HYPERION RESEARCH

BROAD INTEREST IN QUANTUM COMPUTING AS A DRIVER OF COMMERCIAL SUCCESS

Sponsored by D-Wave

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EXECUTIVE SUMMARY

Hyperion Research, working in conjunction with D-Wave, a major provider of quantum computing (QC) hardware and software, recently concluded a study that sought to gather information on the status and prospects for commercial QC end users and end uses. The study drew on insights gained from a multinational survey of commercial organizations with revenues ranging from $15 million US to over $10 billion US across 20 different verticals. The survey ultimately collected over 400 responses from key decision makers integral to their company's strategic technology planning and procurement processes.

Key findings of this study include:

- Commercial organizations operating in key markets around the world are actively looking to introduce and then use quantum computing technology in their overall computing environment. Indeed, almost half of all survey respondents indicated that their organization already had a program in place to explore QC options and monitor technology developments, while one-third indicated they had a QC proof of concept research program underway.
- QC technology is seen as offering a range of corporate-level benefits including improved research capabilities and increased revenue. Other potential benefits identified included driving innovation, achieving competitive advantage, and enhancing business process efficiencies.
- Financial optimization and manufacturing/logistics are considered the strongest candidates for improved operational capabilities through the application of QC-based technology.
- Every vertical surveyed had a significant number of organizations currently involved in some level of QC activity, with a number of organizations simultaneously conducting different activities that spanned entry-level activities such as exploring options and monitoring technology development to the use of QC technology for one of more business processes.
- The chief hurdles for introducing QC technology into the business process centered on the large commitment to current classical-based budget/IT resources, the complexity with integrating QC technology into an existing IT infrastructure, and the lack of in-house QC expertise and domain knowledge.
- Data analysis, optimization, and modeling/simulation jobs are already prevalent in many of the compute sites surveyed. Similar to some of the most promising QC-based applications known today, these workloads would be well-suited for migration to quantum-based computational solutions.

The general commercial interest in QC technology as a driver of technological, business, and competitive advantage coupled with near-term applicability of QC technology bodes well for the future of the QC sector writ large.

OVERVIEW

Hyperion Research, working in conjunction with D-Wave, a major provider of quantum computing (QC) hardware and software, recently concluded a study that sought to gather information on commercial QC end users and end uses. The study drew heavily on the results of a Hyperion Research-directed survey sent to a wide and diverse base of organizations drawn from 20 major commercial verticals. The survey, which was conducted between September 17, 2021 and September 26, 2021, ultimately collected 415 responses. A key target demographic was decision makers with involvement in their company's strategic technology planning process and employed by commercial organizations with at least an estimated $15 million US in 2021 revenue. Other key demographics (detailed in a later section as well as in the Appendix) included:

- Survey respondents represented commercial organizations in the US (133 respondents), the UK (71), France (39), Germany (34), Japan (33), Italy (32), South Korea (32), Spain (31), and Switzerland (11).
- More than 80% of respondents were either involved in final decisions or had an active role informing those decisions in both the strategic planning and procurement process within their organization.
- Respondent company revenues ranged from a low of $15 million US to over $10 billion US, with concomitant IT budgets typically between $10 million to more than $50 million.

Verticals included in study:

Advanced Manufacturing

Aerospace

Automotive/Transportation/Mobility

Bio-Sciences

Chemicals excluding pharmaceuticals

Computer, electronic, and optical products

Computer-aided engineering

Defense

Energy, excluding oil & gas

Financial or Financial services

Healthcare

Insurance

Manufacturing logistics

Oil & gas

Other types of Geosciences

Pharmaceuticals

Retail/e-commerce

Software and Internet

Telecommunications

Weather and climate

KEY FINDINGS

Widespread Interest in Exploring QC Opportunities: Commercial organizations operating in key markets around the world are looking to introduce and then use quantum computing technology in their overall computing environment. Indeed, almost half of all survey respondents indicated that their organization had a program in place to explore options and monitor technology developments, while one-third of respondents indicated that their organization already had proof of concept research programs underway. Only a small minority (8%) of respondents indicated that their organization had no current QC technology activity nor had any plans to do so in the next few years.

