



HYPERION RESEARCH

QC Highlights From Around the World

HPC User Forum 2024

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QC Market Study Summary/Highlights

Continued strong and steady progress for the global QC sector

- **The global quantum computing (QC) market was estimated to be approximately €920 million in 2024**
 - A projected annual growth rate of 22.1% brings the global QC market to €1.4 billion in 2026
- **Supply-side growth driven by a collection of factors:**
 - Continued revenue growth by traditional QC suppliers
 - First revenue appearances by new-to-market players
 - Expanding base of domestic suppliers in nascent markets
 - Increasing sophistication and specialization of QC stack
- **Demand-side interest on the rise:**
 - Widespread interest in accelerating critical compute jobs
 - More end use case exploration within the overall HPC community
 - Sustained government programs, and related government procurements, fostering sales and increasing credibility to potential end users

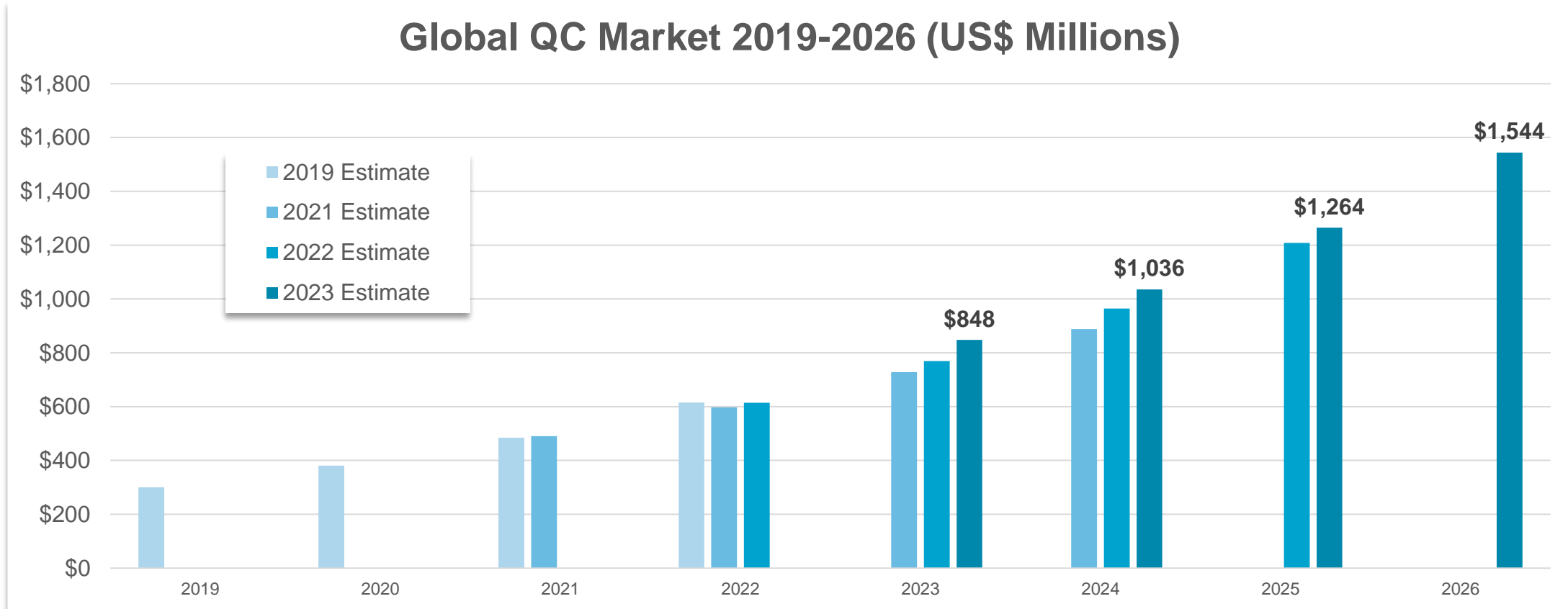
QC Market Study Summary/Highlights (cont.)

Based on a survey of 133 respondents representing 108 different QC commercial organizations

- **The QC supplier sector is taking on a more traditional revenue-based financial profile**
 - In 2021: 49% of survey respondents had \$500K revenues or less, 32% had no revenues
 - In 2023: 27% of survey respondents had \$500K revenues or less, 11% had no revenues
- **Approximately one-third of surveyed organizations expect at least a 25% increase in revenue in 2024**
 - No surveyed organization anticipates a decline in revenue
- **The QC hardware market for on-premises and cloud-based demands will account for about 30% of the overall QC market in 2026**
 - Equating to a US\$469 million global QC hardware market that year
- **End user sectors seen as most attractive for QC suppliers in 2026**
 - R&D for quantum technology chosen by about half of the survey respondents as most attractive
 - From last year, Chemical/Chemistry moves from #4 to #2, while Financial drops from #1 to #3
 - Cybersecurity continues as a perennial favorite
 - N.b. Nearly every sector (of the 21 different options offered) was deemed important by some
- **The trend towards less concern about a potential quantum winter continues**
 - But LLMs are seen as a potential distraction

QC Market Estimate: US\$1 Billion in 2024

22.1% annual growth rate drives QC global market to US\$1.5 billion in 2026



- **Dangerous to project out too far: too many unknowns**
 - But is this the first stages of an exponential curve?

