The Global Quantum Sensor Market: Solid Growth, But Spanning a Diverse Technology/Product Base

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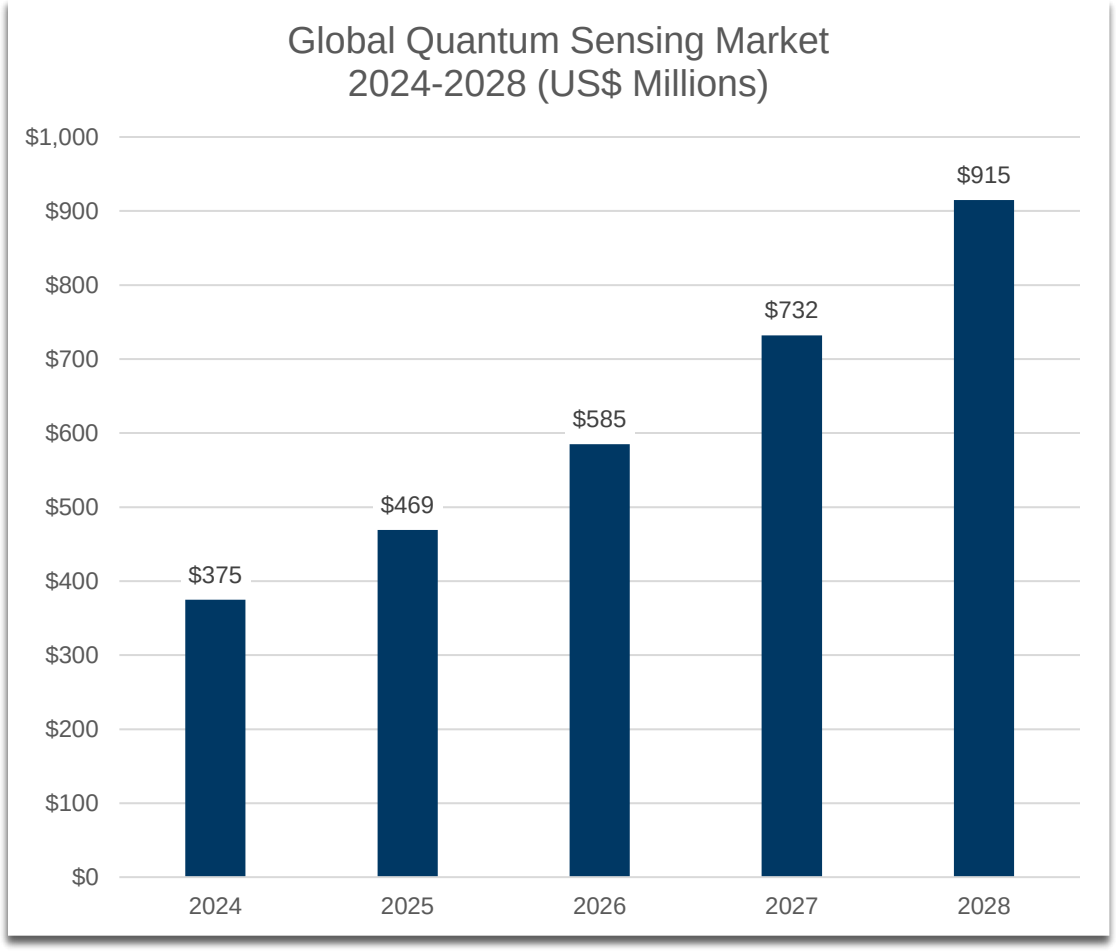
QS Market Executive Summary/Highlights

- The global quantum sensing (QS) market will grow from $375 million in 2024 to a projected $915 million in 2028
  - Represents a compound annual growth rate of 25%
- Based on results from a survey of 100 respondents representing 67 different QS companies:
  - Only about 17% of commercial QS suppliers have their most important QS technology currently available on the market, rising to 28% in 2028
    - One third of QS suppliers' most important commercial QS developments are in the prototype stage
  - Photons and neutral atoms are the most important currently engaged QS technologies
  - There likely is no clear sense of the overall composition of the near-term QS market, even within the current QS supplier base
    - Atomic clocks and photon detectors were seen as leading QS applications, combining for about one-third of the 2024 market while gyroscopes, acoustic sensors, and electrometers were seen as having little market presence
  - As the top three options, aerospace, biosciences, and telecommunications were seen as the most promising QS end user sectors
    - However, the aerospace sector was seen as the single most promising QS commercial end use sector
  - The combined government sector (defense and non-defense) is the largest QS market sector now and forecast for 2028 when the government sector is expected to hold 37% of total QS market, with 2/3 of that defense related
    - In 2028, the commercial sector is seen at 28% of overall market, roughly equal to government defense market

Quantum Sensing Global Market Size and Forecast

Market goes from $375 million in 2024 to $915 million in 2028



- Represents a compound annual growth rate of 25%
- Based on the annual revenues and anticipated growth rates of the 67 different companies that responded to the survey, with the assumptions that:
  - A portion of the companies currently in the R&D stage will being shipping products soon
  - Several new entrants will enter the market as use cases and related market prospects increase
  - Government funding to the sector for key applications will continue
  - Defense and commercial applications will share common product requirements
    - Limited fractionation of applications/products