QC Technology Offers Many Competitive Advantages: Survey respondents indicated that the use of QC technology can offer a range of corporate-level opportunities. The most cited benefits were improving research capabilities and increasing revenue. Other potential benefits identified included driving innovation, achieving competitive advantage, and enhancing business process efficiencies.

Universal QC Activity Across A Range of Verticals: Every vertical surveyed had a significant number of organizations currently involved in some level of QC activity, with a number of organizations simultaneously conducting different activities that spanned entry-level activities such as exploring options and monitoring technology development to the use of QC technology for one or more business processes. The sectors with the highest overall combination of QC-related activities were computer, electronic, and optical products, computer-aided engineering, and software and internet. Almost 30% of the organizations in these three sectors had limited in-house pilot programs underway.

Optimistic Outlook on QC Value for Improving Business Processes: When offered the opportunity to select any of the presented business problems that were addressable by quantum computing, more than half of the survey respondents saw financial optimization and manufacturing/logistics as the strongest candidates for improved internal business process. Various commercial sectors strongly favored some business problems over others. In particular, logistics/supply chain problems were selected the most by the aerospace, automotive/transportation/mobility, energy, and healthcare sectors, while the biosciences and pharmaceuticals (60%) sectors were most interested in the ability of QC technology to address quantum chemistry/materials problems.

Some Potential Roadblocks on the Horizon: When asked about exploring, testing, and investing in quantum computing technology to support business processes, the chief hurdles identified by survey respondents were the high commitment of existing classical budget/IT resources, the complexity with integrating QC technology into an existing IT infrastructure, and the lack of in-house QC-related expertise and domain knowledge. These concerns centered on the technical issues of effectively inculcating QC-based technology into an overall computing environment, while potential hurdles that centered on business considerations generally were not considered as troublesome. For example, concerns with demonstrating ROI and QC technology having a low business priority were cited at much lower rates than counterpart technical issues.

Many Commercial Sites Currently Run Jobs Well-Suited to QC Strengths: When asked about the frequency of select tasks currently running in their computing environment, respondents indicated that data analysis, optimization, and modeling and simulation jobs were all run frequently. Additional jobs that typically run, albeit with less frequency, included those in the machine/deep learning and material science fields. Because all these jobs represent some of the most promising algorithmic and application opportunities for QC adoption, the bulk of surveyed data centers would be well-suited for migration to a quantum-based computational solution.

QC Technology Can Address Significant Unmet Computational Demand: Survey respondents uniformly indicated that their compute centers do not have adequate compute capability to meet all of their existing demands. Indeed, some surveyed organizations stated they could benefit from a doubling of available compute capability. In contrast, only a small percentage indicated that all of their current computational workload requirements are met by their existing compute capabilities. The combination of widespread unmet computational demand coupled with the frequent running of QC-amenable applications discussed above points to opportunities for QC technology to solve this problem for a broad set of end user compute centers.

