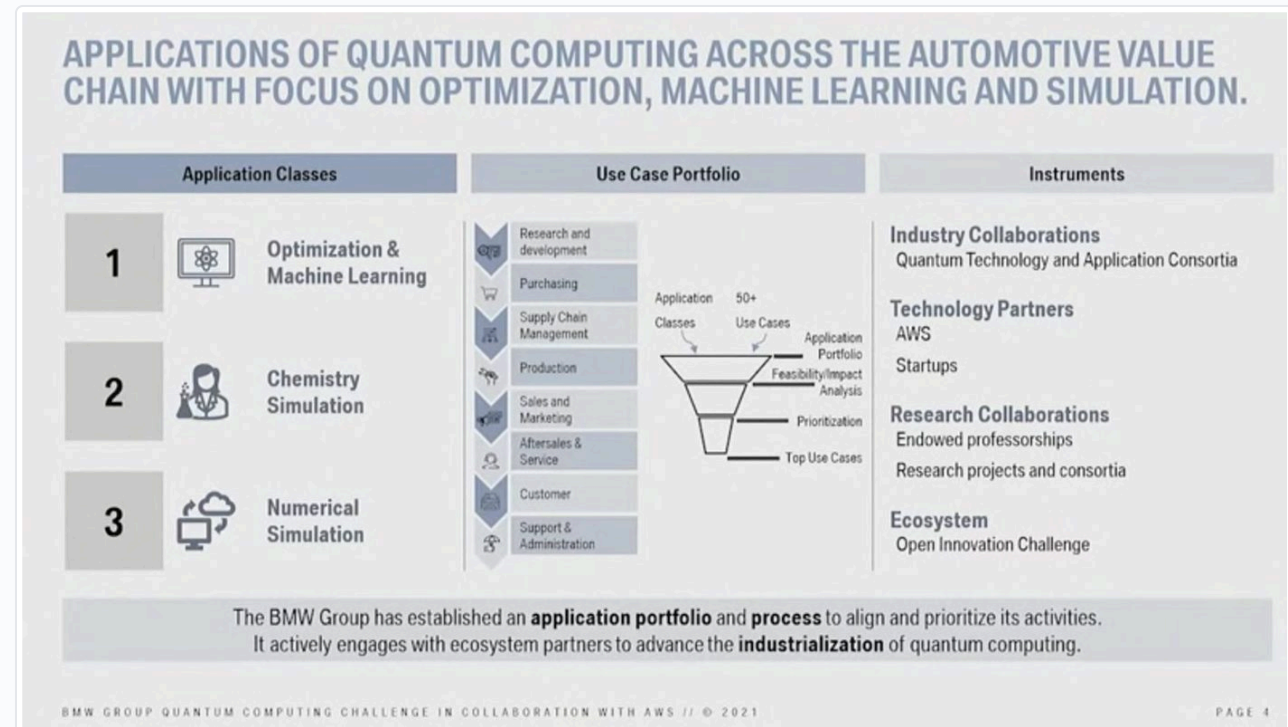
➤ [Nissan and Quemix successfully demonstrate world's first vehicle aerodynamic simulation using quantum algorithm](#)

Ford and Microsoft partnered to explore applying quantum-inspired technology to solve complex problems unsolvable by current computers. They simulated numerous vehicles' impact on congestion, showcasing the potential of this innovation.

➤ [How Ford Is Exploring the Quantum World with Microsoft to Help Reduce Congestion](#)

BMW has utilized Honeywell's quantum computer to optimize component procurement and is keen on exploring quantum computing's transformative potential in the automotive industry. The company is focusing on chemistry applications and optimization, managed by different divisions, with an internal team dedicated to research.

➤ [How BMW Can Maximize Its Supply Chain Efficiency with Quantum](#)



➤ [Q2B 2021 | BMW and AWS Explore Industrial Use Cases for Quantum Computing | Panel](#)

➤ [Q2B 2022 SV | Quantum Computing at the BMW Group: Towards a Practical Quantum Advantage | BMW Group](#)

➤ [Classiq Collaborates with BMW Group and NVIDIA to Drive Quantum Computing Applicability in Electrical Systems Engineering](#)

General Motors intends to use its quantum computing project to run real-world industrial algorithms on an actual quantum computer.

➤ [Paint shop sequencing - Quantum computing considering color changeover and painting quality](#)

Honda R&D and Quemix co-developed a quantum-state readout technique that let them run an X-ray absorption (XAFS) materials calculation on logical qubits on a real quantum computer, aimed at battery and energy-component research for Honda's 2050 carbon-neutrality goal (2025). Honda followed up in 2026 with an equity investment in Quemix after the pair reported an exponentially faster DFT algorithm, targeting next-generation battery materials.

➤ [Honda and Quemix Co-develop a New, World's First Quantum State Readout Technology](#)

U.S. Department of Transportation (USDOT) is exploring quantum technologies to enhance transportation systems' safety, efficiency, and sustainability. In its [July 2024 workshop](#), USDOT examined how quantum computing can address optimization challenges, such as EV charging station placement and supply chain logistics, while quantum sensors can improve navigation, infrastructure monitoring, and leak detection. These technologies promise transformative benefits, including higher sensitivity, stability, and efficiency, across various transportation modes.

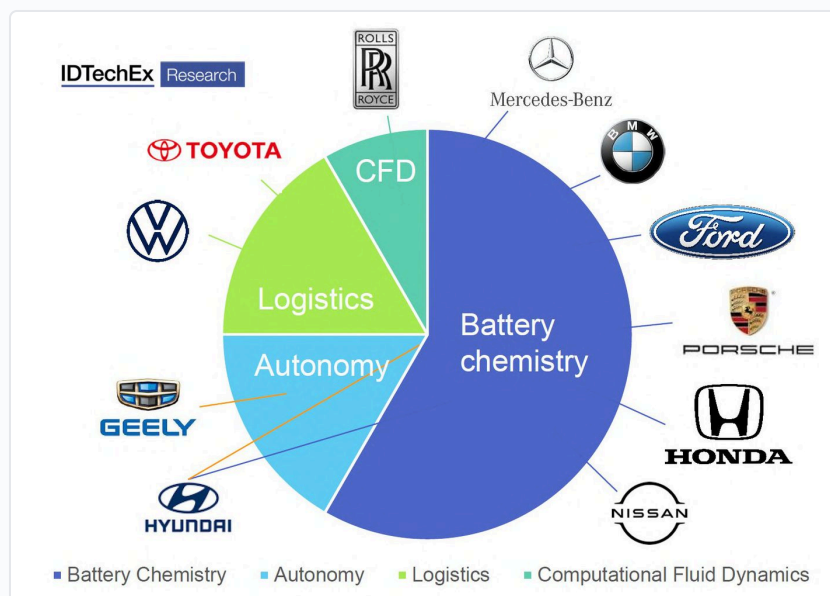
USDOT's next steps include participating in national quantum initiatives, developing a technology assessment framework, and fostering research partnerships with agencies like DARPA and DOE. Near-term projects focus on integrating quantum optimizers with digital twins for network optimization and employing quantum sensing for infrastructure health and environmental monitoring. By engaging early with quantum advancements, USDOT aims to position U.S. transportation at the forefront of innovation, ensuring readiness for future breakthroughs while addressing current challenges in safety and sustainability. The table below summarizes the quantum computing opportunities identified during the workshop and maps each to the transportation modes for which benefits may accrue:

How Might Quantum Computing Change the Way USDOT Works In the Future?									
Quantum Opportunity	Transportation Mode								
	Vulnerable Road Users	Passenger Vehicles	Rail	Trucking	Public Transit	Aviation	Infrastructure	Maritime & Seaway	Pipeline/Hazardous Materials
Predictive Safety and Maintenance	○	●	●	●	●	●	●	●	●
Routing/Scheduling/Congestion Management	○	●	●	●	●	●	●	●	●
Supply Chain Optimization	○	○	●	●	○	○	○	●	○
Revenue Forecasting	○	○	○	○	●	○	●	●	○
Emergency Management/Network Disruption Mitigation	●	●	●	●	●	●	●	●	○
Weather Forecasting	●	○	○	○	○	●	●	●	●
Materials Discovery	○	○	○	○	○	○	●	○	●
Battery Design	○	●	○	●	○	○	○	○	○
Corrosion Chemistry	○	○	●	○	○	○	●	●	●
Computational Fluid Dynamics	○	○	○	○	○	●	●	●	○
Fuel Efficiency	○	●	●	●	●	●	○	●	○
Smart Mobility Corridors	○	●	○	○	●	●	○	○	○
Close Call/Near Miss Mitigation	●	●	●	●	●	●	●	●	●
Cybersecurity	○	●	●	●	●	●	●	●	●
Human/Automated Vehicle Interaction Simulation	●	●	●	●	●	●	●	○	○
Last Mile/Curb Management Optimization	○	●	○	●	●	●	●	○	○
Crash Simulation	○	●	○	●	●	●	●	○	○
Connection Protection	●	●	●	●	●	●	●	●	●

Quantum Technologies in Transportation Workshop Report | November 2024

Volkswagen and D-Wave demonstrated the first real-time traffic-routing system to rely on quantum computing to predict traffic volumes and route trips to minimize wait times for passengers and travel times for using buses in Lisbon, Portugal. Quantum computers may be better suited for these types of problems than classical computers, according to Florian Neukart, Director, Volkswagen Group Data:Lab in Munich.

➤ [Volkswagen takes the quantum computing revolution from the lab to the factory](#)



Denso, with Tohoku University, developed hybrid classical-quantum algorithms on D-Wave annealers to route automated guided vehicles on its factory floors, cutting AGV waiting times by an average of 15%, and applied the same approach to multimodal traffic and delivery scheduling, including taxi-dispatch trials in Bangkok with Toyota Tsusho. Denso runs a dedicated quantum computing group led by quantum-annealing co-inventor Tadashi Kadowaki.

➤ [DENSO: Imagining An Optimized Future \(D-Wave case story, PDF\)](#)

Toyota Motor / Toyota Systems and Fujitsu, together with Toyota Motor Corporation, combined an AI model of expert design rules with Fujitsu's quantum-inspired Digital Annealer to automate connector-pin placement for electronic control units, a combinatorial problem with $\sim 9.3 \times 10^{157}$ candidate layouts for a 100-pin array. The method is more than 20x faster than conventional design and has been applied to Toyota's mass-production ECUs since May 2025, with rollout to Toyota Group suppliers planned (announced January 2026).

➤ [Toyota Systems, Fujitsu utilize quantum-inspired technology and AI to streamline on-board computer design and contribute to sustainable development](#)

Daimler launched the Quantum Computing Initiative in 2015 to explore the potential of quantum technology. Led by Ben Boeser, the initiative focuses on understanding emerging trends, particularly quantum computing, with a long-term research perspective of 10 to 15 years. The goal is to grasp the basics and actively participate in the evolving quantum computing landscape.

➤ [IBM and Daimler use quantum computer to develop next-gen batteries](#)

Hyundai Motor works with IonQ on quantum machine learning for image classification and 3D object detection for autonomous driving, with IonQ's Aria system already classifying 43 road-sign types before testing in Hyundai's simulation environments; a separate January 2022 agreement applies quantum chemistry simulation to lithium-battery performance, cost and safety.

➤ [IonQ and Hyundai Motor Expand Partnership to Use Quantum Computing for Object Detection](#)

ÖBB-Infrastruktur / Hessische Landesbahn

Austrian infrastructure manager ÖBB-Infrastruktur, regional operator Hessische Landesbahn and DB InfraGO joined planqc, DLR and Fraunhofer IKS in the 18-month QCMobility project under the DLR Quantum Computing Initiative, testing quantum-assisted algorithms on real timetable data for short-term disruption management (train prioritisation during blockages) and long-term track and timetable planning, benchmarked against classical methods (2025). No results reported yet.