QS Supplier Survey:
Road Map and Key Demographics

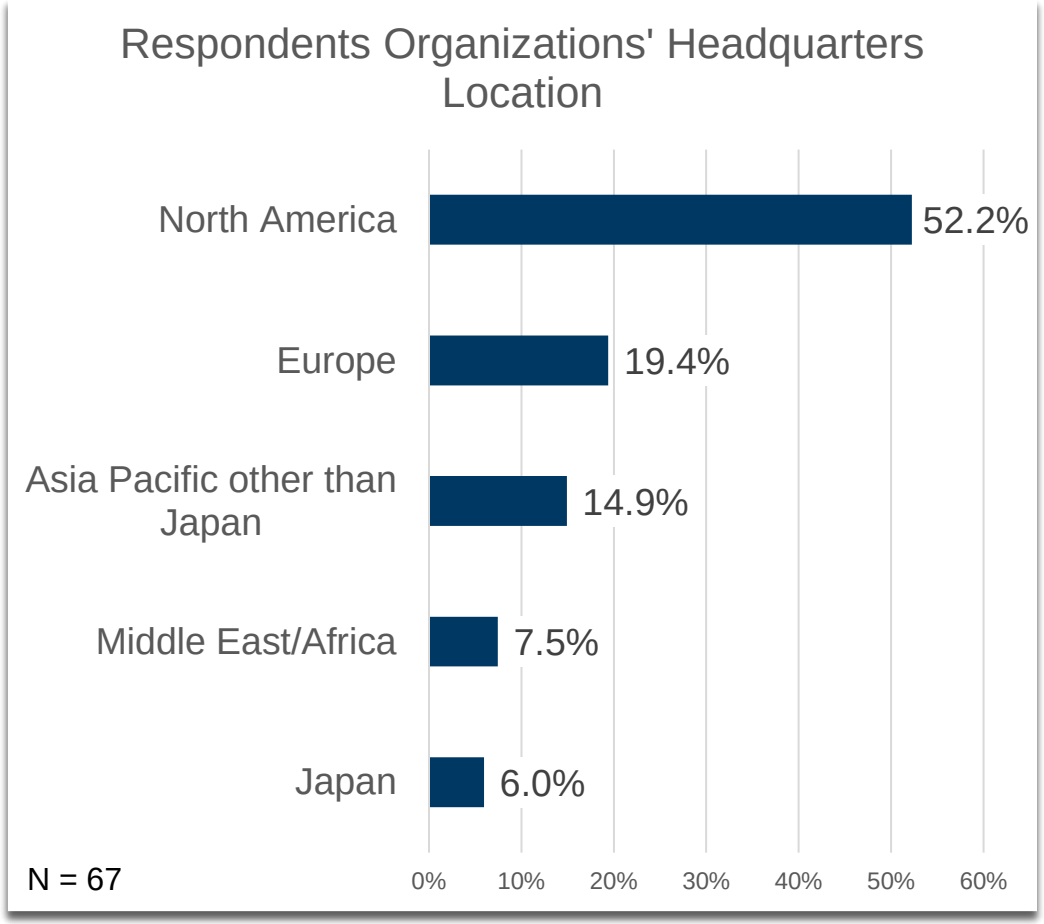
2024 QS Market Dynamics Study Roadmap

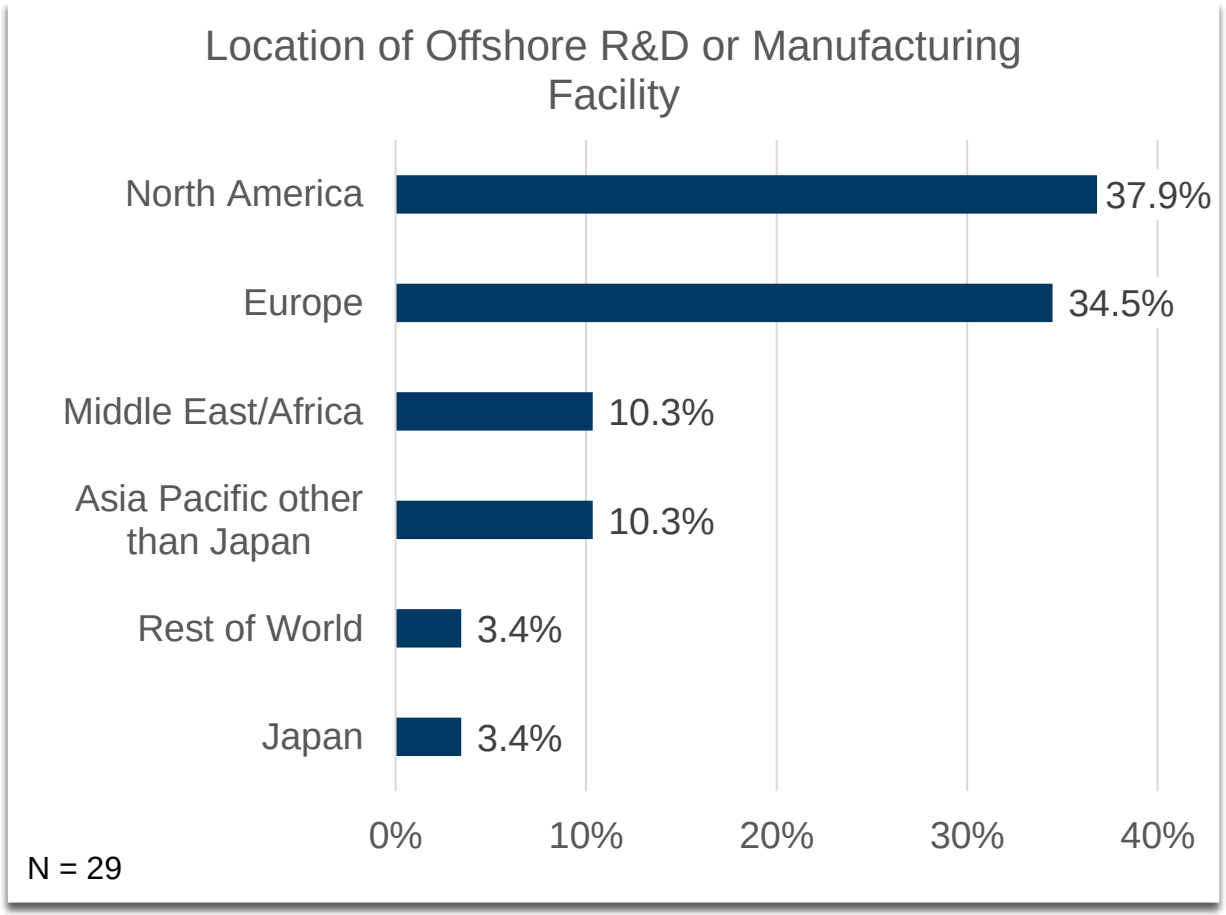
Formulate global status and prospects from a data-driven perspective