SUBSTANTIAL COMMERCIAL INTEREST IN QUANTUM COMPUTING AS AN ENABLING TECHNOLOGY

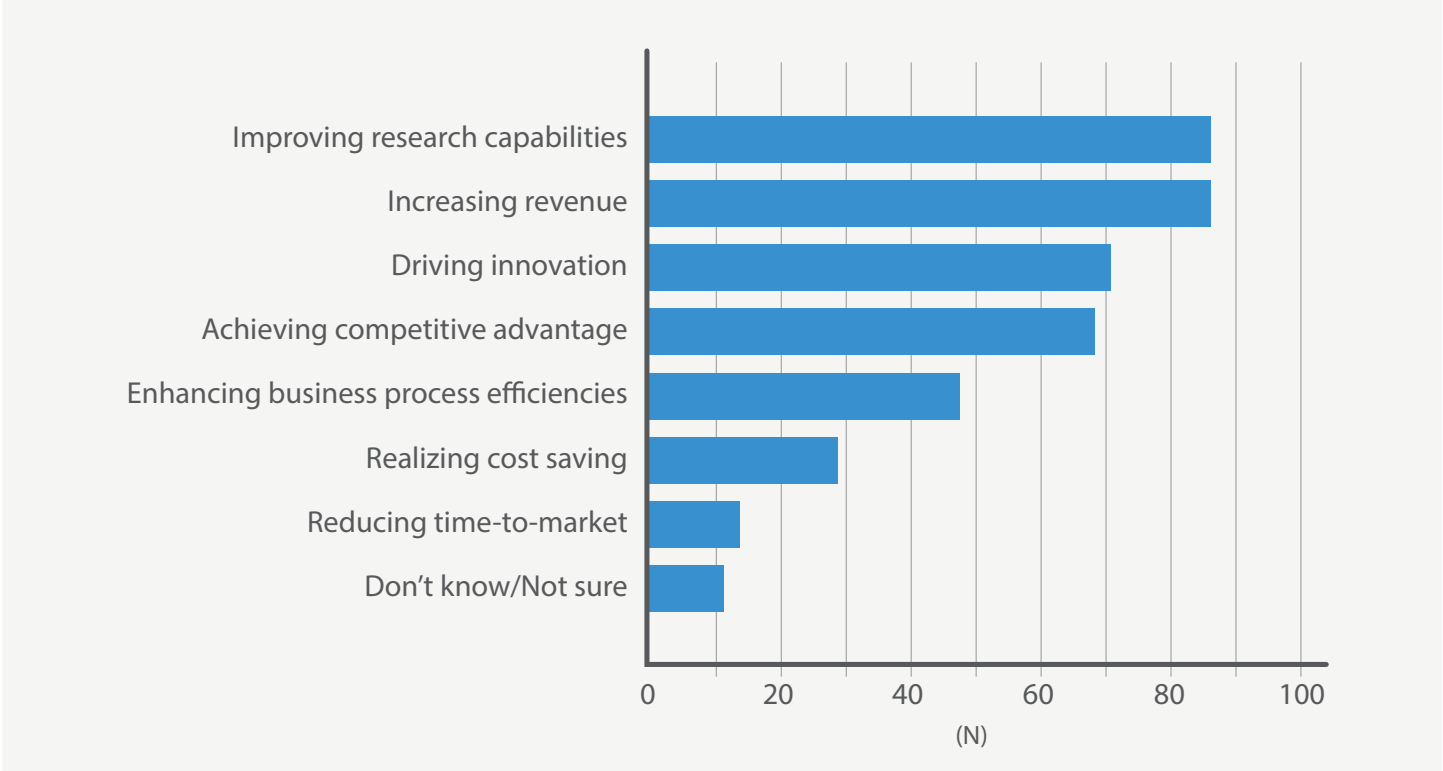
There is substantial interest with the global commercial base spanning a wide range of verticals interested in applying the capability of QC-based technology to their existing and planned computational workloads. These organizations see opportunities to improve their research capabilities while tackling some of their most pernicious computational workloads. They do, however, see some hurdles to successful QC implementation that center on the existing high commitment of budget/IT resources and the complexity with integrating QC technology into their existing IT infrastructure.

As seen in Figure 1, when asked about the greatest opportunity quantum computing offers their organizations, the two most selected options were improving research capabilities and increasing revenue, each selected by about one-fifth of all respondents. Other responses included driving innovation (17%) and achieving competitive advantage (16%). Drilling down into country-specific responses, however, reveal some divergence in emphasis.

- Increasing revenue was the most selected option by US respondents (32%), compared with French based counterparts who selected that option the least (4%).
- Organizations from Spain, Switzerland, and South Korea strongly looked to quantum computing to help drive research capabilities at a rate of about three times that of increasing revenue.
- Organizations from France, Germany, Italy, and Spain each selected driving innovation as the greatest opportunity presented by emergent QC capabilities.