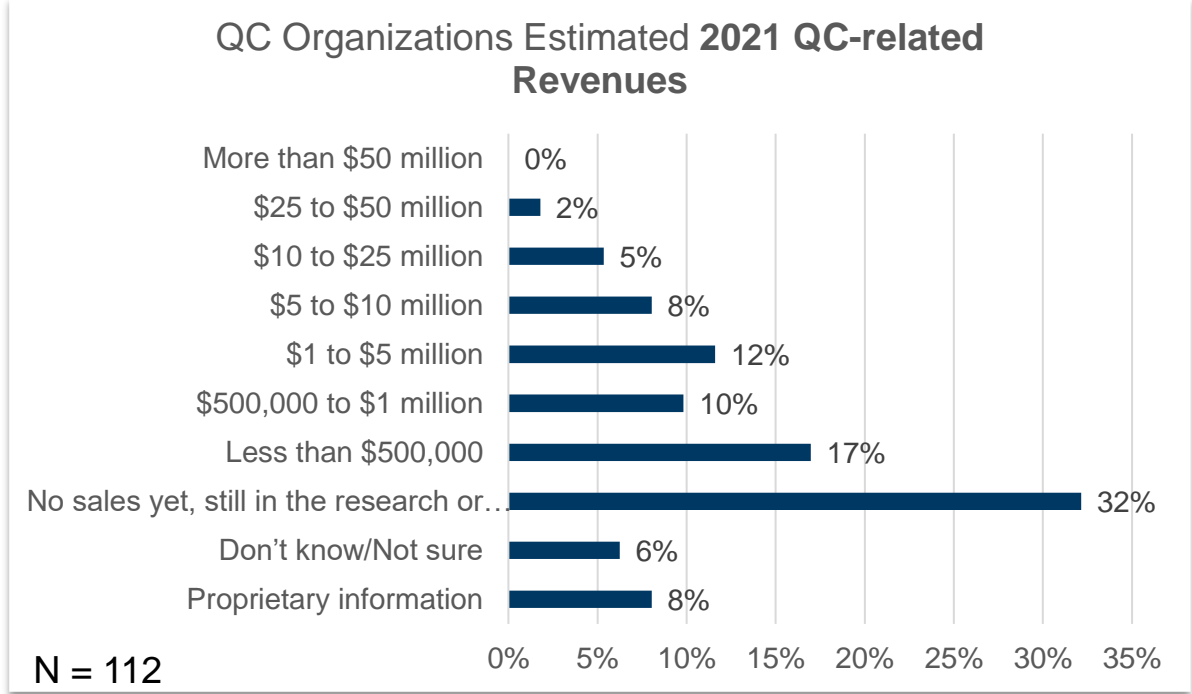
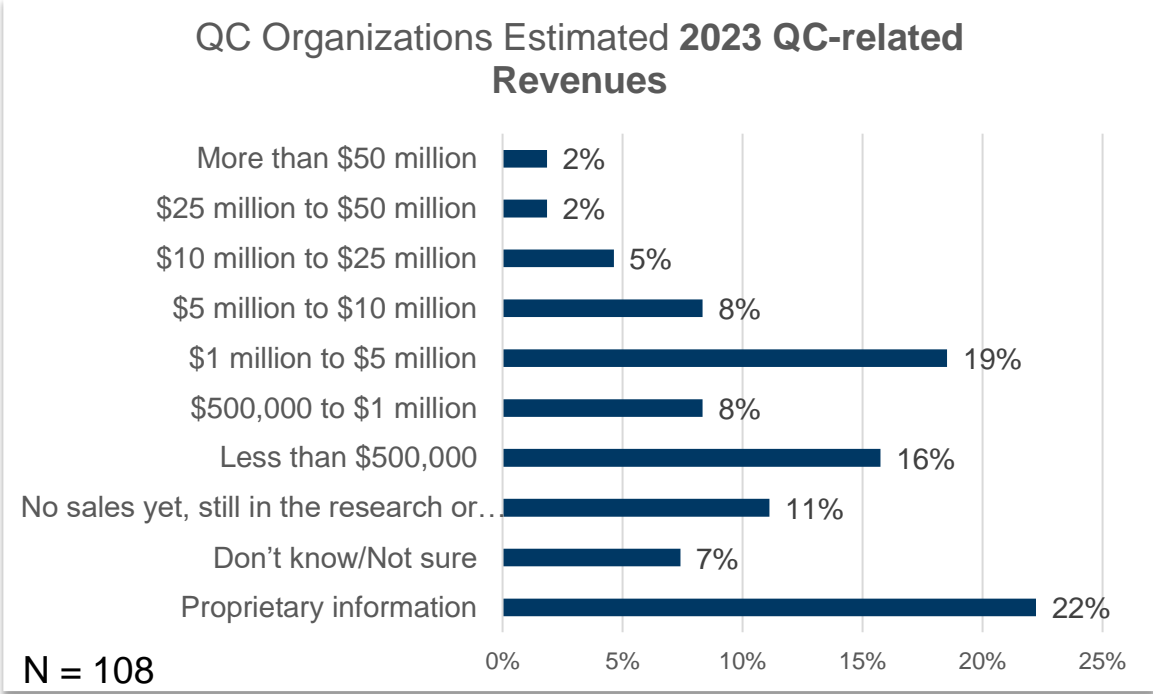
2023 QC Market Study Roadmap

Formulate global status and prospects from a data-driven perspective

- **Conducted QC supplier survey to gather data and insights on QC market dynamics**
- **Many thanks for assistance from various QC consortia in reaching out to their respective membership to encourage participation in this effort:**
 - Quantum Economic Development Consortium (QED-C)
 - European Quantum Industry Consortium (QuIC)
 - Quantum Industry Canada
 - Japan Quantum Strategic Industry Alliance for Revolution (Q-STAR)
 - Australian Quantum Alliance
 - UKQuantum
 - Korea Quantum Industry Association
- **Gathered results to span:**
 - Geographic variety, company size (total and QC-related revenues), market concentration, QC industry sentiment, and impressions on general trends in the sector
- **Analyzed results from 133 respondents representing 108 different companies**
 - Individual responses for industry-wide questions
 - Combined single response for organizations