- Conducted QS supplier survey to gather data and insights on QS market dynamics
- Many thanks for assistance from various QC/QS consortia in reaching out to their respective membership base 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 QS-related revenues), market concentration, QS industry sentiment, and impressions on general trends in the sector
- Analyzed results from 100 respondents representing 67 different QS suppliers
  - Individual responses for industry-wide questions
  - Combined single response for multiple inputs from single organizations (78 total)
  - Included supplemental input from 22 QS experts from non-supplier organizations

QS Supplier Demographics: Location and Activity

67 companies currently engaged in commercial efforts, 11 more by 2028

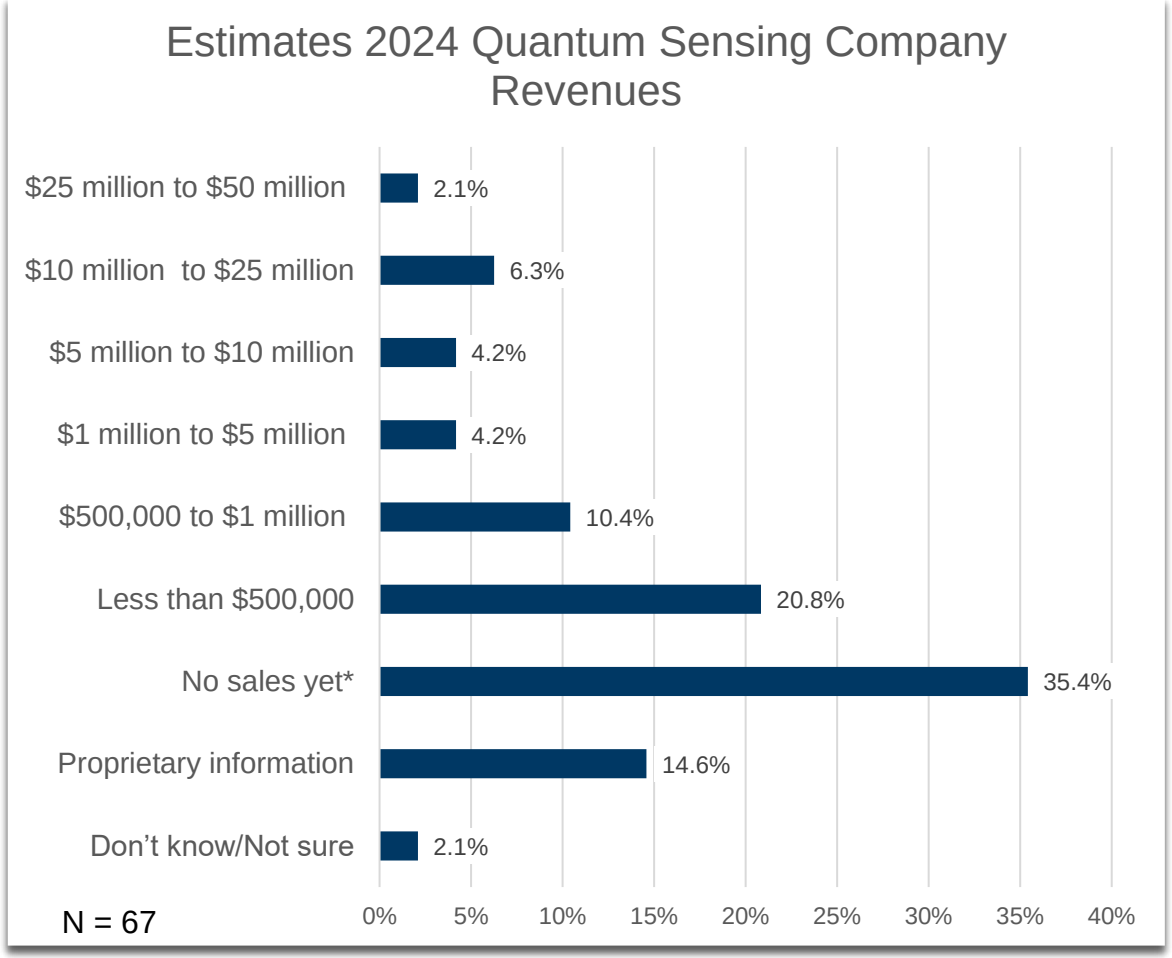


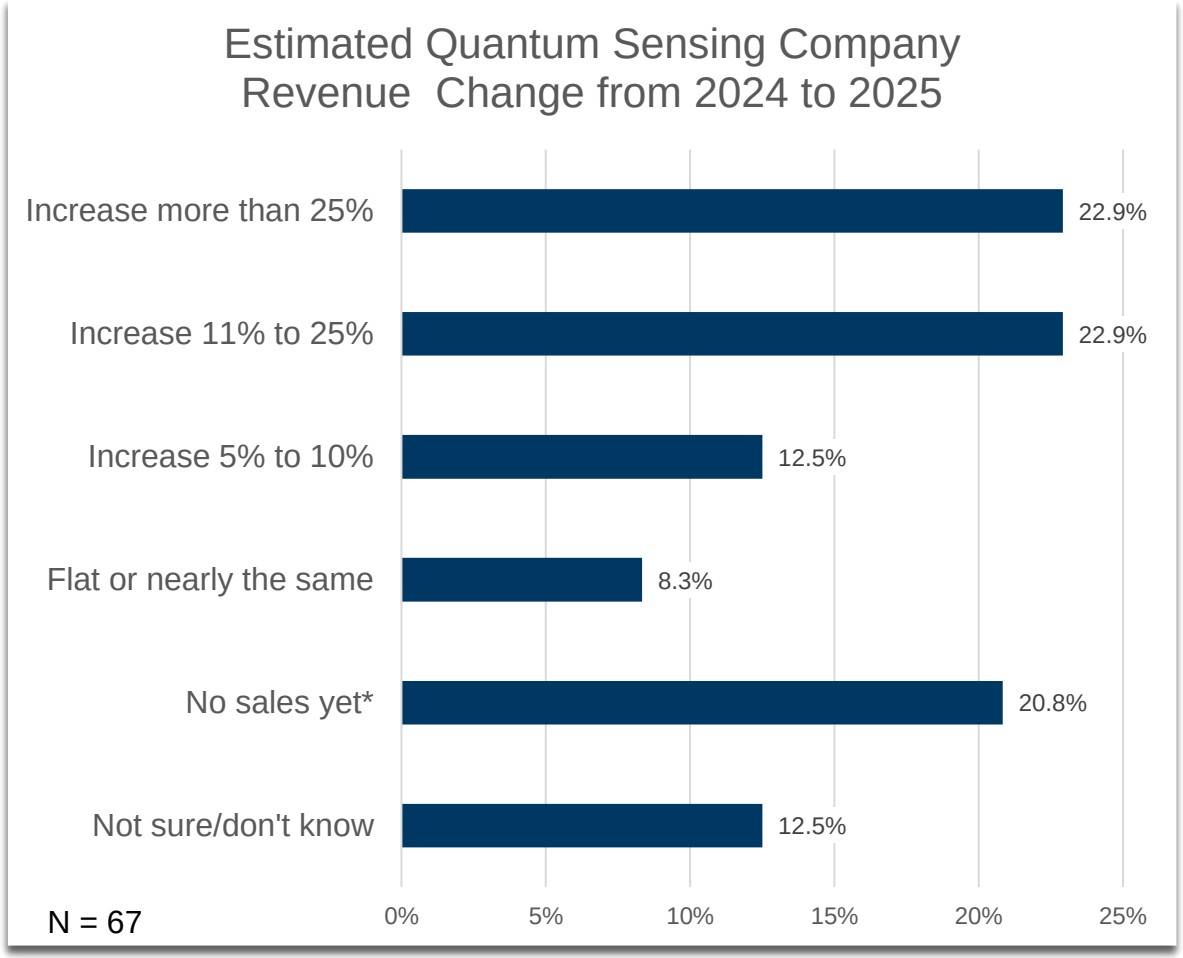


43% of respondent organizations had either R&D or manufacturing facilities outside their organization's headquarters country

QS Supplier Revenues and Anticipated Growth Rates

More than half < $500K, most anticipate significant revenue growth, some first-time players