FIGURE 1

Greatest Opportunity Quantum Computing Offers to Your Organization



n = 415

Source: Hyperion Research, 2021

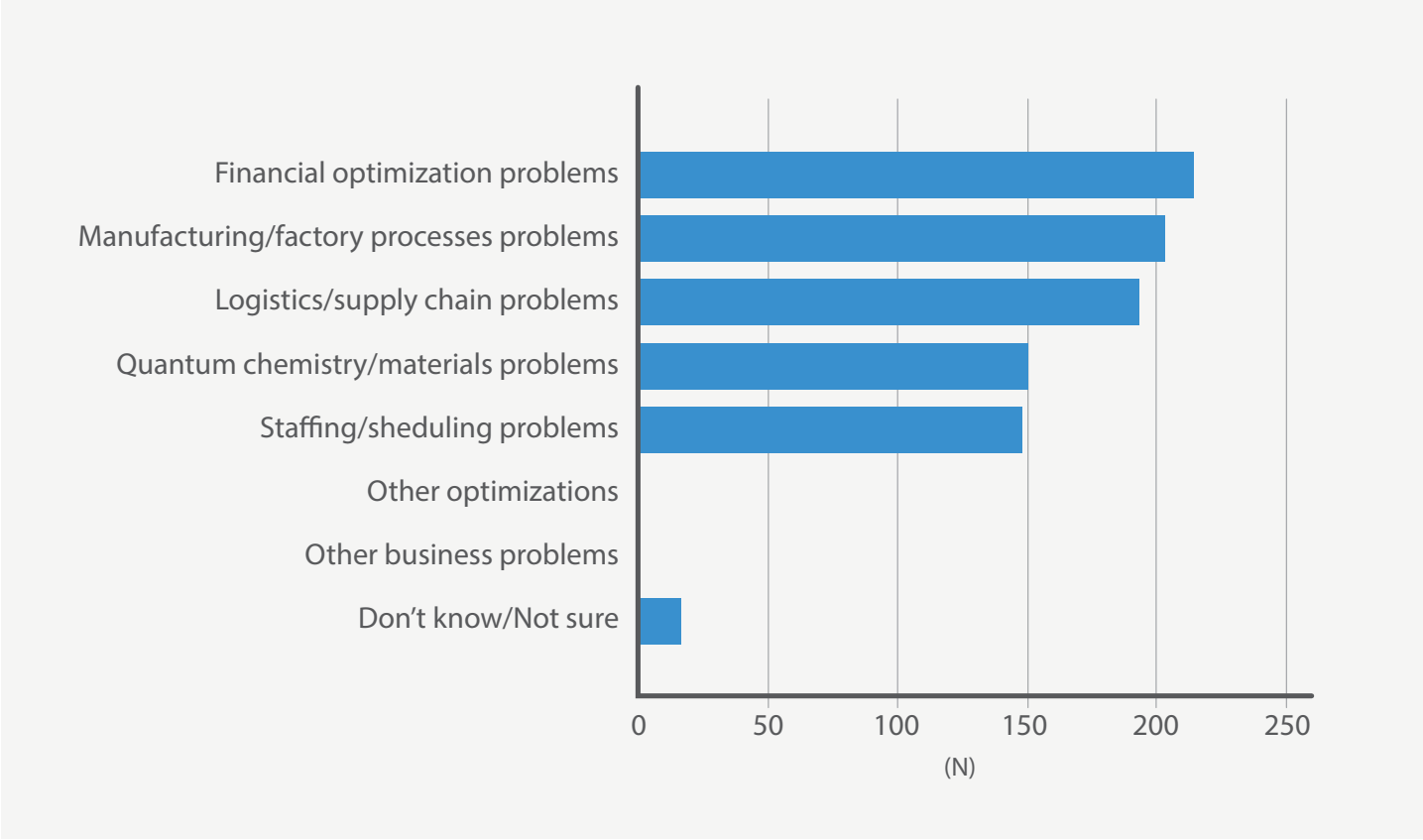
As seen in Figure 2, when offered the opportunity to select any of the presented business problems they believed addressable by quantum computing, respondents exhibited an overall optimistic perspective, and they saw QC technology as valuable for a wide range of existing business problems. More than half (52%) saw financial optimization and manufacturing/logistics (49%) as strong candidates for QC-based improvements. Some commercial sectors strongly favored some business problems over others.