QC Suppliers' Revenues: Now and Then

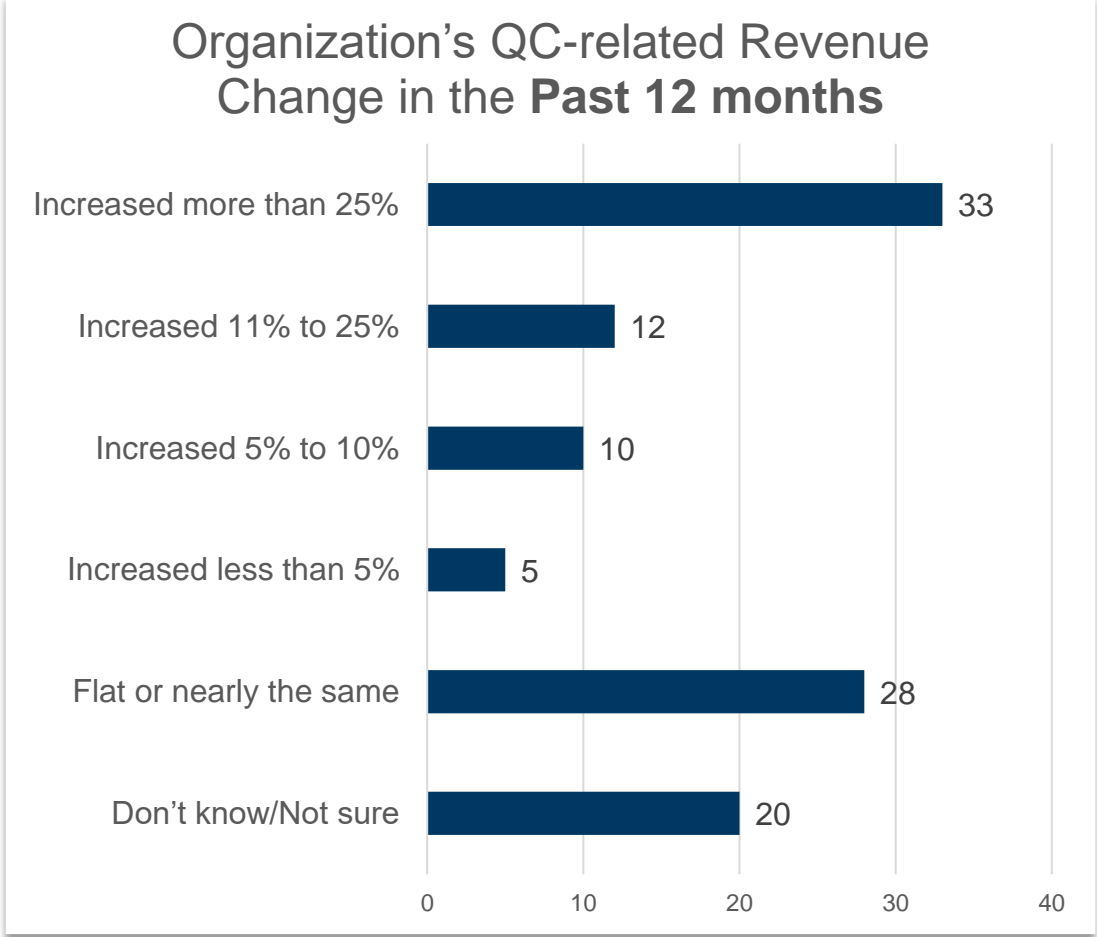
Comparing 2023 with 2021: Quantifying QC supplier base revenue profiles



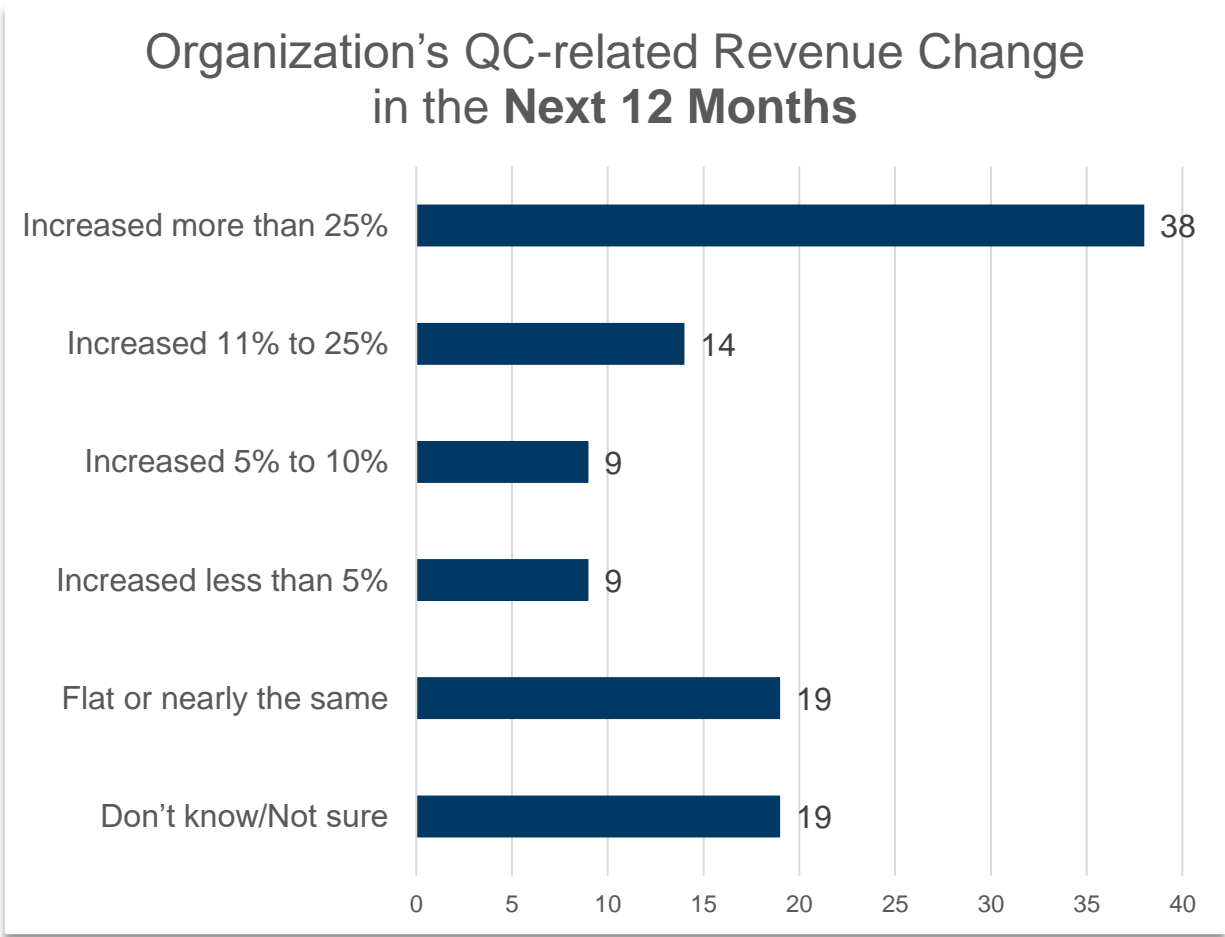
- In 2021: 49% of respondents had \$500K revenues or less, 32% had no revenues
- In 2023: 27% of respondents had \$500K revenues or less, 11% had no revenues
 - Propriety information on the rise?
- In 2023, four companies above the \$25 million line, double two years earlier