Most Important Currently Engaged QS Technology

Both photons and neutral atoms top list at ~20% of QS commercial suppliers

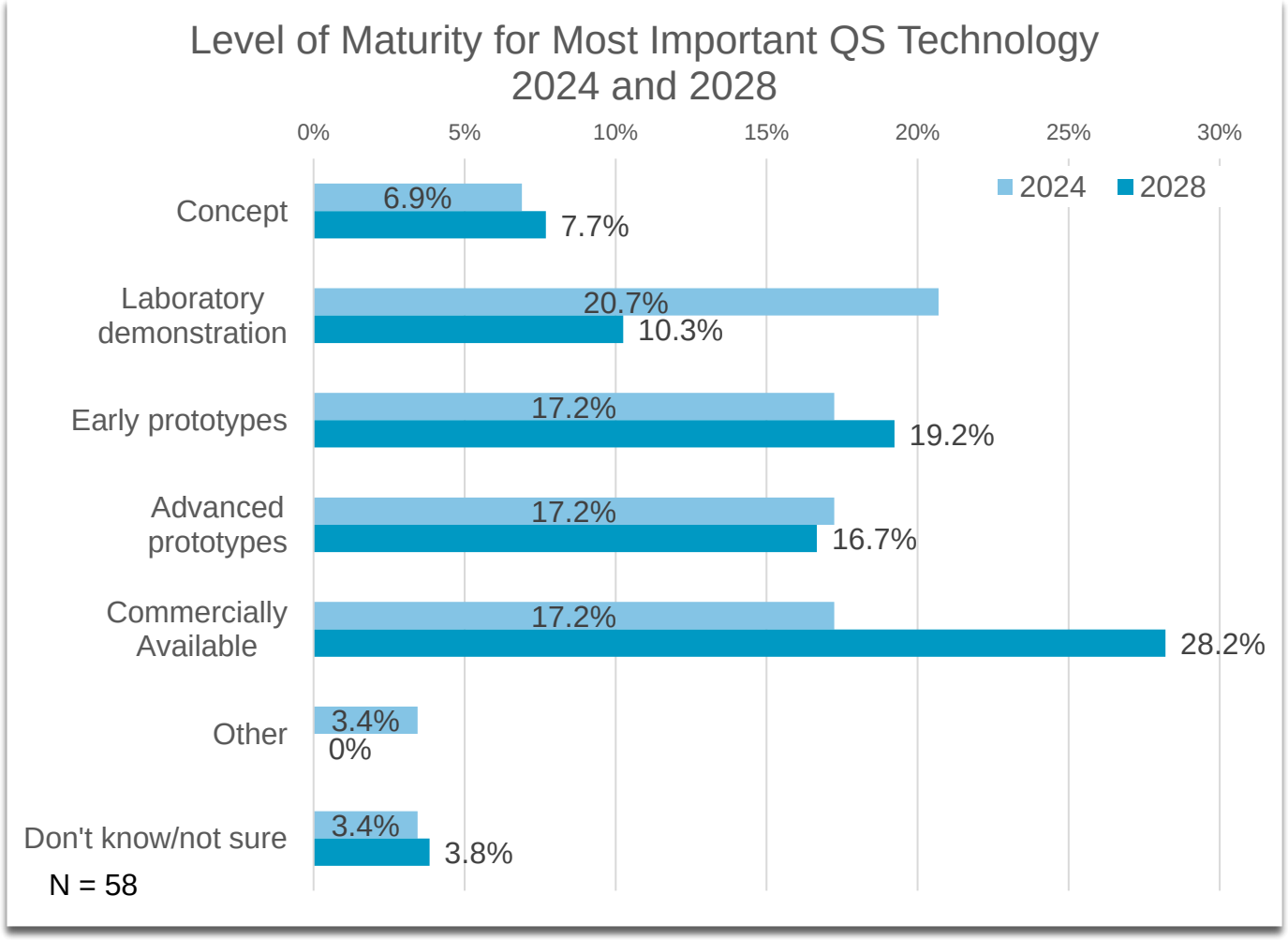
Option	% Selected
Photon	20.9%
Neutral atoms (e.g. atomic vapor, cold clouds)	19.4%
Solid-state spins: ensemble (e.g. NMR sensors, NV center ensembles)	14.9%
Superconducting circuits (e.g. SQUIDS, flux qubit, charge qubit)	9.0%
Trapped ions	7.5%
Solid-state spins: single spins (e.g. quantum dots, single NV centers)	6.0%
Optomechanics (Phonons)	6.0%
Elementary particle qubits (e.g. muons, neutrons)	4.5%
Rydberg atoms	1.5%
Single electron transistor	1.5%
Other	1.5%
Don't know/not sure	7.5%

N = 67

- Four different technologies account for two-thirds of engaged QS technologies
- Seven other QS technologies still considered most important by some
- Only 9 of the 67 companies (13%) indicated current engagement with one technology
- 5 out of 67 (7%) indicated two technologies