- Logistics/supply chain problems were the most selected business problem addressable by QC by the aerospace (80%), automotive/transportation/mobility (68%), energy (56%), and healthcare (67%) sectors.
- Not surprisingly, the biosciences (78%) and pharmaceuticals (60%) sectors were most interested in the ability of QC technology to address quantum chemistry/materials problems.

Despite that no respondent cited any 'other' potential optimization or business problems for Figure 2, the collection of open-ended use cases summarized below in Table 1 reveals the wide range of envisioned applications end users see as suited for QC adoption.

FIGURE 2

Business Problems Addressable by Quantum Computing



n = 415

Source: Hyperion Research, 2021

Table 1 is a list of results when survey respondents were asked to provide specific examples of applications important to their organization that they might want to explore with quantum computers. The broad base of answers reveals that many commercial organizations in the survey set are open to exploring a wide range of potential use cases. Although the list contained a number of distinct and non-overlapping cases, the three most often cited were cybersecurity/network security, data analysis/analytics, and financial modeling/forecasting.

TABLE 1

A Sampling of Important Use Cases for QC Technology

AI	Market research
Blockchain	Materials/Material optimization
Cloud	Optimization
Communication	Pharmaceutical development
CRM	Physics
Cybersecurity/Network security	Pricing/Profitability
Data analysis/analytics	Problem solving
Data storage/Data management	Production
Employee management/human resources	Project management
Financial modeling/forecasting	Research/Research simulations
Gene/DNA Research	Sales
Inventory	Software or app development/optimization
Logistics	Speed/Increased productivity
Machine learning/Deep learning	Supply chain
Manufacturing	Traffic optimization

Source: Hyperion Research, 2021

As seen below in Table 2, every vertical surveyed had a significant number of organizations currently involved in some level of QC activity, with a number of organizations simultaneously conducting a number of different activities that spanned entry-level activities such as exploring options and monitoring technology development to the use of QC technology for one or more business processes.

- The sectors with the highest overall combination of QC-related activities, measured as the combined percentage of all possible on-going activities with their organization, were computer, electronic, and optical products, computer-aided engineering, and software and internet. Almost 30% of the organizations in these three sectors had limited in-house pilot programs underway.
- These were followed closely by the oil & gas, energy, and telecommunications sectors.
- For these six leading sectors, between one third and one half of the respondents' organizations currently had a proof – of concept programs underway.

Meanwhile, almost all respondents within their sector indicated an overall high degree of activity or interest in some form of QC activity: six verticals had zero respondents select no activity and no plans to have any activity in the next few years: defense, Healthcare, oil & gas, other types of geosciences, pharmaceuticals, and weather and climate, while the four verticals with the highest response rate for no current or near-term plans were retail/e-commerce (15%), insurance (14%), automotive/transportation/mobility (12%), and manufacturing logistics (11%).

Meanwhile, there were a number of organizations across all verticals that currently do not have any QC activity, but that plan to start up activity in the next few years, led by defense (50%), Other types of geosciences (50%), pharmaceuticals (45%), and aerospace (38%).

It is important to note, however, that for some of the verticals listed here, the total sample size was not large enough to draw any conclusive, statistically valid conclusions. See Table 3 for more details.