➤ [Fewer delays, better track planning and timetables: Quantum computing for rail transport](#)

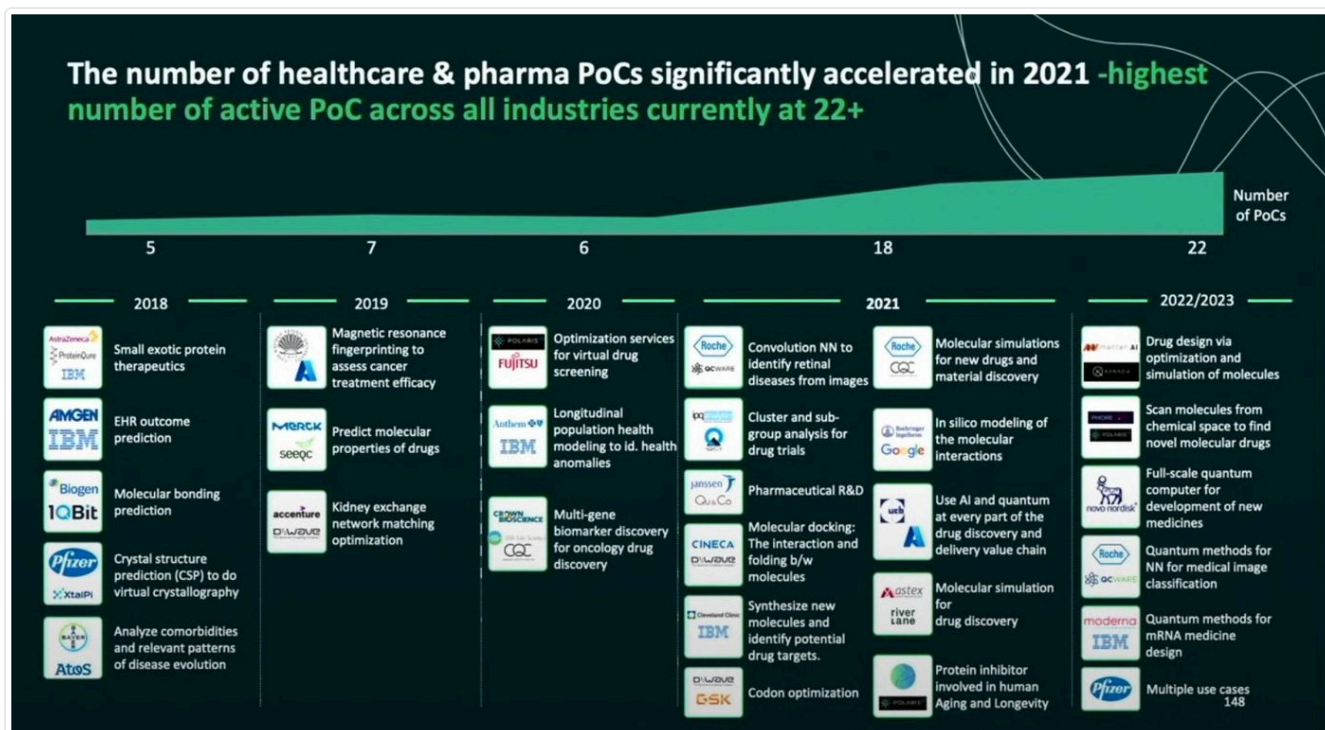
Bosch, collaborating with QuSoft since 2019, is actively involved in quantum computing applications and has invested in quantum companies like Zapata and IonQ. Additionally, Bosch, in partnership with IBM, aims to advance quantum research and establish Germany as a leader in the quantum market, with recent efforts including a 2022 startup focused on developing quantum sensors for biomedical applications.

➤ [Bosch Partnering with IBM on Strategic Quantum Computing Materials Science Engagement](#)

Try it — Classiq library examples

- [Classiq > Applications > Logistics > Facility Location Problem](#)
- [Classiq > Applications > Logistics > Travelling Salesman Problem](#)
- [Classiq > Applications > Optimization > Integer Linear Programming \(e.g. Pickup & Delivery Routing Problem\)](#)
- [Quantum Computing In Automotive Industry | Classiq](#)

Quantum computing leverages the peculiar characteristics of quantum particles, and is increasingly being adopted by pharmaceutical and healthcare companies. This 'quantum advantage' is what pharmaceutical companies aim to harness for rapid in silico evaluation of drug molecule targets and protein folding characterization. Quantum computing's potential to integrate genomics, transcriptomics, and all human 'omics to make more reliable predictions than traditional computers is a significant draw for these companies.



CCRM (Centre for Commercialization of Regenerative Medicine)

Toronto-based CCRM, which runs 100,000+ sq ft of GMP advanced-therapy manufacturing, named IonQ its core quantum technology partner across its global hub network; initial projects in Canada and Sweden (CCRM Nordic) start in 2026 on bioprocess optimisation, disease-modelling workflows and quantum-enhanced simulation for advanced-therapy design and manufacturing (announced December 2025).

➤ [IonQ and CCRM Announce Strategic Quantum-Biotech Collaboration](#)

Astex Pharmaceuticals and Riverlane are partnering to showcase quantum computers' capabilities in modeling chemical compounds binding to proteins in the human body.

➤ [Riverlane partner with bio-tech company Astex](#)

Chugai Pharmaceutical

Chugai researchers, with Deloitte Tohmatsu, published a quantum-phase-estimation approach for computing intermolecular interaction energies (hydrogen bonding) relevant to drug binding, reproducing the reference CASCI result to within 0.02 kcal/mol using only 12 qubits, with circuits optimised in the Classiq SDK (simulation-based, December 2025). Chugai had earlier presented quantum computing for cyclic-peptide docking at Bio-IT World 2024.

➤ [Supramolecular approach-based intermolecular interaction energy calculations using quantum phase estimation algorithm \(arXiv\)](#)

Tel Aviv Sourasky Medical Center (Ichilov) hosts the Quantum Center for Life Sciences launched with Classiq and NVIDIA, described by Prof. Roni Gamzu as "the first quantum computing lab here at Ichilov" (November 2023). Follow-on work with Classiq uses hybrid quantum neural networks to decode and forecast speech intentions (vowel classification) from brain-probe recordings of patients with neurological conditions, alongside quantum-kernel EEG/MEG diagnostics (2026).

➤ [Classiq Announces Quantum Center for Life Sciences in Collaboration with NVIDIA](#)

NYU Langone Health

NYU Langone radiology researchers and Fermilab's SQMS Center developed "QuantuMRI", a quantum algorithm that simulates how tissue responds during MRI scans to deliver fast, high-resolution estimates of multiple tissue properties for quantitative MRI; the project won a Phase 1 award and advanced to Phase 2 of the NIH Quantum Computing Challenge (January 2026).

➤ [Fermilab SQMS Center and NYU Langone Advance in NIH Quantum Computing Challenge](#)

GSK is actively partnering with various quantum companies, exploring the potential of quantum computing for specific workloads that face scalability and complexity challenges with traditional architectures, particularly in the realm of genetic algorithms.

➤ [GlaxoSmithKline Marks Quantum Progress with D-Wave](#)

The NIH is [exploring](#) quantum computing's potential to tackle complex healthcare challenges, focusing on applications that accelerate biomedical advancements. Key [use-cases](#) include medical imaging, where quantum algorithms like quantum Fourier transform and quantum machine learning improve diagnostics through enhanced image analysis and pattern recognition. In genomics, quantum methods speed up tasks such as sequence alignment and mutation detection, crucial for precision medicine. Drug discovery also benefits from quantum simulations and hybrid workflows, enabling faster and more accurate modeling of molecular interactions. NIH [funds](#) interdisciplinary efforts and [challenges](#) to align quantum advancements with healthcare needs, ensuring innovations address challenges while maintaining data security and ethical standards.

Cleveland Clinic and IBM have started the deployment of the country's first private sector onsite, IBM-managed quantum computer.

➤ [Cleveland Clinic and IBM Unveil First Quantum Computer Dedicated to Healthcare Research](#)

Cleveland Clinic, Algorithmiq and IBM won the \$2 million Wellcome Leap Q4Bio prize for an end-to-end quantum-classical workflow computing excited-state properties of a photosensitizer drug for photodynamic cancer therapy, running circuits of up to 100 qubits on IBM hardware (April 2026); the same year Cleveland Clinic's quantum-centric protein simulations with IBM and RIKEN (up to 12,635 atoms) were named a 2026 ACM Gordon Bell Prize finalist, and two Cleveland Clinic teams won Phase 1 of the NIH Quantum Computing Challenge (2025).

➤ [Wellcome Leap Announces \\$2M Prize in \\$50M Quantum for Bio Challenge Program](#)

Novo Nordisk Foundation, in collaboration with the Niels Bohr Institute, is set to establish a fully functional quantum computer within the next 10–12 years, focusing on quantum simulators for medicinal development and climate change insights. The program received a grant of US\$200 million (DKK 1.5 billion) for this initiative.

➤ [Novo Nordisk Foundation Quantum Computing Programme](#)

Roche recognizes the potential of quantum computing and has established a quantum computing task force guiding its initiatives in the field. The company has collaborated with Cambridge Quantum Computing to explore drug discovery use cases, particularly in [Alzheimer's research](#). In addition to:

Our scientific use cases

Covering pharmaceutical relevant applications



Chemistry

Chemistry Simulation

Optimization

Protein Folding

Machine Learning

Image Classification

The overall value of the uses cases lies understanding in what area QC will disrupt the R&D productivity, including by when and how much:

- **Chemistry Simulation:** Accurate binding affinity estimation would strongly influence efficiency in Lead Identification and Lead Optimization
- **Optimization:** Rapid identification of minima would strongly influence the whole pipeline of pRED and many other Roche units.
- **Machine Learning:** If Machine Learning is impacted by QC, better predictions would impact areas from Target Assessment to the Clinic.

➤ [Q2B 2022 SV | The Potential of Quantum Computing for Drug Development - Roche | Yvonna Li](#)

Japan Tobacco Inc. (Pharmaceutical Division)

JT's pharmaceutical division and D-Wave trained a transformer-based generative model with D-Wave's annealing QPU in the loop to explore chemical space; the quantum-hybrid workflow produced more valid molecules and higher drug-likeness scores than classically trained models, which JT called "the first work for annealing quantum computation to outperform classical results concerning LLM training in drug discovery" (PoC, March 2025). In August 2025 JT signed a follow-on agreement moving the work into a pilot toward production deployment.

➤ [Japan Tobacco and D-Wave Announce Quantum Proof-of-Concept Outperforms Classical Results for LLM Training in Drug Discovery](#)

Vithas (hospital group, Spain)

Spanish hospital group Vithas (via its Brain Tumor Laboratory), Telefónica and Francisco de Vitoria University launched a hybrid quantum project targeting the BRAF V600E mutation, pairing an LSTM molecular generator with a Quantum Circuit Born Machine to propose inhibitor candidates; preliminary results showed generated molecules improving on nearly all drug-evaluation parameters and the project was shown at MWC Barcelona (February 2026).

➤ [Telefónica, Vithas, and UFV Launch Quantum Computing Project for Cancer Drug Design](#)

Merck collaborated with HQS Quantum Simulations for a three-year partnership to apply quantum chemical software for quantum computers. Merck notes that quantum computing (QC) is applicable to a limited subset of their challenges.

➤ [Using quantum technology in industry](#)

➤ [Quantum computing is the start of possibilities without end - Merck](#)

UnitedHealth Group is exploring quantum computing through Optum Technology, UHG's technology arm, in the areas of patents and defensive publishing.

➤ [How UnitedHealth Group Is Using Quantum Computing](#)

AstraZeneca collaborates with ProteinQure to design novel peptide therapeutics, leveraging ProteinQure's expertise in biologics to support AstraZeneca in completing experimental validation.

➤ [ProteinQure Collaborates with AstraZeneca to Design Novel Peptide Therapeutics](#)

Janssen collaborated with Qu&Co (now merged with PASQAL) for three years to explore the application of quantum computing in computational chemistry and machine learning for pharmaceutical R&D, aiming to identify potential benefits and the expected timeframe for implementation.

➤ [Qu&Co and Janssen Develop and Test Quantum Computational Methods Pharma R&D](#)

National Cancer Center Japan

Japan's National Cancer Center signed a collaborative research agreement with PsiQuantum to develop fault-tolerant quantum algorithms for oncology and healthcare, using PsiQuantum's software suite to design and resource-estimate applications in drug discovery, molecular simulation, resource allocation and patient outcomes. The work is led from NCC Hospital East and is intended to involve Japanese pharmaceutical companies (2026).