Maturity Level of Most Important QS Technology

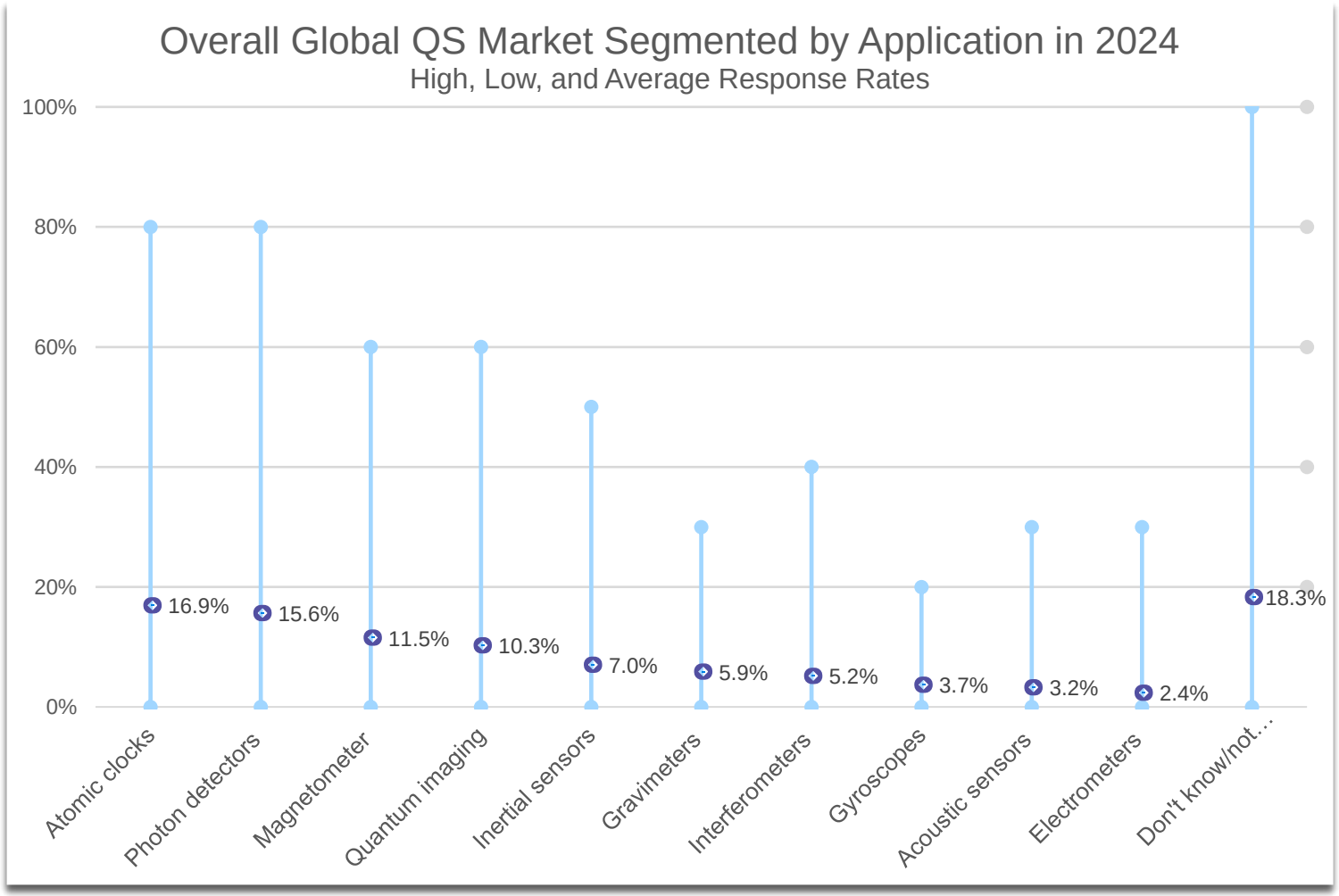
Major shift towards commercially available QS products between 2024 and 2028



- For 2024
  - Only about 17% of commercial QS suppliers have their most important QS technology currently available on the commercial market
  - About one third of commercial QS developments are in the prototype stage for their most important QS technology
- For 2028
  - 28% of commercial entities will have their most important QS technology on the market
  - Laboratory demonstration cut by half: 20.7% to 10.3%