TABLE 2

Current QC Activities by Vertical

Vertical	No current activity, planned in the next few years	Exploring options and monitoring QC developments	Have proof of concept research programs	Limited in-house pilot programs underway	Quantum use case analysis and prioritization underway	Fully funded research efforts are being used	No activity and no plans to have any activity in the next few years
Advanced Manufacturing	25%	48%	42%	30%	39%	31%	4%
Aerospace	38%	54%	31%	31%	23%	15%	8%
Automotive/Trans-portation/Mobility	29%	59%	38%	29%	35%	26%	12%
Bio-Sciences	27%	45%	36%	14%	14%	27%	9%
Software and Internet	22%	58%	37%	27%	47%	37%	6%
Computer-aided engineering	20%	57%	41%	31%	44%	37%	5%
Chemicals excluding pharmaceuticals	32%	58%	32%	26%	47%	26%	5%
Computer, electronic, and optical products	18%	63%	38%	26%	46%	45%	9%
Defense	50%	17%	50%	17%	50%	50%	0%
Financial or Financial services	21%	56%	29%	28%	37%	29%	5%
Energy, excluding oil & gas	12%	47%	35%	12%	65%	29%	6%
Oil & gas	33%	50%	50%	42%	42%	25%	0%
Other Geosciences	50%	50%	50%	0%	50%	0%	0%
Healthcare	12%	47%	32%	29%	32%	29%	0%
Insurance	19%	48%	29%	43%	24%	38%	14%
Manufacturing logistics	18%	49%	25%	21%	28%	21%	11%
Pharmaceuticals	45%	36%	27%	9%	55%	9%	0%
Retail/e-commerce	15%	49%	26%	25%	34%	26%	15%
Telecommunications	13%	52%	37%	21%	40%	44%	6%
Weather and climate	33%	67%	0%	0%	67%	33%	0%

Source: Hyperion Research, 2021

Table 3 shows the range of commercial sectors that participated in this study and highlights the span and diversity of business processes and research agendas within these organizations that could be relevant to quantum computing technology.

TABLE 3

Organizations' Main Line of Business

Option	% Selected	# Responses
Software and Internet	32%	134
Computer, electronic, and optical products	21%	86
Financial or Financial services	19%	77
Computer-aided engineering	16%	66
Retail/e-commerce	13%	55
Advanced Manufacturing	13%	55
Manufacturing logistics	11%	46
Telecommunications	10%	42
Automotive/Transportation/Mobility	7%	28
Healthcare	7%	28
Bio-Sciences	4%	18
Insurance	4%	17
Chemicals excluding pharmaceuticals	4%	15
Energy, excluding oil & gas	3%	14
Aerospace	3%	11
Oil & gas	2%	10
Pharmaceuticals	2%	9
Defense	1%	5
Weather and climate	1%	2
Other types of Geosciences	0.4%	2

Source: Hyperion Research, 2021

Table 4 shows the respondents' main location of their organization, with the single largest group coming from the United States (32%), followed by the UK (17%) and France (9%). As a block, the EU represents about one third (35%) of all respondents.

TABLE 4

Organization's Main Location

Option	% Selected	# Responses
US	32%	133
UK	17%	71
France	9%	39
Germany	8%	34
Italy	8%	32
Spain	7%	31
Switzerland	3%	11
South Korea	8%	32
Japan	8%	33

n = 415

Source: Hyperion Research, 2021

As seen in Table 5, there is an extensive range of on-going quantum technology-related activities for the commercial organizations surveyed. These efforts, often reflecting multiple diverse activities within a single organization, range from exploring options and monitoring technology developments to the production use of quantum computing for one or more business processes among the set of survey respondent organizations.

Most prominent, almost half of all survey respondents (48%) indicated that their organization had a program in place to explore QC technology options and monitor technology developments. Meanwhile, one-third (33%) of respondents indicated that their organization already had QC-related proof of concept research programs underway.

- For those who currently did not have any in-house quantum computing effort currently underway (28%), almost three-quarters of those indicated that they were planning to start an activity within the next few years.
- Only a small minority (8%) of respondents indicated that their organization had no current QC technology activity nor had any plans to do so in the next few years.