QC Suppliers: Accelerating Revenue

~One-third expect more than 25% growth, no expected decreases



N = 108

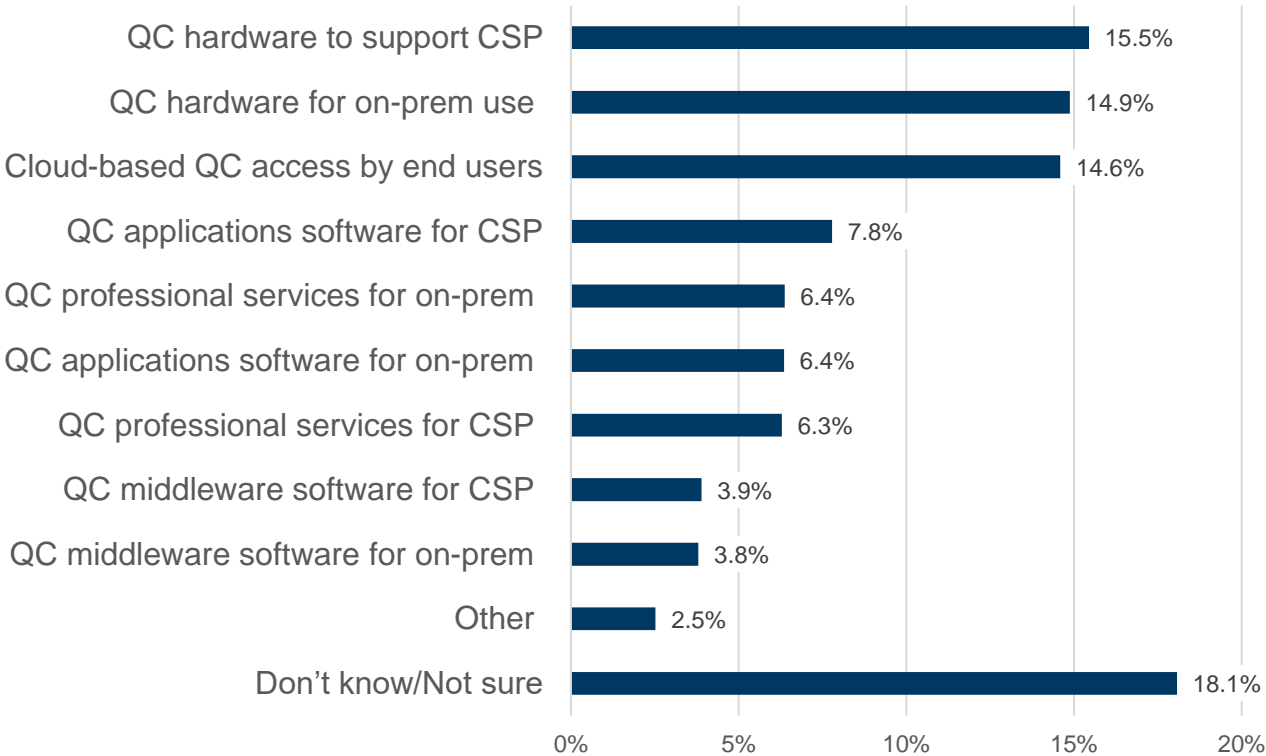


N = 108

QC Market 2026: Major Market Segments

QC hardware 30% of the market, CSP-related revenues about half

QC Major Market Segments by Revenue in 2026



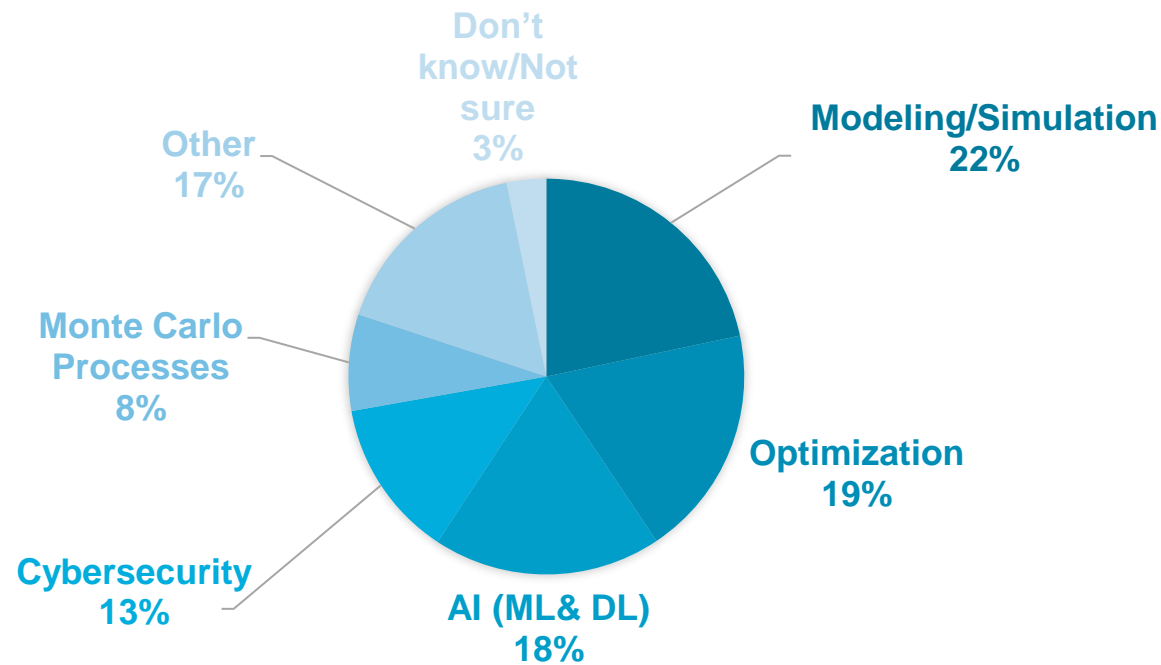
- QC hardware for on-prem plus cloud = 30.4%
 - Equates to US\$469 million QC hardware market in 2026
- CSP interactions (hardware, software and end user access) account for 48.1% of all QC revenues
- Total on-premises based revenues (31.4%) worth about US\$485 in 2026
- No claims as to how the “Don’t know/Not sures” will partition

N = 133

QC Market 2026: Major Algorithms by Revenue

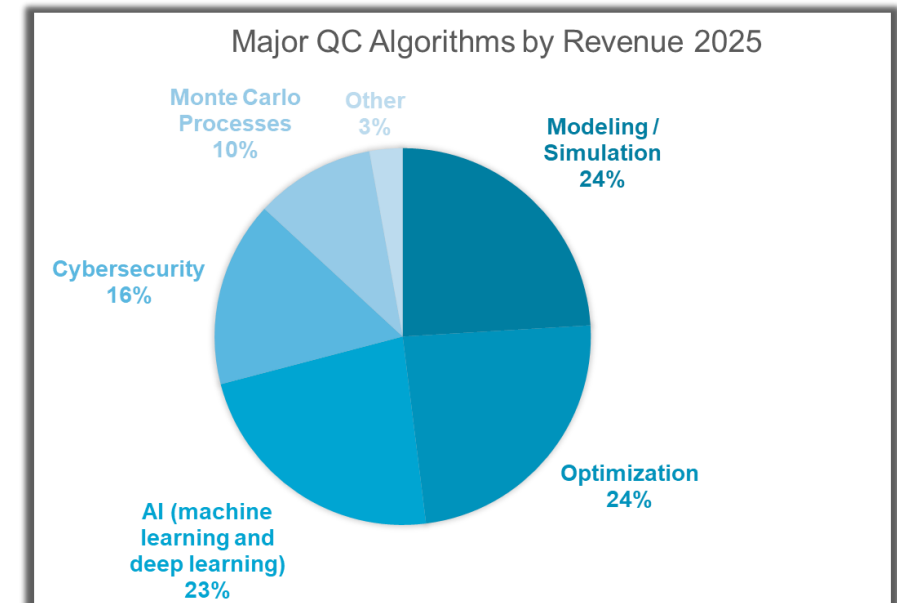
Mod/sim, optimization, and AI still the three major algorithms areas