2024 Quantum Sensor Applications Segments by Revenue

Atomic clocks and photon detectors lead 2024 QS market share

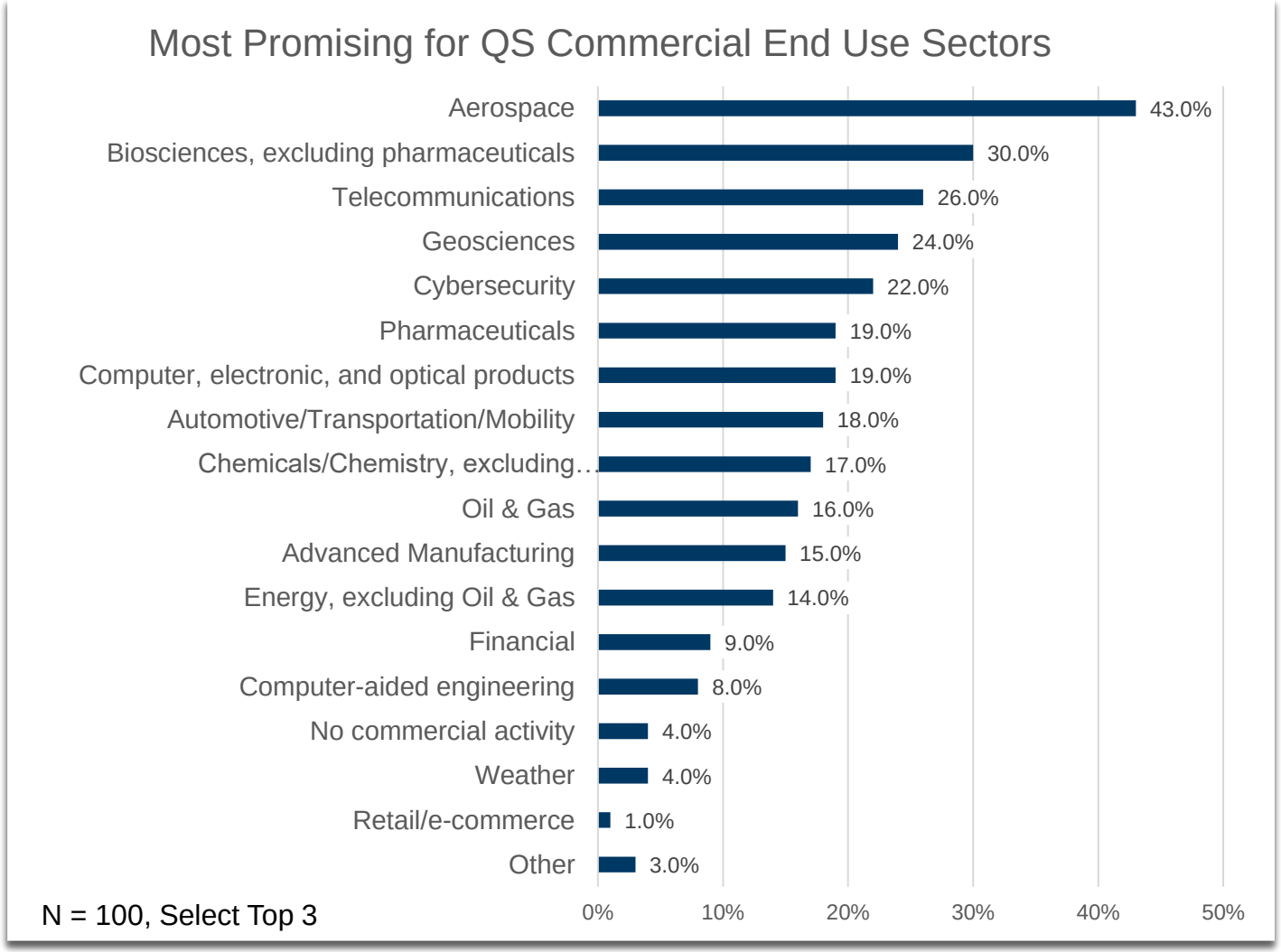


N = 100

- Atomic clocks and photon detectors were seen as leading QS applications, combining for about one-third of the 2024 market
- Gyroscopes, acoustic sensors, and electrometers were seen as having limited market presence currently
- However, there was a wide range of variation for many of the responses across most of the categories, with limited consensus