➤ [PsiQuantum and National Cancer Center Japan Partner to Accelerate Drug Discovery for Healthcare](#)

Mayo Clinic's Quantum Sensing and Computing program (Digital Innovation Lab / Quantum Incubator, Jacksonville) built a hybrid quantum-AI model that classifies left- vs right-hand movement intention from EEG recordings and executed it on quantum hardware, winning the Kipu Quantum-organised Berlin Quantum Hackathon 2026; Mayo hosted its first "Quantum Today, Healthcare Tomorrow" summit in June 2026 with use cases in epilepsy, radiotherapy planning, arrhythmia prediction and genomics via AWS Braket.

➤ [Mayo Clinic team takes quantum leap to win global competition with brain-signal model](#)

Boehringer Ingelheim is using quantum algorithms to investigate the behavior of small molecules in the vicinity of proteins to predict protein-ligand binding energies. Pfizer and IBM have also collaborated to integrate generative AI and quantum computing to improve clinical trial performance and speed results.

➤ [Q2B 2023 Paris | Perspective on Challenges & Opportunities in Life Science | Clemens Utschig-Utschig](#)

Insilico Medicine (with St. Jude Children's Research Hospital and University of Toronto), the University of Toronto (Aspuru-Guzik lab), St. Jude and Zapata combined a 16-qubit IBM quantum processor with classical generative models to design inhibitors of the "undruggable" KRAS cancer protein; of 15 synthesised candidates, two quantum-generated molecules showed strong binding across multiple KRAS mutants in live cells (Nature Biotechnology, January 2025). The authors stress it is a proof-of-principle with no demonstrated quantum advantage.

➤ [AI and quantum computing used to target 'undruggable' cancer protein](#)

Auransa

Clinical-stage AI biopharma Auransa is deploying POLARISqb's QuADD platform, which runs on a 5,000+-qubit D-Wave Advantage annealer; in a head-to-head study QuADD produced 3,000 drug-like molecules in ~30 minutes versus 40 hours for a diffusion-model baseline, with its top-100 candidates showing ~1 kcal/mol stronger predicted binding and lower synthetic complexity (January 2026). Auransa earlier used the platform on a triple-negative breast cancer pathway.

➤ [PolarisQB Details QuADD Results Comparing Quantum and AI Drug Design Approaches](#)

Bayer is partnering with Google to accelerate its in-silico research and development by utilizing Google Cloud's high-speed processors, particularly Tensorflow Processing Units for large quantum chemistry calculations. This collaboration also involves leveraging AI technology, including Google Cloud's Vertex AI and Med-PaLM 2, to enhance clinical trials and advance AI integration in radiology.

➤ [Bayer to Accelerate Drug Discovery with Google Cloud's High-Performance Compute Power](#)

Wellcome Sanger Institute (with University of Oxford)

As a Wellcome Leap Q4Bio Phase III finalist, the Oxford-Sanger "Quantum Pangenomics" team encoded the Hepatitis-D genome on an IBM Quantum Heron r2 processor, achieving what Sanger's CIO described as at least an order-of-magnitude improvement over prior quantum DNA representations (April 2026).

➤ [IBM Details Q4Bio Outcomes as Teams Demonstrate 50+ Qubit Algorithms for Life Sciences](#)

Siemens Healthineers and UCL are collaborating to explore the application of quantum machine learning techniques for enhancing cognitive computing in healthcare.

➤ [Quantum Algorithms for Cognitive Healthcare](#)

Pfizer is starting to attend quantum technology webinars and events. Researchers from Pfizer are looking at using a modeling technique called crystal structure prediction (CSP) to map the 3D structure of molecules calculations that typically take months to complete.

➤ [How Quantum Physics and AI is Disrupting Drug Discovery & Development](#)

Moderna recognizes the importance of quantum computing (QC) for its industry and is collaborating with IBM to utilize generative artificial intelligence and quantum computing for advancing mRNA technology, crucial for the development of the company's Covid vaccine [Therapeutic Design](#).

➤ [Moderna, IBM Quantum Researchers Use Quantum Computers For Critical Step in RNA-based](#)

Amgen has used Quantinuum's computer hardware as a first step toward computer-aided drug design. The algorithm classified peptides according to their binding affinity to a particular molecule to identify a therapeutic capable of regulating the immune response. Amgen also participated and [invested](#) in the Quantinuum \$300M round.

➤ [The Path to Quantum Breakthroughs: Insights from Amgen](#)

Try it — Classiq library examples

- [Classiq > Applications > Chemistry > Protein Folding Algorithm](#)
- [Classiq > Applications > Optimization > Max Independent Set \(e.g. Gene Co-Expression Network\)](#)
- [Classiq > Algorithms > QML > QSVM \(e.g. Clinical Symptom Classification\)](#)
- [Quantum Computing In Healthcare | Classiq](#)

Telecom benefits from quantum computing through enhanced data security via quantum encryption, which protects against hacking. Quantum algorithms optimize network traffic, reducing latency and improving bandwidth management. They enable faster error correction in communication systems, ensuring reliability. Additionally, quantum computing enhances signal processing for better call quality and data transmission. It accelerates research and development of 5G/6G technologies. Lastly, quantum-enabled simulations improve infrastructure planning and deployment efficiency.

Additionally, telecom operators function as extensive IT, financial, customer-facing, and service organizations, making them well-positioned to benefit from quantum computing advancements across these domains.

SoftBank Corp. partnered with Quantinuum in 2025 to identify problems "that can only be solved by quantum computers" in its own business: quantum chemistry to search for new optical-switch materials for all-optical networks, and topological data analysis for anomaly and fraud detection in its communications infrastructure, alongside market research for a CPU-GPU-QPU "quantum data center". A joint white paper (July 2026) benchmarks both use-cases against Quantinuum's hardware roadmap.

➤ [SoftBank Corp. and Quantinuum Announce Groundbreaking Partnership Toward Practical Application of Quantum Computing](#)

Telefónica and Multiverse Computing used quantum-inspired tensor-network techniques to compress Meta's Llama 3.1 8B and Llama 3.3 70B models by ~80%, cutting energy consumption by up to 75% while preserving answer quality; the compressed models run on Telefónica's own infrastructure to support Movistar customer-service agents (2025). At MWC 2026 Telefónica Tech extended this into a "Quantum Telco" offer with IQM, Fujitsu's Digital Annealer, Qilimanjaro, QCentroid and IBM for network-design and logistics optimisation.

➤ [Telefónica and Multiverse Computing develop an AI-based model to support customer service agents with 75% energy savings](#)

TIM (Telecom Italia) became the first European operator to use quantum computing live on its mobile network, running a QUBO model on D-Wave's 2000Q to plan 4.5G/5G radio-cell parameters ten times faster than classical optimisation; better cell-ID planning gave customers a more stable VoLTE experience when moving between cells (2020).

➤ [TIM is the first operator in Europe to use quantum computing live on its mobile networks \(4.5G and 5G\)](#)

China Telecom (China Telecom Quantum Group) Quantum Group, with QuantumCTek, deployed the domestically built "Tianyan-287" superconducting quantum computer in Hefei and connected it to its Tianyan quantum computing cloud platform, which since launch in November 2023 has logged over 37 million visits from users in 60+ countries; the team also built an AI system for automated chip calibration (2025). In parallel it rolled out a hybrid QKD + PQC encryption service across 16 cities.

➤ [China speeds up quantum tech transfer, building supply chains from lab research — Xinhua](#)

Singtel launched Southeast Asia's first Hybrid Quantum-Safe Network as a managed service (October 2025), layering quantum key distribution with post-quantum cryptography so enterprises can choose the level and geography of protection; this is the operator's main quantum initiative, building on its earlier nationwide QKD network with ID Quantique.

➤ [Singtel launches Southeast Asia's first Hybrid Quantum-Safe Network to deliver flexible, scalable security for enterprises](#)

AT&T is diving into quantum technology, aiming to be "quantum ready" by 2025 for better security. AT&T Labs explores quantum computing's network impact, focusing on edge intelligence and future processing. AT&T CDO is working on cyber security related Quantum POC. Collaborations with institutions like CalTech accelerate quantum tech for more secure communication channels.

➤ [AT&T Aims to be 'Quantum Ready' by 2025](#)

TELUS signed an MoU with Xanadu (March 2026) to integrate Xanadu's photonic quantum processors with TELUS's high-performance computing and secure, Canadian-controlled data-centre operations, exploring a quantum data centre for sovereign workloads in AI, drug discovery, materials, cybersecurity and national security. The collaboration is at exploration stage.

➤ [Xanadu and TELUS Explore Sovereign Quantum-Classical Computing Infrastructure in Canada](#)

Vodafone is collaborating with IBM and other quantum companies to explore quantum computing for telecom applications. This includes optimizing network performance, enhancing machine learning for anomaly detection, and testing quantum-safe VPNs. In the UK, Vodafone leads the GSMA Post-Quantum Telco Network Taskforce, driving the development of quantum-secure policies to safeguard future telecommunications infrastructure.

➤ [Vodafone explores quantum computing for network optimisation](#)

NTT & NTT Data NTT is investing heavily in quantum technologies, particularly quantum cryptography and quantum computing applications for telecom. NTT's R&D is focused on integrating quantum technologies into network optimization, secure communications, and distributed systems.

➤ [NTT Research Center for Theoretical Quantum Information](#)

➤ [Quantum Computing at the NTT DATA EMEAL Innovation Center](#)

➤ [Innovating Optical Quantum Computing | NTT STORY](#)

British Telecom (BT) BT is actively exploring quantum key distribution (QKD) for ultra-secure communication. The company is also exploring quantum computing applications in circuit switching, packet routing, signal processing, and antenna beam steering.

➤ [Shaping the UK's quantum enabled economy](#)

LG U+, with KAIST and Qunova Computing, used D-Wave's quantum annealer to optimise ground-to-satellite and inter-satellite link connectivity for a 6G low-earth-orbit network, reporting an optimisation algorithm ~600x faster than classical methods and verifying >1 Gbps user speeds with ≤5 ms end-to-end latency. Results were presented at Quantum Korea 2023.

➤ [LG U+ Enhances Next-Generation Network Competitiveness With Quantum Computing](#)

Telstra is collaborating with Australian quantum computing startups to explore applications in network optimization, encryption, and next-generation telecommunications technologies.

➤ [Telstra takes a step closer to quantum secure networking](#)

Turkcell completed a proof-of-concept with Juniper Networks and ID Quantique integrating QKD-generated keys into its 5G mobile backhaul routers and firewalls, validating quantum-resistant protection while preserving 5G timing accuracy and throughput (2025); earlier in 2025 it demonstrated the first intercontinental fibre QKD link across Istanbul.

➤ [Turkcell Collaborates with Juniper Networks and ID Quantique to Pioneer Quantum-Safe Network Security](#)

Ericsson researchers built a three-stage hybrid workflow (spectral clustering pre-processing, QUBO-based quantum refinement, classical validation) for Tracking Area planning in mobile RANs and tested it on real operator data covering 1,509 gNBs, achieving a 36.4% reduction in inter-TA handovers, 25% lower peak paging traffic and 13.6% fewer cells per TA (2026). Runs were on a quantum simulator, with estimated execution under 1 ms on current superconducting hardware.

➤ [From classical to quantum: Transforming RAN planning for future networks](#)

SK Telecom signed a strategic MoU with IonQ (February 2025) to combine IonQ's quantum computers with SKT's Personal AI Agent, AI data centres, GPU-as-a-Service and edge-AI offerings, and to merge its QKD/PQC portfolio with IonQ's systems; SKT and SK Square exchanged their ID Quantique shares for IonQ stock to cement the tie-up. No concrete deliverables have been published yet.