QC ALGORITHMS BY REVENUE 2026



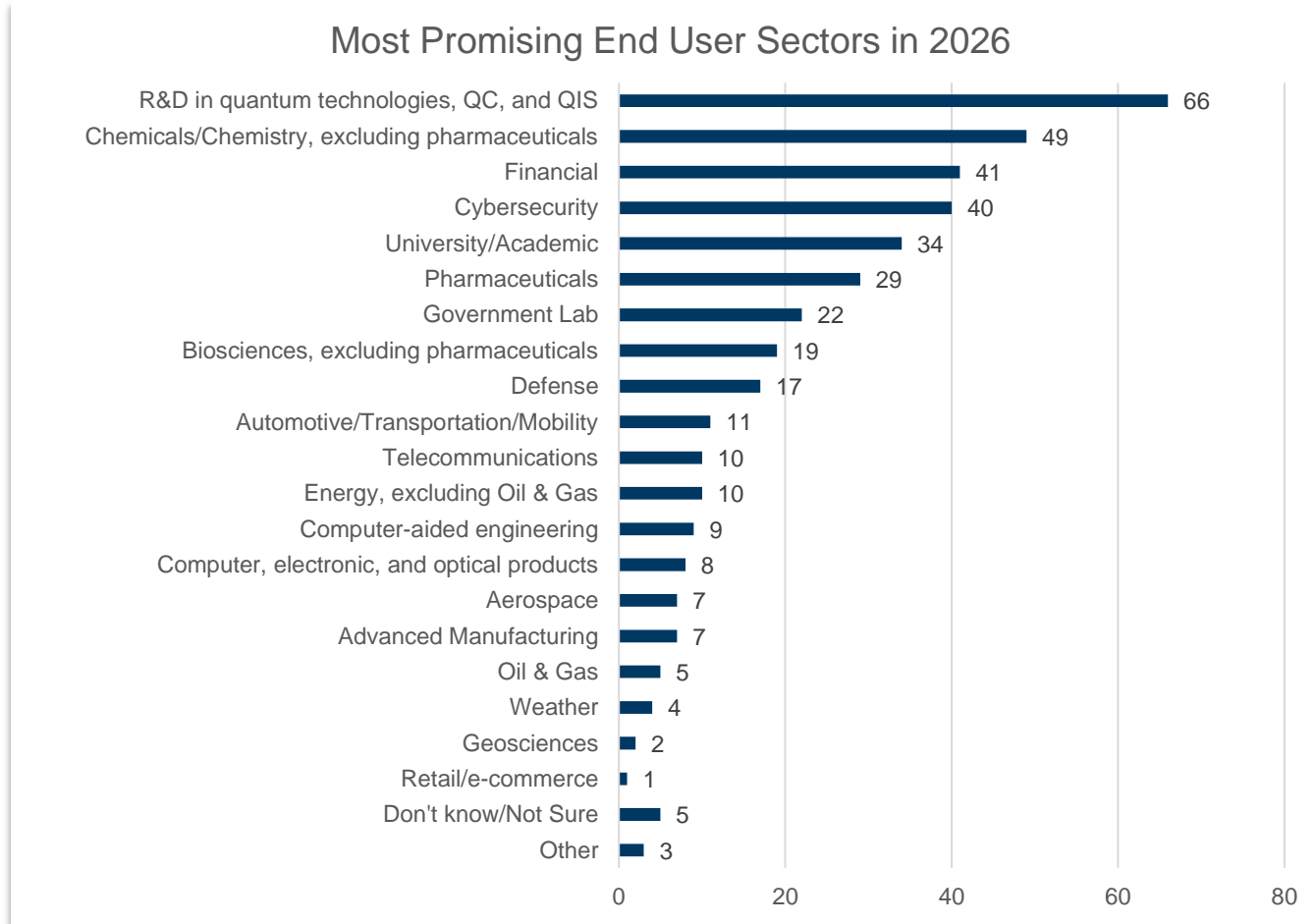
N = 133

- Some changes from previous years' studies
 - The overall share of the big three is slipping due to major gains in the 'Other' category
 - But there was little detail offered about the new alternatives
 - Suggests trends towards mixed algorithms use