  - Even the most popular choices also received a significant number of zero share inputs
- *There likely is no clear sense of the overall status of the near-term QS market, even within the current QS community*

Top Three Most Promising QS Commercial End Use Sectors

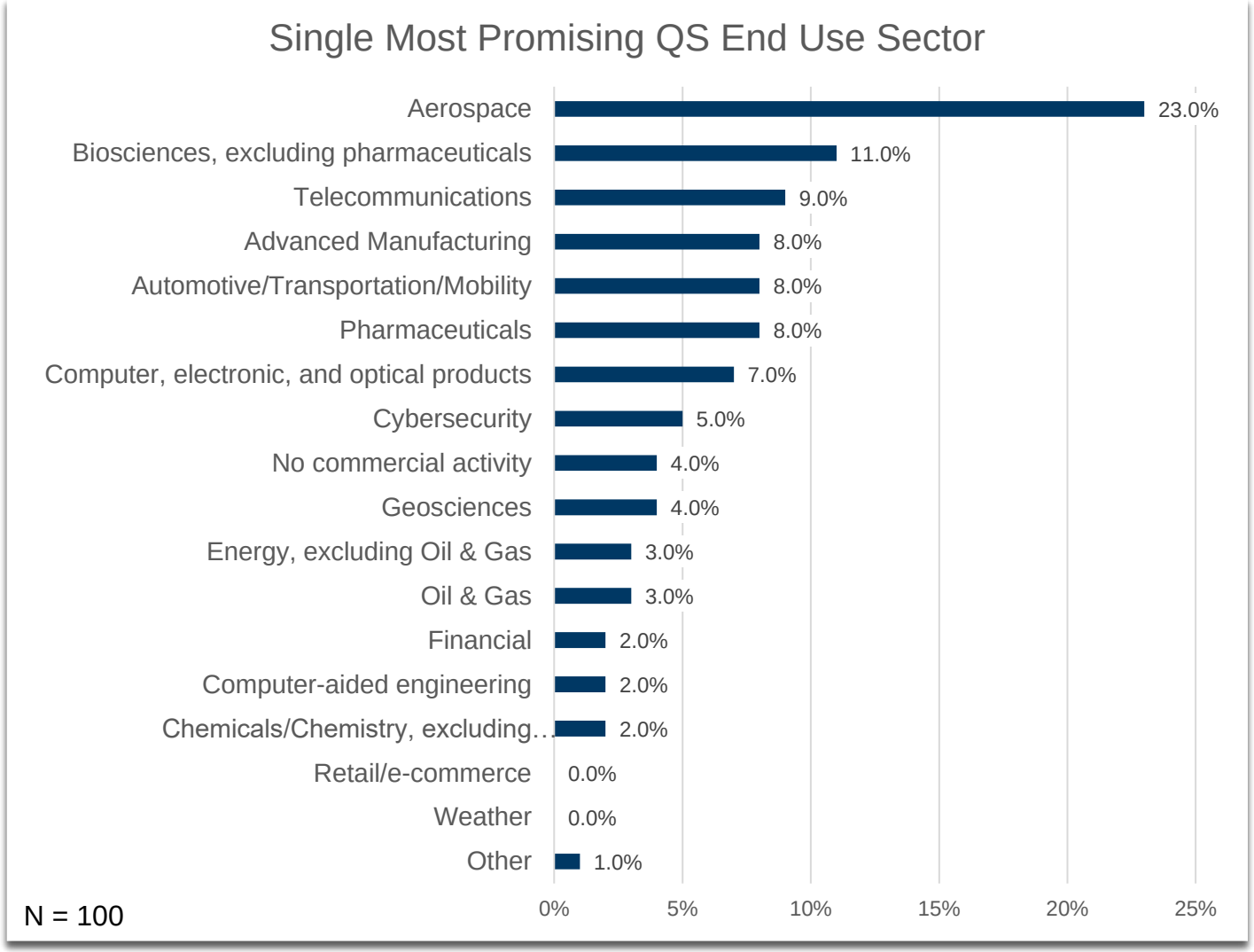
As a top three option, aerospace, biosciences, and telecommunications were seen as the most promising QS end user sectors