➤ [SK Telecom Signs MoU with IonQ on AI and Quantum Computing](#)

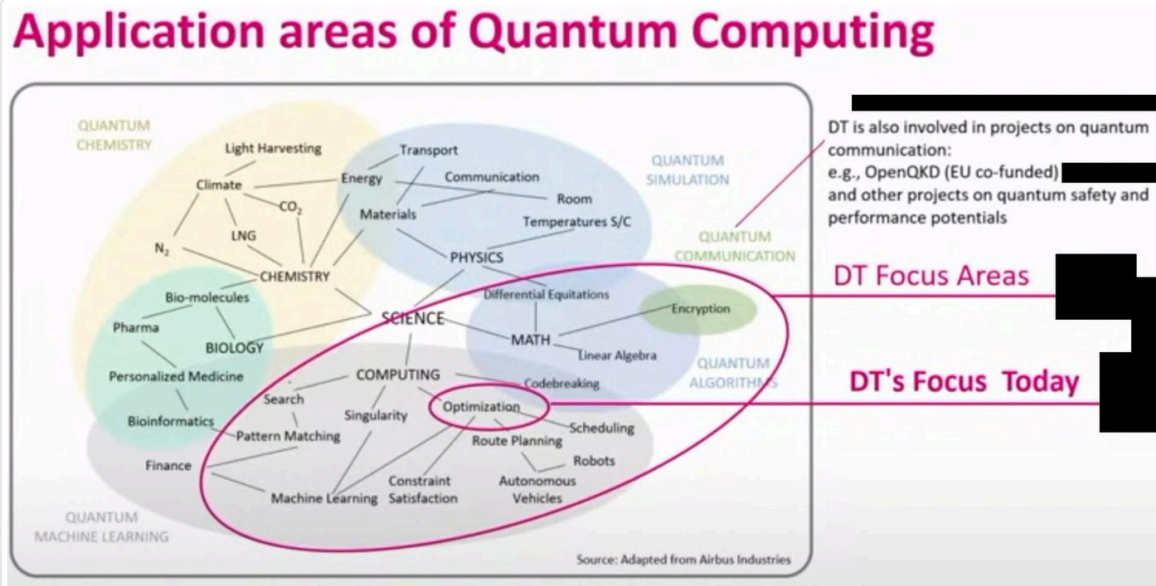
KDDI and KDDI Research formed a five-party alliance with Jij, QunaSys and Waseda University (2025) to build an "AI-Quantum Business Platform" that routes optimisation and quantum-chemistry workloads to the best available AI or quantum resource. KDDI has already explored quantum applications such as optimising base-station configurations to improve network performance and automating shift scheduling at its customer-service centres.

➤ [KDDI, KDDI Research, Jij, QunaSys, and Waseda University Form Partnership to Build AI-Quantum Computing Infrastructure](#)

Deutsche Telekom is part of several European quantum initiatives on quantum-safe communication. DT is also exploring quantum computing for optimizing network performance and reducing operational costs. In addition to being a large system integrator and offering quantum computing services with T-Systems.

➤ [Deutsche Telekom opens quantum research lab](#)

➤ ; [Practical Quantum Computing: Telecom Use-case](#)



Problem classes of selected telecom applications

Combinatorial Optimization

- Process Optimization**
 - Route optimization of Technical Field Service
- Network Optimization**
 - Network routing*
 - Excavation fiber rollout
 - Frequency assignment*
 - **Automatic Cell Planning***
- Quantum Networks**
 - QKD network optimization
- Industry 4.0**
 - Job Shop Scheduling with AGVs
 - Road traffic optimization*
 - Mix Sigma Quality Assurance*

Machine Learning

- Quantum-enhanced Neural Network**
 - for classification
- Q-KNN (K-nearest neighbor) clustering**
 - for optimal customer contacting time (CRM)
- Quantum Boosting**
 - for fraud detection
- Generative Adversarial Networks (GAN)**
 - for anomaly detection

Try it — Classiq library examples

➤ [Classiq > Applications > Logistics > Workflow Scheduling Problem](#)

➤ [Classiq > Applications > Optimization > Max Independent Set \(e.g. Wireless Network Optimization\)](#)

➤ [Classiq > Algorithms > QML > Quantum GANs \(e.g. Broadband Channel Estimation\)](#)

Quantum computing holds immense potential for transforming the oil and gas industry by addressing some of its most complex challenges. One of its key applications lies in subsurface analysis, where quantum computers can process intricate geological data with greater efficiency and precision. This leads to more [accurate subsurface models](#), improving the identification of hydrocarbon reserves. Additionally, advanced molecular modeling, explored by companies like TotalEnergies and Shell, can help design more effective materials for carbon capture and storage, contributing to emission reduction efforts and supporting sustainability initiatives.

Beyond exploration and environmental applications, quantum computing also has the potential to optimize operational efficiency. Quantum algorithms can significantly enhance supply chain logistics by improving the alignment of production with demand, thereby reducing costs and operational inefficiencies. Moreover, quantum computing's ability to process vast amounts of seismic data can revolutionize data interpretation, aiding in [better exploration](#) and resource management decisions. While still in its early stages, the adoption of quantum computing in the oil and gas sector promises to drive innovation, operational improvement, and environmental responsibility.

ExxonMobil partnered with IBM to explore quantum computing's potential in advancing energy and manufacturing technologies. This collaboration aims to boost ExxonMobil's research and development capabilities.

Problem-driven quantum computing research at ExxonMobil

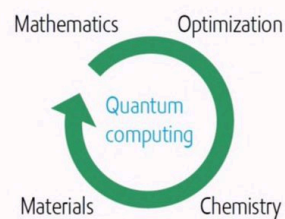
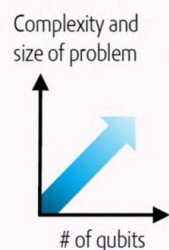
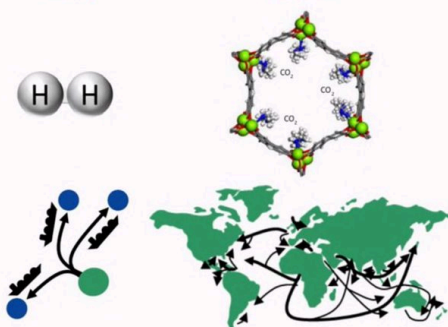
Develop algorithms and workflows to solve small versions of business-relevant problems

Test *whether* and *how* algorithms and workflows scale

Build and integrate capabilities in quantum

Today

Future



Collaboration with IBM

- [ExxonMobil and IBM to advance energy sector application of quantum computing](#)
- [Q2B 2020 | Quantum computing research at ExxonMobil | Amy Herhold | ExxonMobil](#)

TotalEnergies is intensifying its research in Carbon Capture, Utilization, and Storage (CCUS) technologies by entering a multi-year partnership with UK start-up Quantinuum (formerly Cambridge Quantum Computing). This collaboration aims to leverage quantum algorithms to accelerate the development of CCUS technologies, crucial for achieving carbon neutrality by 2050.

- [Total is exploring quantum algorithms to improve CO2 capture](#)

VINCI Energies is actively collaborating with QuantumBasel and D-Wave's quantum technology in a pilot project to enhance efficiency in sustainable building design, particularly in HVAC systems. The project, utilizing D-Wave's quantum computers and quantum hybrid solvers, represents a crucial step in applying quantum computing to address complex challenges and advance environmental and digital transition initiatives in building design.

➤ [Collaboration between VINCI Energies, QuantumBasel and D-Wave Improves Efficiency in HVAC System Design with Quantum Computing](#)

Shell cooperates with theoretical physicists and chemists of Leiden University to research how quantum computer algorithms can help simulate complex molecules.

➤ [Shell works with Leiden and VU researchers on quantum computer algorithms for chemistry](#)

BP has partnered with the IBM Quantum Network to explore quantum computing applications for business and engineering challenges, leveraging IBM's expertise and a premium 65-qubit quantum system. The collaboration aims to drive efficiencies and reduce carbon emissions, aligning with bp's clean energy goals.

➤ [bp joins the IBM Quantum Network to advance use of quantum computing in energy](#)

bp joined Jij Europe, ORCA Computing and the UK National Quantum Computing Centre to solve the Unit Commitment problem (start-up/shut-down scheduling of power generators at minimum cost) using a hybrid decomposition method on ORCA's rack-mounted photonic testbed at NQCC (2026). A June 2026 white paper benchmarks the hybrid approach and identifies milestones for moving the workflow into production energy operations.

➤ [Jij Europe Collaborates with ORCA Computing, bp, and NQCC on Energy Optimization](#)

EPRI (Electric Power research institute) explores AI-enhanced cybersecurity in utilities, focusing on quantum science and technology. The Quantum Challenge initiative aims to speed up adopting new quantum tech in the electric industry.

➤ [EPRI is leading quantum challenges focusing on how quantum technologies can address energy industry challenges](#)

The US DOE plays a pivotal role in advancing quantum computing for energy-related applications by fostering innovation through its [National Quantum Information Science Research Centers](#) and [Quantum testbeds](#). These initiatives address critical computational challenges, enabling breakthroughs in energy systems that are beyond the reach of classical computers. For instance, quantum computing can accelerate the development of advanced energy storage systems by simulating complex quantum interactions in materials, optimizing catalytic processes for cleaner energy production, and improving grid efficiency through sophisticated modeling. Realizing these use-cases requires addressing key hurdles in quantum hardware, such as mitigating noise, refining material purity, and enhancing device stability, alongside innovations in system architecture and algorithms. By allocating [\\$2.5 billion over five years](#) DOE is supporting foundational advances in materials science, device fabrication, and algorithm development, the DOE is paving the way for transformative energy solutions, enabling deeper insights and more sustainable technologies for a clean energy future.

➤ [US DOE 2024 - Quantum Information Science Applications Roadmap](#)

Saudi Aramco

Aramco and Pasqal installed Saudi Arabia's first quantum computer, a 200-qubit neutral-atom system, in Aramco's Dhahran data center and in 2026 opened it as the Middle East's first commercial Quantum-Computing-as-a-Service platform. Aramco is the foundational customer, targeting well placement, rig scheduling, CO₂ storage and reservoir optimization, port logistics and lower-carbon fuel development.

➤ [Aramco and Pasqal launch Saudi Arabia's first Quantum Computer and Middle East's first commercial Quantum Computing as a Service platform | Aramco](#)

Duke Energy, the largest US investor-owned utility, is collaborating with IBM Quantum to develop foundational quantum expertise for grid optimization and to understand quantum data centers' load impact; its lead enterprise architect calls it "one of the lowest-risk and highest-value investments" in a potentially transformative technology (2026).

➤ [Quantum computing is coming fast. Are utilities ready? | Utility Dive](#)

Middle Tennessee Electric, a 365,000-meter cooperative, signed an MOU with Middle Tennessee State University to found the MT-QuTech Hub and QRISE Center and build a quantum testbed linking the two campuses, with ORNL alliances (2026). Initial focus is quantum-secured grid communications, followed by quantum optimization of dispatch for its 80+ grid batteries and outage prediction.

➤ [Quantum Collaboration | Middle Tennessee Electric](#)

Eaton / US Air Force Research Laboratory

Infleqtion won a multi-year, multi-million-dollar AFRL program, with power-management company Eaton as prime contractor, to apply its Sqale neutral-atom quantum computer to contingency ("what-if") analysis of the US electrical grid, aiming to catch cascading-outage vulnerabilities that overwhelm classical solvers (2026). The program covers algorithm development and quantum-vs-classical feasibility at operational scale.

➤ [Infleqtion Wins Contract To Apply Quantum Computing To Grid Vulnerabilities](#)

EDF (Électricité de France)'s quantum R&D team (active since 2017) ran electricity-demand forecasting for electric-vehicle smart charging on Pasqal's neutral-atom hardware with more than 100 qubits, in a project with GENCI, to tackle forecasting and optimization problems created by EV adoption and renewables (2025). In parallel EDF leads the €6.1M France 2030 "OECQ" project with Alice & Bob, Quandela and CNRS to measure and reduce the energy footprint of full quantum-computer stacks (2024).

➤ [Pasqal and EDF pave the way to optimize energy management for EV Smart Charging with neutral atom quantum computing — Pasqal](#)

Hydro-Québec became a formal partner of PINQ², gaining access to the IBM Quantum System One at IBM Bromont to explore demand forecasting, design and operation of more sustainable energy systems, and hybrid quantum-HPC materials simulation and discovery (2024). The utility is a founding member of PINQ²'s global research group on quantum applications for sustainable energy.

➤ [PINQ² Collaborates with Hydro-Québec, Tapping into Quantum Computing for Sustainable Energy Solutions — HPCwire](#)

EPB (Electric Power Board of Chattanooga)

Chattanooga's municipal utility and fibre ISP EPB signed a \$22M deal with IonQ to host an IonQ Forte Enterprise trapped-ion quantum computer alongside its existing commercial quantum network, making it the first US utility-run quantum computing and networking hub (2025). Target applications are grid load balancing and outage prediction, predictive maintenance, crew route optimization and dispatch of distributed energy resources; the EPB Quantum Center opens in 2026 and will sell compute time to other organisations.