QC Market 2026: Top Three End User Sectors

QC R&D and Chemicals on top, but broad applicability envisioned

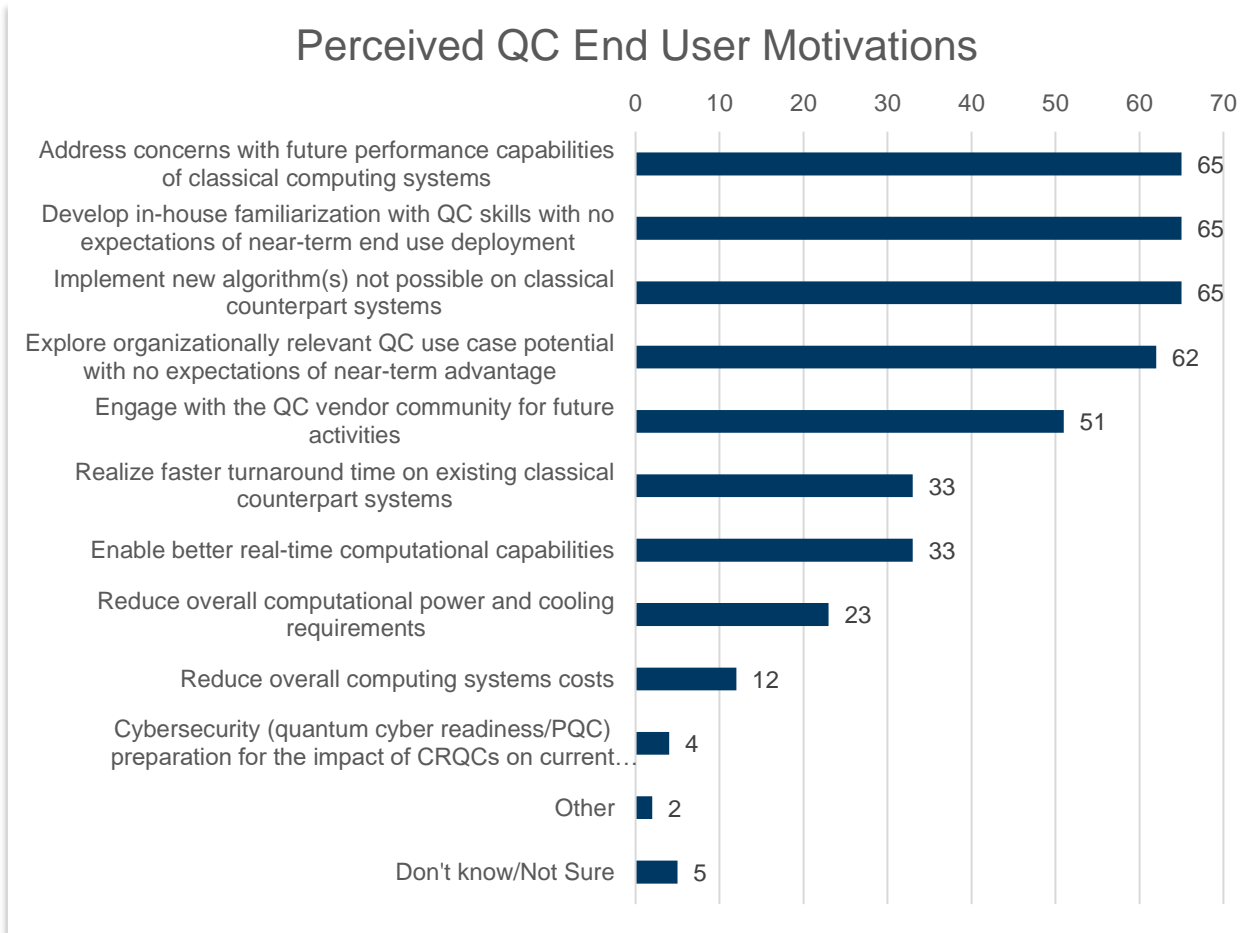


- R&D for quantum technology chosen by about half of the survey respondents
 - In keeping with the nature of a nascent technology/market
- Financial drops from last year's #1 spot to #3
- Chemicals/Chemistry moves from #4 to #2
- N.b. Nearly every sector choice deemed important by some
 - Crossing academic, commercial, and government spaces

N = 133, Select top three

QC 2026: QC End User Perceptions