- 43% of the respondents saw the aerospace sector as a top 3 pick for most promising QS commercial end use sector
- 30% saw biosciences as a top three end use sector
- Nearly every commercial sector selected was considered a top three potential end use
- 4% indicated that there was no commercial potential

Single Most Promising QS Commercial End Use Sector

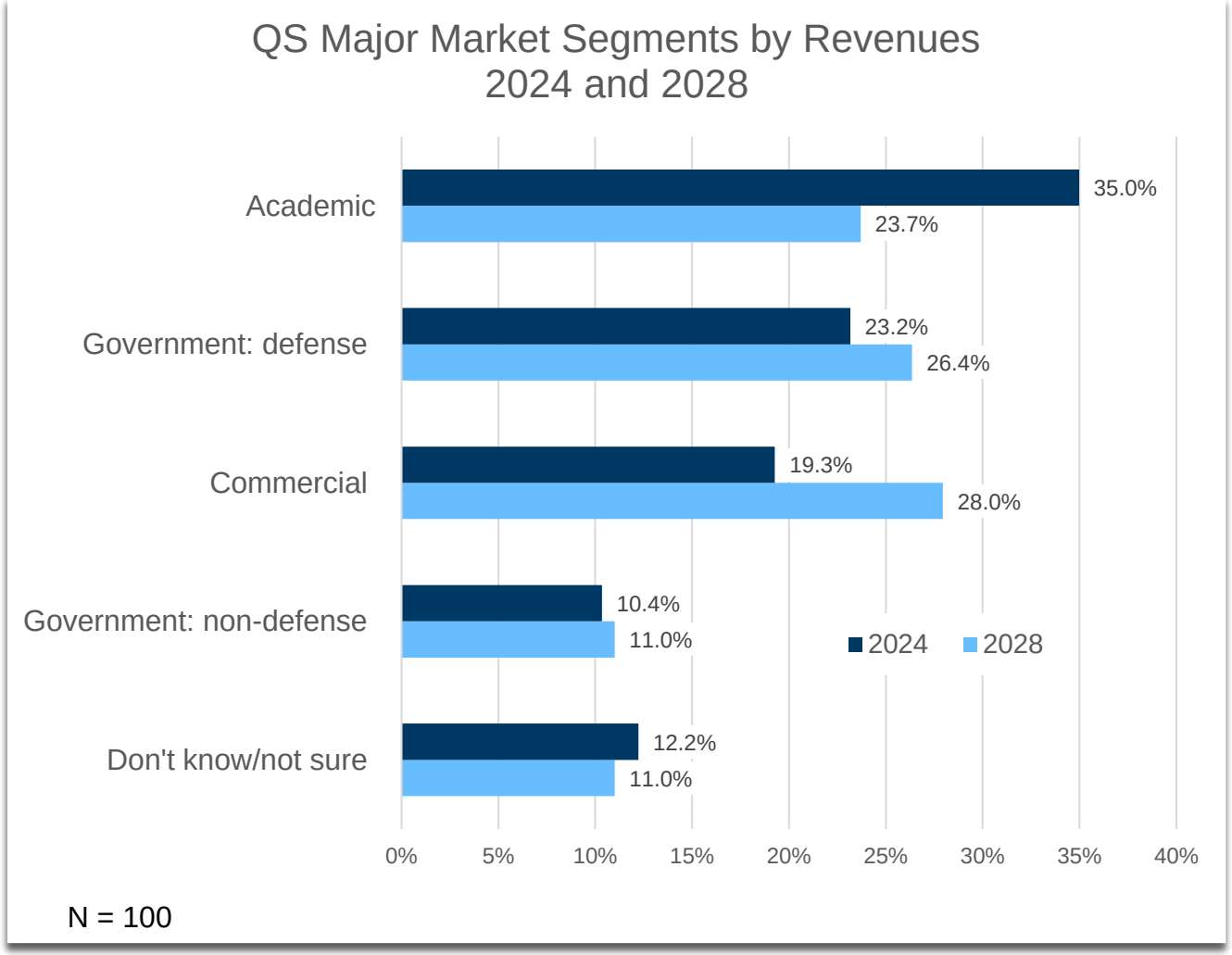
Aerospace dominates single most promising QS end use sector



- One out of four respondents saw aerospace as the single most promising QS commercial end use sector
- 11% saw biosciences as most important
  - Compared with 30% that saw it as a top three
  - Reflects reasonable scaling
- However, geosciences a top pick by only 4%
  - Compared with 24% as a top three option

QS Major Market Segments by Revenue 2024 and 2028

Government dominates QS market: defense at 23.7%, non-defense at 10.4%



N = 100

- Combined government sectors (defense and non-defense) are largest major market sector now and going forward
  - In 2028, government expected to hold 37% of total QS market
  - With defense representing almost two thirds of government sector
- Academic market largest single sector today at 35%
  - Drops to 24% by 2028
- Commercial sector seen at 28% of overall market in 2028
  - Roughly equal to government defense market in 2028

HYPERION RESEARCH

QUESTIONS?

QED-C

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Float to the top or sink to the bottom. Everything in the middle is the churn.

- Amos Burton, Engineer *The Expanse*