- [EPB and IonQ Partner to Establish Chattanooga as the First Quantum Computing and Networking Hub in the U.S. | EPB](#)
- [Additional source: ionq.com](#)

Statkraft / Statnett (with Equinor)

Norway's NeQst project (2022–2026, Research Council of Norway) has SINTEF and the University of Oslo developing hybrid quantum-classical algorithms for hydropower scheduling and other industrial optimization problems with Statkraft (Europe's largest renewable generator), grid operator Statnett (2025–2026) and Equinor (2022–2024). The work benchmarks algorithms on real hardware and characterizes error mechanisms.

- [NeQst — Quantum Computing Applied to Industrial Optimization Problems — SINTEF](#)

Iberdrola and Multiverse Computing completed a 10-month pilot on the Gipuzkoa (Basque Country) distribution grid to optimize where grid-scale batteries should be installed, balancing installation cost, voltage control and outage impact. Running on quantum annealers and Multiverse's Singularity platform, several quantum and quantum-inspired algorithms matched or outperformed the classical benchmark for grid reliability and voltage control (2024).

- [Iberdrola and Multiverse Computing announce pilot project success to optimise battery installation in the grid](#)

Eni and ITQuanta formed the joint venture Eniquantic through Eni's venture builder Eniverse to develop integrated quantum-classical computing for renewable generation and storage optimization, molecular-dynamics materials discovery and commodity-trading analytics (2024). Algorithms are tested against Eni's in-house HPC infrastructure to identify where hybrid quantum architectures add value across the value chain.

- [Eni Leverages HPC to Explore Quantum-Classical Integration in New Quantum Computing Joint Venture — HPCwire](#)

E.ON's quantum team works with IBM Quantum to price fixed-price energy offers and hedging decisions under varying weather scenarios, and to model grids stressed by renewables and EV demand. Early results were obtained with Qiskit dynamic circuits on a 27-qubit IBM processor; the work remains proof-of-concept ahead of utility-scale hardware (2024).

- [Powering the Future: IBM & E.ON Engineer Quantum Solutions to Navigate Energy Challenges](#)

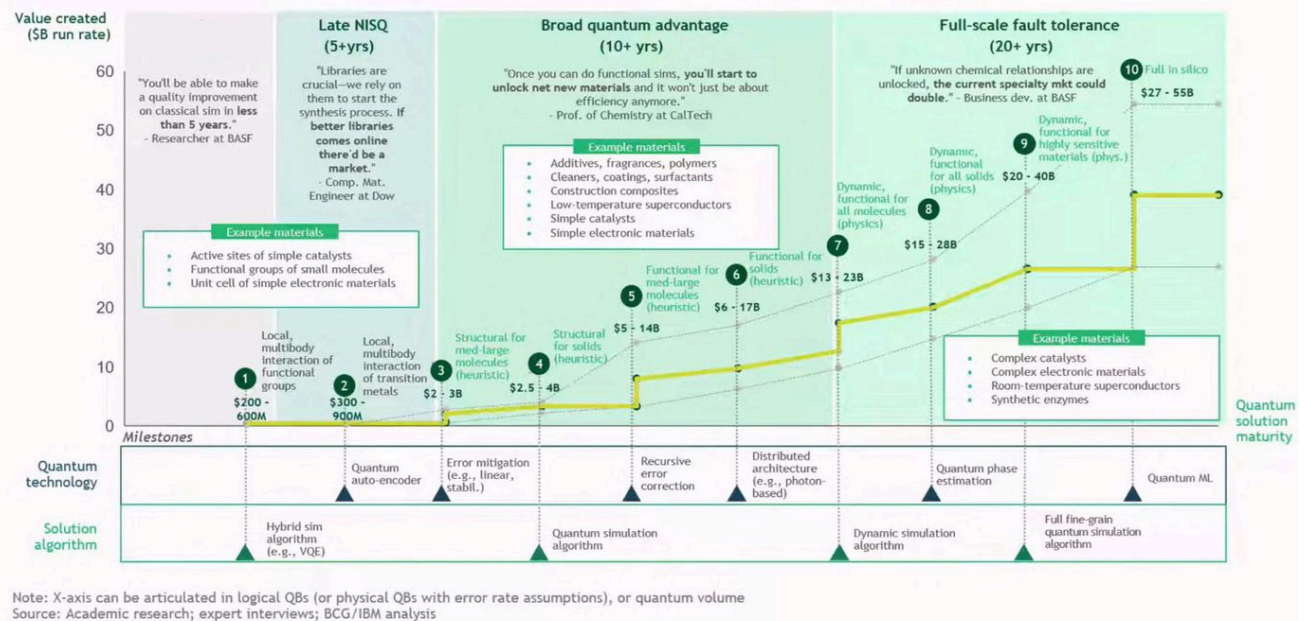
Try it — Classiq library examples

- [Classiq > Applications > Optimization > Electric Grid Optimization using QAOA](#)
- [Classiq > Algorithms > HHL Algorithm \(e.g. Energy Grid Power Flow\)](#)
- [Classiq > QMOD > Library Functions > Quantum Fourier Transform \(e.g. Seismic Data Processing\)](#)
- [Quantum for Energy & Networks | Classiq](#)

Quantum computing mimics nature's fundamental processes by accurately simulating quantum systems, making it ideal for revolutionizing materials science. Its application enables breakthroughs in areas like the design of low and room-temperature superconductors, advanced construction composites, and simple catalysts. Quantum technology also supports the development of highly functional electronic materials, synthetic enzymes, and dynamic materials for sensitive applications. By unlocking new materials and processes, quantum computing drives innovation across industries, from clean energy solutions to advanced manufacturing.

Path to value in materials design defined by expanding breadth, accuracy of simulation

Maximum value reached with full in silico simulation of materials of all types of complexity



Johnson Matthey works with Microsoft's Azure Quantum team to find lower-platinum alloy catalysts for hydrogen fuel cells in trucks and buses, using Azure HPC, quantum-chemistry tooling and AI-refined workflows that roughly halved calculation time and cut turnaround for scaled workloads from six months to one week (2023). Separately, JM partnered with Riverlane and Rigetti on quantum simulation of hydrogen-platinum catalysis, including a live demonstration where chemistry chosen by a London audience was computed on a Rigetti quantum computer in California (2022).

➤ [Microsoft and Johnson Matthey join forces to speed up hydrogen fuel cell innovation with Azure Quantum — Microsoft Azure Quantum Blog](#)

BASF is applying quantum computing to tackle key challenges in chemistry and material science. The company focuses on optimizing molecular structures, reaction pathways, and catalyst designs to enhance chemical processes. Quantum simulations are used to improve battery technologies, enabling advancements in energy storage and efficiency. BASF leverages quantum algorithms to reduce the need for extensive physical experiments, accelerating the R&D process. The technology also supports the development of sustainable solutions, such as environmentally friendly materials and energy-efficient production methods. Collaborating with academic and industrial partners, BASF ensures access to cutting-edge quantum research and applications. This integration of quantum computing enhances precision and innovation in BASF's core areas of expertise.

Our Vision: Quantum Computing will accelerate innovation

It will help us to solve some of our most challenging problems



Chemical Simulations  Quantum Computing will accelerate the development of new products through precise, rapid modeling of chemical reactions and properties of molecules.	Optimization  Quantum Computing will speed up the optimization of supply chains, production processes, energy flows and much more.	Machine Learning and AI  Quantum Computing will speed up the formulation of new products by considering an extremely high number of options.
Use cases  We identify and validate the most promising BASF use cases for Quantum Computing. We develop suitable algorithms and test them on different hardware.	Collaborations  We work closely with academia, industry and start-ups. We are involved in working groups and participate in political discussions.	Talent and Expertise  We build up internal competencies and focus on training, know-how exchange and communities.
Academia (fundamental progress)  • Friedrich-Alexander-University Erlangen-Nürnberg • Heinrich-Heine-University Düsseldorf • Fraunhofer Gesellschaft • Ludwig-Maximilians-Universität München	Industry/Commercial (near term use cases)  • Robert Bosch GmbH • HQS Quantum Simulations GmbH • Google Quantum AI • Zapata Computing Inc • Pasqal SAS	Gov't & Interest Groups (long term progress)  • QuIC • QUTAC • QuCUN • OpenSuperQ Industrial User Board • bitkom e.V. • Advisory Board of Q4Climate

➤ Q2B 2022 SV | Qemistry: Quantum Computing at BASF | Joshua Speros | BASF Venture Capital

➤ Quantum Computing- BASF Website

Covestro

Polymer maker Covestro signed a five-year collaboration with QC Ware to develop quantum algorithms for discovering new materials and catalysts and improving production processes, aiming to have Covestro ready to run practical chemistry simulations on 200–500-qubit hardware. The pair had already published two peer-reviewed papers on resource-efficient VQE ansätze and hybrid quantum/classical energy gradients (2022).

➤ [Covestro and QC Ware Partner to Develop Quantum Algorithms for Materials R&D](#)

Nippon Steel worked with Cambridge Quantum and Honeywell Quantum Solutions (now Quantinuum) on two fronts: formulating the scheduling of intermediate products in steelmaking, which the company calls one of its biggest logistical challenges, and running it on the Honeywell System Model H1 to reach an optimal schedule after a few iterations (2021); and developing algorithms plus a chemistry-specific noise-mitigation method to simulate hydrogen and periodic iron crystals in two phases on IBM Falcon processors, aimed at understanding how carbon dissolves in different iron states to enable discovery of new steels (arXiv, 2021).

➤ [CQ, Nippon Steel Scientists Forging Path to Algorithms That Can Simulate Materials on Today's Quantum Computers](#)

Mitsubishi Chemical is actively exploring quantum computing to enhance material development and chemical research. In collaboration with Classiq Technologies and Deloitte Tohmatsu, they achieved up to 97% compression of quantum circuits, improving calculation accuracy for new material development. Additionally, partnering with PsiQuantum, they aim to design energy-efficient photonic materials using fault-tolerant quantum computers. These initiatives demonstrate Mitsubishi Chemical's commitment to leveraging quantum technology for innovative solutions in material science.

➤ [Classiq, Deloitte Tohmatsu, and Mitsubishi Chemical Compress Quantum Circuits by Up to 97%](#)

Xanadu and Mitsubishi Chemical launched phase two of their EUV-lithography project after phase one showed quantum algorithms can model the optical properties of EUV photoresists. The new phase, funded by Canada's NRC IRAP and Japan's SIP programme, builds a production-oriented workflow that feeds parameters from Xanadu's quantum simulations of radiation-induced blur — an inherently quantum effect that bottlenecks classical simulation — into Mitsubishi's multi-scale models (August 2026).

➤ [Canada-Japan Support Advances Xanadu and Mitsubishi Chemical Partnership on Quantum Semiconductor Research](#)

Unilever integrated Microsoft's Azure Quantum Elements into its Datalab digital laboratory to run molecular simulations, screen tens of thousands of candidate materials and optimise formulations (e.g., water solubility of shampoo ingredients, restoring hair-fibre bonds) rather than making physical samples, running "thousands of computational simulations in the time it would take to run tens of laboratory experiments." Today the platform is HPC/AI-based with quantum hardware integration on the roadmap (2024).

➤ [Future R&D: How Unilever is transforming innovation with Microsoft](#)

Mitsui Chemicals and Tokyo quantum-software company blueqat launched a project combining natural-language processing with quantum computing to speed up the search for new applications of Mitsui's chemical products. They compressed a SimCSE sentence-embedding model with tensor-network technology so it can be mapped onto quantum circuits, and have vectorised a patent database to find similar patents with high accuracy, with quantum-hardware execution as the next step (June 2024).

➤ [Mitsui Chemicals, blueqat Launch Project Using Quantum Computing and AI Technology for Discovery of New Applications | MITSUI CHEMICALS, INC.](#)

Syngenta partnered with QuantumBasel, Switzerland's first commercial quantum computing hub, in a co-located working model in Basel that pairs QuantumBasel's algorithm team and access to quantum hardware/simulators with Syngenta's crop-science R&D. Initial projects target modelling complex molecular interactions in crop-protection chemistry that classical methods cannot resolve; announced at the World Agri-Tech Innovation Summit in March 2026.