Mixed Drivers for QC End User Adoption

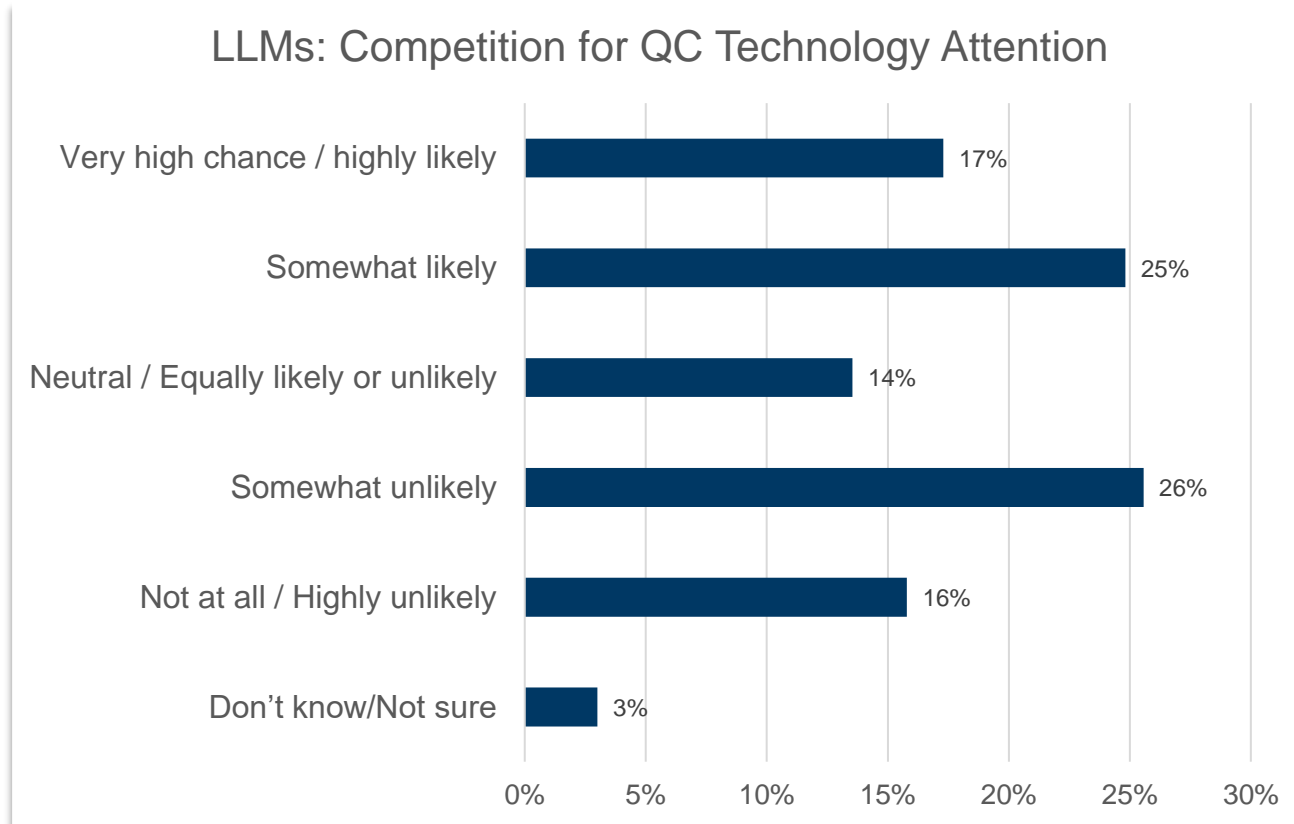


N = 133, Select All That Apply

- No single driver for QC adoption, but main drivers span:
 - Concerns with future classical performance gains
 - Developing in-house expertise future decision making
 - Implementing new QC algorithms
- Drivers of lessor concern:
 - Reductions in power and cooling
 - Lower computing costs

QC Distractions and LLMs

How likely is it that the emergence of large language models like ChatGPT and BERT will draw attention away from end user interest in quantum computing?