➤ [Syngenta deepens research capabilities with QuantumBasel partnership | Syngenta](#)

Evonik and Terra Quantum completed a project using Terra Quantum's tensor-network-based, quantum-inspired solver TQOptimaX to optimise component geometries in computational-fluid-dynamics simulations, trading off objectives such as drag and heat dissipation to produce Pareto fronts with fewer expensive simulation runs. Benchmarking showed the solver performed comparably with Evonik's state-of-the-art production solver, and Evonik's CDO stated such quantum solutions "can compete with the best solvers available" (January 2025); this builds on the pair's 2023 hybrid quantum CFD prototype.

➤ [Terra Quantum and Evonik Use Quantum-Inspired Optimization for Improved CFD Geometry Design](#)

JSR Corporation

Semiconductor-materials maker JSR worked with IBM Quantum to simulate a molecule that behaves like a photo-acid generator used in photolithography, which IBM described as "the most advanced chemical simulation done on a quantum computer to date," with plans to scale to battery materials, OLEDs and crystalline materials (2023). JSR also expanded a collaboration with Quantinuum to use the H1 trapped-ion system and InQuanto to model transition-metal oxides and metal complexes for microelectronics (2022).

➤ [Solving hard chemical engineering problems with quantum | IBM Quantum Computing Blog](#)

Try it – Classiq library examples

- [Classiq > Applications > Chemistry > Molecule Eigensolver \(VQE method\)](#)
- [Classiq > Applications > Chemistry > Creating a Molecule's Potential Energy Curve](#)
- [Classiq > Applications > Chemistry > Quantum Phase Estimation \(QPE\) for Solving Molecular Energies](#)
- [Quantum Computing Applications - Chemistry | Classiq](#)

Quantum computing is poised to revolutionize cybersecurity by enhancing the efficiency and effectiveness of various classical algorithms used in cyber defense. Techniques such as anomaly detection, malware classification, and intrusion detection, which currently rely on algorithms like Support Vector Machines (SVMs), Decision Trees, and K-Means clustering, could see significant performance improvements through quantum algorithms. For instance, quantum clustering methods have demonstrated superior performance compared to classical [clustering techniques](#) in analyzing cybersecurity vulnerabilities. Additionally, [quantum deep learning](#)-based anomaly detection techniques offer robust solutions for identifying network attacks, potentially leading to more efficient and accurate threat detection systems.

While much of this research remains in the academic realm, the potential applications of quantum computing in cybersecurity are vast. The ability of quantum computers to encode complex relationships using quantum states, represent quantum uncertainty, allowing for richer, more complex representations of probabilistic systems, Capture correlations using quantum entanglement, enabling non-classical dependency structures, Utilize quantum inference methods like quantum measurement and amplitude amplification and process complex computations at unprecedented speeds could enable real-time analysis of large datasets, rapid identification of sophisticated cyber threats.

IBM patent, “Quantum Computing Machine Learning for Security Threats” introduces a transformative approach to cybersecurity by combining quantum computing and machine learning to counter non-linear cyberattacks. Utilizing the Bloch sphere for attack path visualization and the Quantum State Probabilities Matrix (QSPM) for predicting attacker transitions, this innovation enables real-time threat analysis and proactive defense strategies. By anticipating unpredictable attack patterns, identifying adversary profiles, and strengthening cloud security, this quantum-enhanced model addresses the limitations of traditional linear frameworks.

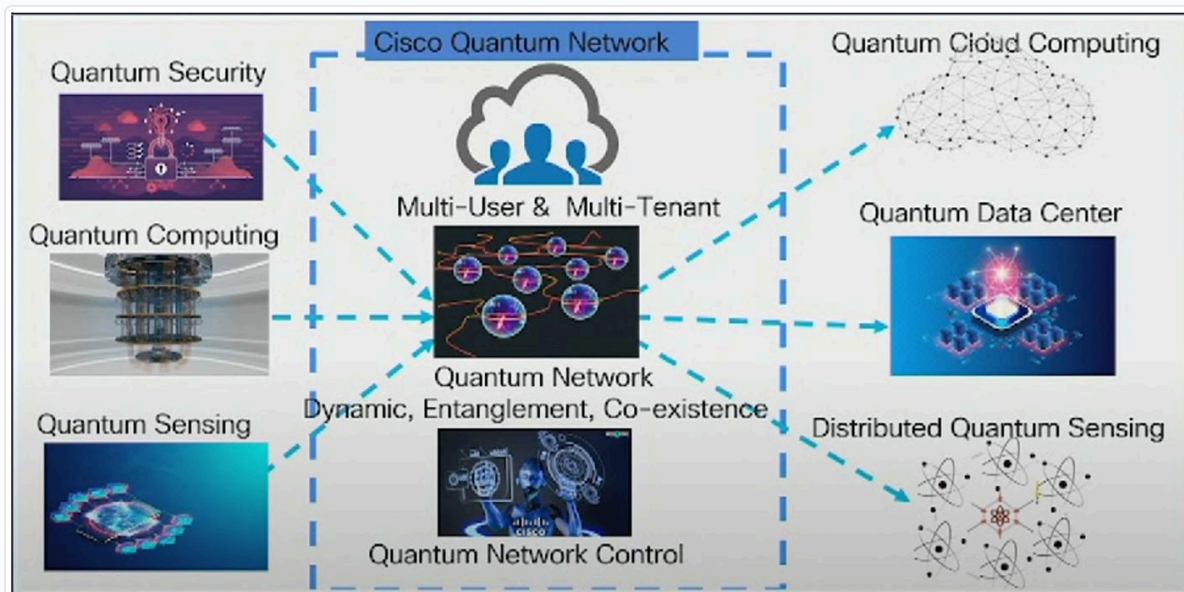
➤ [IBM Quantum Computing Machine Learning Cyber Warfare - Threat Detection and Response](#)

U.S. Department of War (Pentagon CIO)

The Department of War CIO signed a five-year agreement (December 2025) to deploy SandboxAQ's AQtive Guard platform for automated discovery and inventory of cryptographic assets across the department, the first step of its post-quantum migration and an extension of an earlier DISA quantum-resistant PKI prototype; a June 2026 DoW PQC strategy then set December 2030 (all systems PQC-capable) and December 2031 (all systems using PQC / CNSA 2.0) deadlines.

➤ [SandboxAQ & DoW CIO Partner to Strengthen US Cyber Defense | SandboxAQ](#)

Cisco is at the forefront of quantum technology, with significant contributions spanning [quantum networking](#), [security](#), and collaboration within the quantum research community. As a corporate partner of the [Chicago Quantum Exchange](#), Cisco is driving innovation in quantum communications and research, fostering partnerships to develop groundbreaking technologies. Cisco's [Quantum Research Lab](#) is central to its efforts, exploring quantum algorithms, systems integration, and applications to address critical challenges in networking and security. The company is also committed to developing [quantum-safe standards](#), focusing on quantum key distribution (QKD) and other cryptographic techniques to mitigate future quantum cyber threats.



[Cisco Quantum Summit 2024; What Cisco is Researching, Developing, and Incubating in Quantum Networking \(presentation\)](#)

Government of Canada (Canadian Centre for Cyber Security)

The Canadian Centre for Cyber Security issued "Roadmap for the migration to post-quantum cryptography for the Government of Canada" (ITSM.40.001) in June 2025, requiring every federal department to file a PQC migration plan and cryptographic inventory by April 2026, migrate high-priority systems by end-2031 and all remaining non-classified systems by end-2035, with annual progress reporting to Treasury Board.

➤ [Government of Canada Launches Post-Quantum Cryptography \(PQC\) Migration Roadmap](#)

North Wales Police worked with D-Wave on a hybrid quantum application to optimise forward deployment of officers and vehicles, cutting a planning exercise from about four months to four minutes and modelling roughly 50% faster emergency response (2025).

➤ [D-Wave and North Wales Police Use Hybrid Quantum Application to Optimize Emergency Response — Quantum Computing Report](#)

Zoom

In May 2024 Zoom made post-quantum end-to-end encryption globally available for Zoom Meetings (with Zoom Phone and Rooms to follow), using Kyber-768 (NIST ML-KEM, FIPS 203) to protect meeting content from harvest-now-decrypt-later attacks — the first UCaaS provider to do so.

➤ [Zoom Gets Ready Now For Remote Meetings in The Quantum Era](#)

Meta

In April 2026 Meta published a detailed post-quantum migration framework on its engineering blog, defining five "PQC Migration Levels" from PQ-Unaware to PQ-Enabled and reporting that it has already deployed quantum-resistant (hybrid ML-KEM) encryption across significant portions of its internal infrastructure; ML-KEM and ML-DSA in hybrid mode are its standard algorithms.

➤ [Meta PQC Migration Playbook: Lessons for CISOs](#)

Cloudflare has deployed hybrid post-quantum key agreement (X25519MLKEM768) across its network since 2022 and reported that over 50% of human HTTPS traffic it handles was post-quantum encrypted by October 2025, rising to 65% by April 2026; it has set a 2029 target to complete post-quantum authentication (certificates and signatures) for visitor, origin and Cloudflare One connections.

➤ [Cloudflare targets 2029 for full post-quantum security](#)

Cyber Security Agency of Singapore (CSA)

In July 2026 Singapore's Cyber Security Agency, with GovTech and IMDA, published its Quantum-Safe Migration Handbook v1.0 directing owners of Critical Information Infrastructure across 11 sectors to submit migration plans by 31 March 2027, make new systems quantum-safe-ready from 2028 and retire all quantum-vulnerable cryptography (RSA, DH, ECC) by 31 December 2031, using ML-KEM, ML-DSA and SLH-DSA.

➤ [Singapore Sets 2031 Quantum-Safe Migration Milestone](#)

U.S. Federal Government (White House / OMB)

In June 2026 the White House signed a post-quantum cryptography executive order requiring federal agencies to move high-value assets to NIST-standardised quantum-resistant encryption by 2030–2031, with Commerce, NSA and DHS running a pilot migration in 2027 and contractors required to meet the standards by end-2030; an OMB memo followed, demanding agency PQC migration plans within 120 days and a five-phase timeline running to 2035.

➤ [Trump Administration Executive Order Places Quantum at Center of Federal Technology Strategy](#)

Australian Signals Directorate (ASD / ACSC)

Australia's Signals Directorate set one of the world's most aggressive deadlines, directing organisations to stop using traditional asymmetric cryptography (RSA, ECC, DH) by 2030; its 2025 "Planning for Post-Quantum Cryptography" guidance asks organisations to finish transition plans by end-2026, start migrating critical systems by 2028 and complete migration by 2030.

➤ [ACSC's Post-Quantum Plan: Start Now, Plan for Longer Execution](#)

UK National Cyber Security Centre (NCSC)

In March 2025 the UK's NCSC published the first national timeline for migrating to post-quantum cryptography: organisations must inventory cryptographic services and have a migration plan by 2028, complete priority upgrades by 2031 and finish full migration by 2035, with the guidance aimed at large organisations, critical sectors and SMEs alike.

➤ [Cyber chiefs unveil new roadmap for post-quantum cryptography migration](#)

European Commission / EU NIS Cooperation Group

On 23 June 2025 the European Commission and Member States (via the NIS Cooperation Group) released a coordinated implementation roadmap for post-quantum cryptography: all Member States must start national PQC strategies and cryptographic inventories by end-2026, migrate high-risk systems (critical infrastructure, utilities, telecom, finance, government) by end-2030 and complete the transition by 2035.

➤ [EU Commission Roadmap Targets 2030 for Post-Quantum Cryptography Transition](#)

Signal Foundation (and Threema)

Building on its PQXDH (2023) and SPQR triple-ratchet (2025) upgrades, Signal is working with IBM Research to protect group-messaging metadata using a modified ML-DSA signature scheme with a decentralised "gatekeeper" model to limit bandwidth overhead, while Swiss messenger Threema is integrating ML-KEM; both were presented at Real World Crypto in March 2026.

➤ [IBM, Signal, and Threema Partner to Fortify Messaging Against Quantum Threats — Quantum Computing Report](#)

EPRI explores AI-enhanced cybersecurity in utilities, focusing on quantum science and technology. The Quantum Challenge initiative aims to speed up adopting new quantum tech in the electric industry.

➤ [Quantum Technologies for AI-Enhanced Utility Cybersecurity](#)

Defence Cyber Marvel 3 (DCM3) (DCM3), Europe's premier cyber defense exercise organized by the Army Cyber Association, brings together defense, government, industry, and international allies to tackle evolving cyber threats in a simulated environment. The event showcases cutting-edge technologies critical to network security. A highlight of DCM3 is the integration of quantum computing, led by [Infleqtion](#) utilizing Oxford Quantum Circuits' 32-qubit [OQC](#) Toshiko superconducting quantum computer to demonstrate the potential of quantum systems in cybersecurity. The company focuses on identifying maximally distinguishable quantum circuits to simulate files in distributed databases, illustrating quantum computing's capacity for secure and efficient data management. By bridging quantum technology and cyber defense, DCM3 underscores the transformative potential of quantum systems in addressing critical security challenges.

Apple

In February 2024 Apple rolled out PQ3, a hybrid post-quantum/elliptic-curve cryptographic protocol for iMessage across iOS, iPadOS, macOS and watchOS that secures both the initial key exchange and all subsequent messages with a self-healing rekeying mechanism, which Apple describes as "Level 3" security, above the PQXDH approach that protects only key establishment.

➤ [Apple Unveils Post-Quantum Secure Messaging With iMessage](#)

Sample academic papers

- [Quantum deep learning-based anomaly detection for enhanced network security](#)
- [A Quantum LSTM-based approach to cyber threat detection in virtual environment](#)
- [Analysis of a Huge Amount of Network Traffic Based on Quantum Machine Learning](#)
- [Quantum Machine Learning Algorithms for Big Data Analytics in Cyber Security](#)
- [Network attack detection scheme based on variational quantum neural network](#)
- [Adaptive Quantum Learning Frameworks for Real-Time IIoT Attack Identification](#)
- [QML-IDS: Quantum Machine Learning Intrusion Detection System](#)
- [Enhancing Cyber Security Using Quantum Computing and Artificial Intelligence: A Review](#)

Try it — Classiq library examples

- [Classiq > Applications > Cyber Security > Link Monitoring for Internet-of-Things](#)
- [Classiq > Applications > Cyber Security > Tackling Kill-Chains with Quantum Computing](#)
- [Classiq > Algorithms > QML > Hybrid Classical Quantum Neural Networks \(e.g. Cyberattack Detection\)](#)
- [Quantum Cyber Security | Classiq](#)

Quantum technologies hold transformative potential in defense and aviation through advancements in computing, sensing, and networking. Quantum computing enables rapid simulations for aerodynamics, structural modeling, and [mission planning](#), offering strategic advantages. Quantum sensing enhances navigation, detection, and surveillance systems with unprecedented precision, such as detecting submarines or stealth aircraft. Networking advancements through quantum communication provide ultra-secure data transmission, ensuring confidentiality in military operations. These technologies also support optimization of logistics, fuel efficiency, and fleet management. Additionally, quantum computers can potentially break classical encryption, which defense sectors aim to exploit for offensive as well as must be ready on the defensive side with cybersecurity strategies. These applications collectively strengthen operational efficiency and security across the defense and aviation domains.

Quantum at Lockheed Martin



Quantum Computing Cutting edge applications on commercial hardware: machine learning, optimization, chemistry, and more	
Quantum Sensing Exquisitely fine sensors and devices create a more accurate picture of the world	Quantum Communications Advanced channel capacity and security enhancements

Japan Airlines (JAL)

JAL rolled out a quantum-computing-and-mathematical-optimisation tool developed with Japanese quantum software firm AQuantum for aircraft maintenance operation planning, moving to full-scale deployment in March 2026 and cutting the time needed for complex planning previously dependent on veteran staff. In May 2026 JAL's CVC fund invested in AQuantum to extend the approach to flight operations, cabin, airport, reservations and workforce scheduling.

➤ [JAL Invests in A*Quantum to Accelerate Enterprise DX and Business Transformation Through Quantum Technologies | JAL Group Press Release](#)

Davidson Technologies (with Anduril)

Huntsville defence contractor Davidson Technologies hosts the first on-premises D-Wave Advantage2 annealer, which D-Wave made available for US government applications in November 2025 to work on radar detection, resource deployment, military logistics optimisation and other national-security problems under a multi-year agreement. In January 2026 Anduril, Davidson and D-Wave reported a proof-of-concept for air-and-missile-defence planning on Advantage2 showing roughly 10x faster processing and up to 12% better threat mitigation than classical methods.

➤ [D-Wave Advantage2 Quantum Computer Now Available for U.S. Government Applications at Davidson Technologies](#)

Rolls-Royce will work with Classiq on a hybrid approach to quantum computing that will speed up testing.

➤ [NVIDIA, Rolls-Royce and Classiq Announce Quantum Computing Breakthrough for Computational Fluid Dynamics in Jet Engines](#)

Thales and Pasqal modelled satellite-constellation mission scheduling as a Maximum Independent Set problem and solved it on Pasqal's neutral-atom emulator and early QPUs (May 2024, funded by the Paris Region's PACT Quantique), targeting faster re-planning as constellations grow to hundreds of satellites. Separately, in the €2.6M AeroQAT project (September 2024, France 2030) Thales, Alice & Bob and Inria are developing fault-tolerant quantum algorithms to accelerate electromagnetic simulation of radar and telecom antennas for airborne equipment design.

➤ [Thales — Pasqal success story](#)

European Space Agency (ESA)

ESA installed its first on-premises quantum computer, Equal1's rack-mounted 6-qubit silicon-spin Bell-1, in the ESRIN data centre in Frascati as a testbed for hybrid quantum-classical algorithms for Earth-observation challenges (climate modelling, weather forecasting, disaster response), following an agreement signed in November 2025 and announced in July 2026, with a pilot demonstration planned by end-2026. It builds on ESA Φ-lab's QC4EO programme on quantum ML for land-cover classification and SAR ground-motion data.

➤ [ESA's first quantum computer will shift computing frontiers in space — ESA Φ-lab](#)

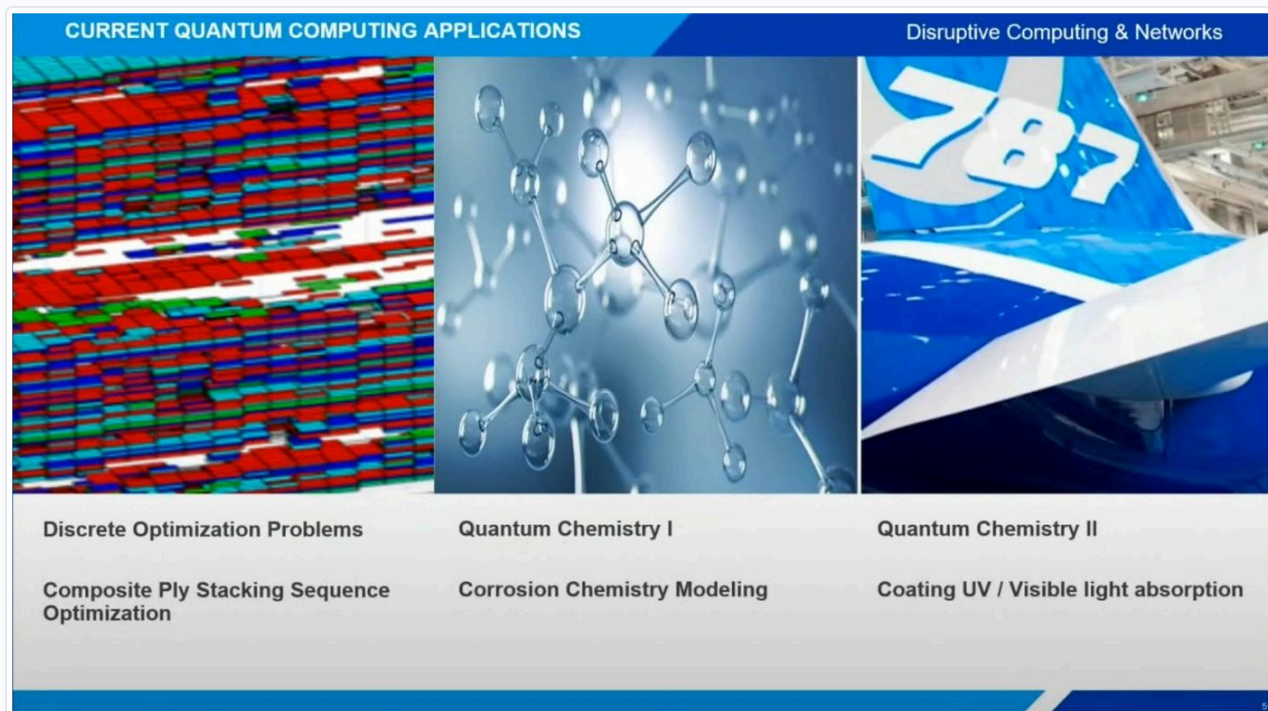
GE showcased quantum computing's potential, focusing on optimization and demonstrating its application in Aviation service shops. Additionally, IonQ and GE Research collaborated on risk management using hybrid quantum computing to predict future performance from historical data indexes.

➤ [IonQ and GE Research Demonstrate High Potential of Quantum Computing for Risk Aggregation](#)

Lockheed Martin is a member of QED-C. The USC-Lockheed Martin Quantum Computing Center is a joint scientific research effort between Lockheed Martin Corporation and the University of Southern California.

➤ [USC-Lockheed Martin Quantum Computing Center](#)

Boeing partners with IBM Quantum for aerospace innovation, exploring corrosion solutions and supporting young researchers through the Boeing Quantum Creators Prize. Their Disruptive Computing & Networks unit focuses on practical quantum aerospace applications.



➤ [Q2B 2022 SV | Aerospace and Materials Design Use Cases for Quantum Computers | Jay Lowell](#)

Vueling

Spanish low-cost carrier Vueling had Lighthouse DIG build a D-Wave hybrid quantum application to assign aircraft to flight schedules under airport time-window and maintenance constraints, replacing a slow, error-prone manual process; the project was presented in 2025 as validation that hybrid quantum optimisation can already address real-world aviation problems.

➤ [Optimizing Aircraft Utilization with Quantum Computing](#)

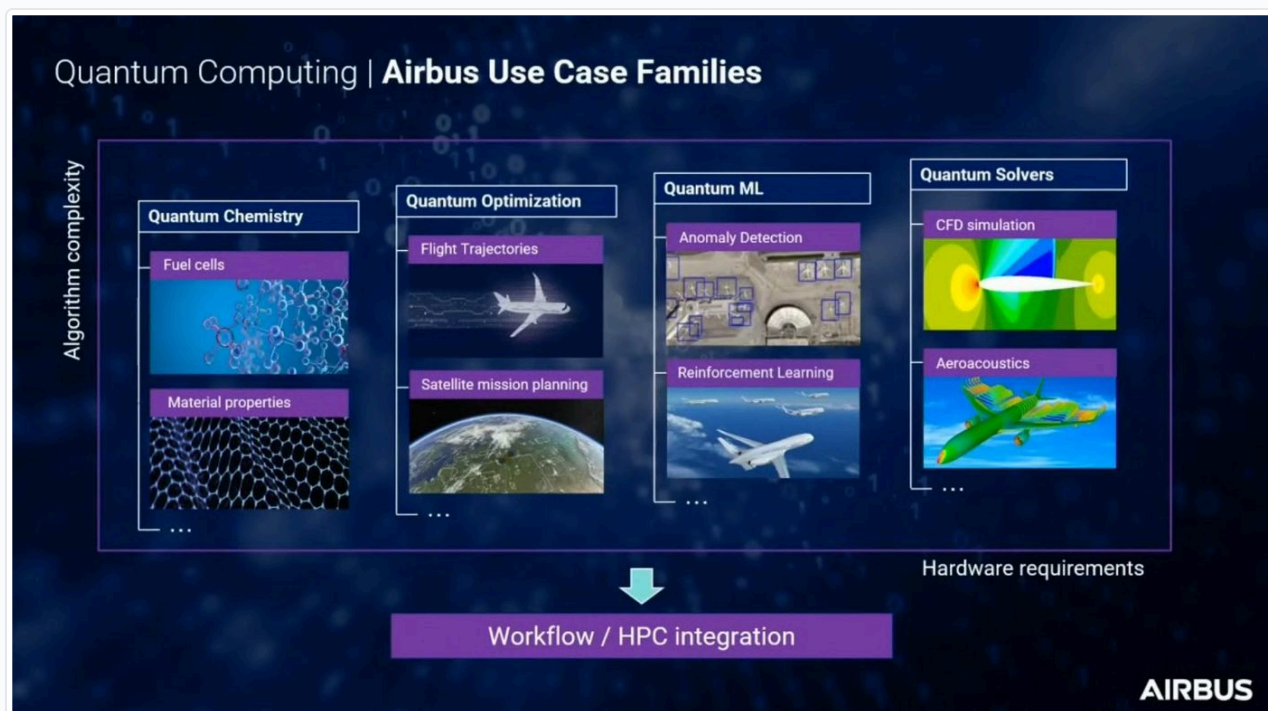
US Air Force Research Laboratory (AFRL)

IonQ commissioned an on-premises, enterprise-grade trapped-ion quantum system at AFRL's Information Directorate in Rome, New York (March 2025), optimised for the lab's quantum-networking and distributed-quantum-computing research; the deployment follows four IonQ-AFRL contracts since 2022 totalling more than \$94M.