- LLMs – and likely generative AI in general - seen as near-term competitor for end user interest in QC by 42% of respondents
- But equal percentage not overly concerned
- Demonstrates need for QC to continue to deliver on technology/performance gains
- Highlights perceived end user interest in performance gains no matter how it is delivered

N = 133

Highlights of Recent QC Activities (EU)

EuroHPC: Providing classical/quantum systems to EU research community

- Six QC procurements in the works
 - LUMI-Q @ IT4Innovations in Czech Republic
 - Finland-based IQM supplies 24 superconducting qubits system
 - System installation to start in (late) 2025, EUR 5 million
 - Partition to LUMI HPC in Kajaani, Finland
 - EuroQCS-France @ GENCI, installed and operated at TGCC
 - 12 qubit photonic quantum computer
 - Quandela/Attocube, 2025 installation
 - EUR 11.4 million
 - Coupled to the Joliot-Curie supercomputer,
 - Euro-Q-Exa @ Leibniz Supercomputing Centre (LRZ) in German
 - Finland-based IQM supplied 20 superconducting qubits
 - EUR 40 million
 - Launched in June 2024
 - Integrated into LRZ's SuperMUC-NG supercomputer

Highlights of Recent QC Activities (EU cont.)

Qubits schemes:

superconducting, neutral atoms, photons, trapped ions, annealing

- EuroQCS-Italy @ CINECA Bologna Technopole
 - Neutral atoms supporting 50 qubits in digital mode, 140 qubits in analog mode
 - Closing date for call September 2024, EUR 13 million
 - Integrated into the EuroHPC pre-exascale system Leonardo
- EuroQCS-Poland @ Poznan Supercomputing and Networking Center (PSNC)
 - AQT supplies 20-plus trapped ion qubits
 - Install targeted for mid-2025, EUR 12.28 million budget
 - Integrated into the local high-performance computing (HPC) infrastructure
- EuroQCS-Spain @ Barcelona Supercomputer Center (BSC)
 - Adiabatic quantum computer (quantum annealer)
 - Launched call in May 2024, EUR 8.5 million
 - Integrated into the EuroHPC supercomputer MareNostrum5

Highlights of Recent QC Activities (UK)

Qubits schemes: superconducting, neutral and cold atoms, photonic, silicon

- In February 2024, the UK National Quantum Computing Centre's (NQCC) announced a £30 million (US\$38.9 million) program designed to establish QC testbeds based on different QC modalities by March 2025
- Seven different testbed systems: a mix of UK and US suppliers
 - UK: Aegiq (photonic), ORCA Computing (photonic), Oxford Ionics (trapped ions), Quantum Motion (conventional CMOS transistor process technology)
 - US: QuEra Computing (neutral atoms), Rigetti (superconducting), Infleqtion (cold atoms)
- All seven of the firms elected to stand up their prototypes at the NQCC:
 - Validating the program's goals of fostering UK-based collaboration among vendors,
 - Driving UK industry adoption,
 - Encouraging a UK-based QC supply chain
- Dovetails with NCQQ's ongoing SparQ programme that provides end users with opportunities to work with emerging quantum algorithms and hardware,

Highlights of Recent QC Activities (Japan)

Tokyo looks primarily to external suppliers...for now

- Japan's AIST awarded US\$41M contract to QuEra for a gate-based neutral-atom quantum computers in 2025.
 - Installed alongside an ABCI-Q supercomputer to provide a hybrid quantum-classical computing research platform
- AIST is set to partner with IBM to develop a next-generation quantum computer
 - The project aims to create a 10,000-qubit quantum computer with a 2029 target date
- Riken, the largest Japanese national research laboratory, plans to procure an IBM System 2, with the latest 133-qubit Heron QPU
 - No details about shipment schedule and pricing, system will be collocated and integrated with the organization's Fugaku system
 - Riken's plans to procure an H1 series ion trap system from US-based Quantinuum to be installed at its campus in Wako, Saitama
- Fujitsu and Riken recently developed 64 qubit superconducting QC at the RIKEN RQC-Fujitsu Collaboration Center
 - Targeting 1000 qubit system

Highlights of Recent QC Activities (misc.)

- The Australian Commonwealth and Queensland Government entered into an agreement with PsiQuantum
 - Called the world's first utility-scale quantum computer, to be located at a new site in Brisbane, Australia
 - Funding consists of a mixed financial package of equity, grants, and loans totaling \$940M AUD (\$620M USD)
- IBM has opened its first Quantum Data Center in Europe, located in Ehningen, Germany
 - Exemplifying IBM's intent to expand into global quantum computing
 - The data center features IBM's Quantum Heron-based system, which offers 16 times better performance and 25 times faster speeds than previous systems, designed for utility-scale quantum computing
- IonQ announces largest 2024 U.S. quantum contract Award of US\$54.5M with United States Air Force Research Lab
 - Design, develop, and deliver technology and hardware that enables the scaling, networking, and deployability of quantum systems

Potential Storm Clouds

Non-technology-based issues

- **Finance**

- Zapata, a QC software firm, is shutting down after its board approved a plan to cease operations due to the company's inability to meet financial obligations, according to an SEC filing
- D-Wave and Rigetti are facing stock delisting
 - Third time for D-Wave, second time for Rigetti

- **Policy**

- France advances quantum technology export controls under New EU Regulation Framework
- Multiple nations enact mysterious export controls on quantum computers
 - Prohibits the export of quantum computers with 34 or more qubits, and error rates below a certain threshold
- US expands controls on quantum, semiconductor tech to secure industry leadership
 - Spans quantum computers, related equipment, components, materials, software, and technology that can be used in the development and maintenance of quantum computer

QUESTIONS?



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Insufficient facts always invite danger.

- Spock, *Stardate: 3141.9.*