➤ [IonQ Commissions Ground-breaking Quantum System at the U.S. Air Force Research Lab](#)

Airbus is leveraging quantum computing to tackle critical aerospace challenges and advance its products and services. The company focuses on quantum computing, sensing, and communication. By collaborating with organizations like IonQ, Q-CTRL, and QC Ware, Airbus and initiatives such as the Airbus Quantum Computing Challenge and partnerships with global and European stakeholders, Airbus is actively shaping the future of quantum technologies to improve operational efficiency, sustainability, and product innovation. In addition, its leadership in the European Quantum Communication Infrastructure (QCI) initiative underscores Airbus's commitment to advancing quantum communication and sensing technologies.

Quantum computing supports Airbus's ambition to address the high computational demands of the aerospace industry, particularly in areas such as computational fluid dynamics (CFD), optimization, and machine learning. Recent projects include fuel cell modeling for hydrogen-powered aircraft and flight path optimization, which aims to enhance fuel efficiency by integrating quantum algorithms. Airbus also focuses on quantum-inspired techniques for solving combinatorial problems like aircraft loading and trajectory planning. With ongoing collaborations, Airbus is developing algorithms and hardware-efficient solutions tailored to aerospace and energy challenges, driving the industry's transition toward sustainable innovation.



➤ [Q2B 2022 SV | Bringing Aerospace into the Quantum Era | Jasper Krauser | Airbus](#)

Delta Air Lines has entered a multi-year contract with the IBM Quantum Network to accelerate quantum research and application development.

➤ [Delta Partners with IBM to Explore Quantum Computing](#)

DARPA (US Defense Advanced Research Projects Agency)'s Quantum Benchmarking Initiative (QBI) is the US defense establishment's structured programme to independently verify whether any quantum-computing approach can reach utility scale (computational value exceeding cost) by 2033. In November 2025 DARPA advanced 11 companies (IBM, IonQ, Quantinuum, QuEra, Atom Computing, Xanadu, Diraq, Nord Quantique, Photonic, Quantum Motion, Silicon Quantum Computing) from Stage A into a year-long Stage B review, with a Stage C build-and-test phase to follow.

➤ [Stage B selection | DARPA](#)

Lufthansa Industry Solutions is set to concentrate on air traffic applications, utilizing quantum computing to optimize maintenance processes, flight plans, flight routes, gate assignments, and air cargo distribution. The focus will be on solving scheduling and routing problems within the aviation industry.

➤ [Quantum algorithms for optimal processing at airports](#)

Lufthansa Industry Solutions and the University of Hamburg's Institute for Quantum Physics started a three-year project (2024, funded by Hamburg's IFB Quantum Computing Initiative) to develop quantum algorithms for the airport gate-assignment problem, aiming to cut delays and improve gate utilisation.

➤ [Quantum Computers To Optimize Airport Operations Worldwide](#)

NASA (Goddard and Langley Research Centers) Goddard contracted Quantum Computing Inc. (December 2024) to use its Dirac-3 photonic optimisation solver on the NP-hard phase-unwrapping problem in interferometric radar imagery, benchmarking against classical methods to unwrap interferograms at full scale. NASA Langley followed with a \$406k subcontract (April 2025) to apply Dirac-3 to removing solar noise from space-based LiDAR data (CALIPSO, ICESat-2) to improve daytime atmospheric sensing.

➤ [Quantum Computing, Inc. Awarded Contract by NASA to Support Phase Unwrapping Using Dirac-3 Photonic Optimization Solver](#)

HENSOLDT

German sensor house HENSOLDT won a contract from the DLR Quantum Computing Initiative for the QUA-SAR project, developing quantum-computing applications to optimise complex radar remote-sensing scenarios and radar resource management in dynamic battlefield environments, together with DLR's Microwaves and Radar Institute and Tensor AI Solutions (2025). It complements the "Quantum Sensing and Technologies" field HENSOLDT set up in 2024.

➤ [HENSOLDT conducts research in the field of quantum computing](#)

Try it — Classiq library examples

➤ [Classiq > Applications > Optimization > Max Clique Problem](#) (e.g. Air conflict resolution)

➤ [Classiq > Algorithms > HHL Algorithm](#) (e.g. Computational Fluid Dynamics)

➤ [Classiq > Algorithms > Algebraic > Shor](#) (e.g. Decryption Attacks)

➤ [Quantum for Aerospace & Defense | Classiq](#)

Logistics is where quantum optimization has moved furthest from the lab. The vehicle-routing, workforce-scheduling and container-stacking problems that define ports, carriers and grocers map naturally onto annealers and hybrid solvers, and several operators now run them in daily production. Port terminal operators, container lines, air-cargo carriers and food retailers have all put real operational data through quantum or quantum-inspired engines, in several cases reporting double-digit productivity gains. As in financial services, the pattern is pragmatic: hybrid quantum-classical workflows embedded into existing planning tools rather than standalone quantum experiments.

CMA CGM

Container line CMA CGM invested in Pasqal and set up a Quantum Computing Center of Excellence at its TANGRAM innovation hub, giving staff access to Pasqal's neutral-atom processor to develop use cases in container management and vessel loading; the 2024 announcement is a program launch, with no operational results yet reported.

➤ [CMA CGM Group Invests in Pasqal, Companies to Explore Quantum Computing For Optimizing Maritime And Logistics Operations](#)

DP World's UAE Region partnered with D-Wave to explore quantum computing for industrial logistics, fleet management and traffic management across its terminals, completing hands-on quantum programming training for its teams as a first step; the 2021 initiative was exploratory and no production deployment has been reported.

➤ [DP World, D-Wave Partner to Explore Using Quantum Computers to Optimize Supply Chain](#)

Fenix Marine Services (Port of Los Angeles, Pier 300), operator of the Pier 300 terminal at the Port of Los Angeles, runs SavantX's HONE optimization engine on D-Wave's annealer to schedule cargo-handling equipment and container placement; the company reported that the system doubled cargo-handling equipment productivity, and it has been in full production making optimization calls roughly every ten seconds across two daily shifts (2022).

➤ [Quantum Computing Application Sees Real World Success at Pier 300 at The Port of Los Angeles](#)

Pattison Food Group, Western Canada's largest food retailer, uses a D-Wave quantum-hybrid application to auto-generate weekly e-commerce delivery-driver schedules across 100+ stores, replacing a task that previously required three to four planners; D-Wave reports an ~80% reduction in the effort needed to create the schedules, with the application in production use (highlighted at Q2B 2024).

➤ [D-Wave to Showcase Real-World Quantum Computing Applications in Action at Q2B24 Silicon Valley](#)

Einride

Swedish electric and autonomous freight company Einride and IonQ began a multi-year partnership in May 2025 and reported first results in December 2025: after screening 15 candidate applications, they built a hybrid quantum-classical workflow inside Einride's Saga platform to allocate shipments across vehicles, drivers and charging constraints, using real commercial transport data. Benchmarks validated integration with production workflows, with quantum advantage expected as hardware matures; IonQ also joined Einride's \$100M funding round as a strategic investor.

- [Einride and IonQ Partnership Uses Quantum Computing to Optimize the Logistics of Electric and Autonomous Freight](#)
- [Additional source: quantumcomputingreport.com](#)

Amerijet International

Miami-based cargo carrier Amerijet ran a proof of concept with Quantum-South's quantum-inspired air-cargo optimization software on 451 real flights, identifying container and center-of-gravity loading alternatives that increased payload by up to 30% and volume by up to 76%; the 2023 PoC was completed successfully with continued collaboration planned.

- [Quantum-South Identifies Alternatives to Boost Amerijet International's Cargo Load Factor by up to 30% with Cutting-edge Solution](#)

Try it — Classiq library examples

- [Classiq > Applications > Logistics > Facility Location Problem](#)
- [Classiq > Applications > Logistics > Travelling Salesman Problem](#)
- [Classiq > Applications > Logistics > Workflow Scheduling Problem](#)
- [Classiq > Applications > Optimization > Integer Linear Programming \(e.g. Pickup & Delivery Routing Problem\)](#)

Heavy industry and electronics makers have approached quantum computing from two directions at once: optimization of production scheduling and plant logistics on today's hardware, and simulation of the alloys, OLED emitters and multiphysics systems that drive their next products. Steelmakers in Japan and Korea have been unusually active, moving from early trapped-ion scheduling trials to multi-year quantum centers of excellence, while Korean electronics giants have paired equity investments in quantum vendors with concrete materials-discovery and product-design programs. Most work remains research or PoC, but the problems being attacked are core to each company's manufacturing economics.

POSCO Holdings teamed up with Pasqal and Korean software firm Qunova Computing to develop quantum-AI algorithms on Pasqal's neutral-atom hardware (on-premises and via cloud) for optimising eco-friendly steelmaking processes, designing secondary-battery materials and solid electrolytes, and improving materials-characterisation accuracy. The work is a three-year national project selected under Korea's Quantum Computing Challenge programme, with KRW 2.75 billion in funding from the Ministry of Science and ICT (2023).

➤ [POSCO Holdings Cooperates with Pasqal and Qunova Computing to Develop Quantum Computing Technologies — Pasqal](#)

Siemens Digital Industries Software began a 3.5-year, fully funded research project with Pasqal and Exeter University to apply neutral-atom quantum methods for solving nonlinear differential equations inside Siemens' computer-aided-engineering tools, targeting faster digital-twin prototyping for automotive, electronics, energy and aerospace customers (2022).

➤ [Siemens Collaborates with Pasqal to Research Quantum Applications in Computer Aided Engineering, Simulation and Testing](#)

LG Electronics made an equity investment in Pasqal and launched a strategic partnership to co-develop quantum algorithms for LG's product-development challenges in multiphysics simulation, optimization and material discovery, while jointly exploring optical and electronic components for neutral-atom systems; the 2025 program builds on LG's earlier IBM Quantum Network membership (2022).

➤ [Pasqal and LG Electronics Forge Strategic Partnership to Advance Quantum Innovation and Industrial Applications](#)

Samsung (Samsung Advanced Institute of Technology) Advanced Institute of Technology and OTI Lumionics benchmarked the iterative qubit coupled cluster (iQCC) quantum algorithm, emulated classically, against conventional methods on 14 OLED emitter materials, emulating systems above 200 qubits on a single CPU node and completing a 112-qubit ground-state calculation in about an hour on GPUs; the 2026 results were published in JACS and aimed at accelerating display-materials development.

➤ [OTI Lumionics, Samsung Benchmark Quantum Simulation Method for OLED Materials](#)

Kobe Steel (KOBELCO) signed a multi-year framework agreement with Tokyo quantum-software firm Jij to set up a joint Quantum Center of Excellence deploying hybrid quantum-classical optimization across KOBELCO Group operations. First-year projects convert two plant problems into QUBO models that run on Ising machines and quantum computers: alloy/material design that balances conflicting mechanical properties, and production planning under complex logistics constraints, tied to the "KOBELCO-X" transformation programme (2026).

➤ [Jij and Kobe Steel Sign Framework Agreement to Launch Quantum Center of Excellence — Quantum Computing Report](#)

➤ [Additional source: steelradar.com](#)

Try it — Classiq library examples

➤ [Classiq > Applications > Logistics > Workflow Scheduling Problem](#) (e.g. production scheduling)

➤ [Classiq > Applications > Optimization > Integer Linear Programming](#)

➤ [Classiq > Applications > Chemistry > Molecule Eigensolver \(VQE method\)](#) (e.g. alloy and OLED materials)

➤ [Quantum Computing Applications - Chemistry | Classiq](#)

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