TABLE 5

Current State of Quantum Computing in Organization

Option (Select All That Apply)	% Selected	# Responses
Exploring options and monitoring technology development	48%	199
Quantum use case analysis and prioritization are being used	35%	146
Proof of concept research programs underway	33%	137
Fully funded research efforts are being used	28%	115
Limited in-house pilot programs underway	23%	97
No current activity but planning to start up activity within the next few years	20%	85
No activity and no plans to have any activity in the next few years	8%	32
Don't know/Not sure	3%	11

n = 415

Source: Hyperion Research, 2021

ROADBLOCKS TO QC ACCEPTANCE

When asked about exploring, testing, and investing in quantum computing technology to support business processes, the chief hurdles identified by survey respondents were the high commitment to their existing budget/IT resources centered on classical technology (56%), the complexity with integrating QC technology into existing IT infrastructure (48%), and the lack of in-house QC expertise and domain knowledge (34%), as seen in the Table 6. These concerns center on the technical issues of effectively inculcating QC-based technology into an overall computing environment.

In contrast, potential hurdles that centered on business considerations generally were not considered as troublesome. Concerns with demonstrating ROI (21%) and QC technology having a low business priority (18%) were cited at much lower rates than counterpart technical issues.

- Of all countries represented in the survey, US and UK respondents considered the high commitment of current budget/IT resources to be the chief hurdle (69% and 66%, respectively).
- The diverse range of selected hurdles suggests that many of the respondents' organizations have not yet clearly defined the problems - and related solutions - needed to better facilitate the inclusion of QC technology into their overall businesses processes.

TABLE 6

Chief Hurdles to Exploring, Testing, and Investing in Quantum Computing

Option (Select All That Apply)	% Selected	# Responses
High commitment of current budget/IT resources	56%	232
Complexity with integrating into existing IT infrastructure	48%	198
Lack of in-house expertise and domain knowledge	34%	142
Issues with appropriate vendor selection	30%	126
Lack of demonstrated use case performance advantage	25%	103
Concerns with demonstrating ROI	21%	89
Low business priorities	18%	76
Other	0%	2
Don't Know/Not sure	3%	11

n = 415

Source: Hyperion Research, 2021

ASSESSING THE CURRENT COMPUTATIONAL LANDSCAPE

In order to better understand respondents' compute environments, survey participants were asked to supply key information about their organization's computational environment. Information gathered included the current research/production emphasis of their main compute center(s), the composition of key computing tasks, and the amount of unmet computational demand as a percentage of their existing compute capability (see the Appendix for additional organization demographics).

As seen in Table 7, survey respondents ranged from concentrated high performance (HPC) research-centric environments (25%), to primarily enterprise IT shop with some or no HPC or related computation research capabilities (19%).

- The most selected option was for mixed HPC/enterprise sites (33%), followed by HPC sites in a research environment (25%).
- Sites that were primarily HPC sites for either research or production workloads comprised almost half (46%) of all sites accounted for in the survey.
- US sites had the highest concentration of HPC research and production sites surveyed (58% total), while Japan had the lowest (23% total).

Based on the broad range of computer environments covered in this study, combined with the overall positive outlook on the advantages of QC technology, optimistic expectations for QC technology likely are not confined exclusively to leading-edge HPC centers but, rather, be dispersed across an array of computer centers with differing computational makeups.

TABLE 7

Organization's Existing Compute Environment

Option	% Selected	# Responses
Primarily high performance computing (HPC) in a research environment	25%	106
Primarily high performance computing (HPC) in a production environment	21%	86
A mixed high performance computing (HPC) and enterprise environment	33%	135
Primarily an enterprise IT shop with some high performance computing (HPC) or related computational research capabilities	15%	60
Primarily an enterprise IT shop with no high performance computing (HPC) or related computational research capabilities	4%	18
Don't Know/Not Sure	2%	10

n = 415

Source: Hyperion Research, 2021

Table 8 shows the results when respondents were asked about the frequency of select computing tasks run in their computing environment. This list is particularly relevant as it represents some of the most promising algorithmic and application opportunities presented by quantum computing technology today. As the data shows, there are many data centers, of all compositions, currently running jobs that would be well suited for migration to a quantum-based computational solution.

For specific workloads currently being run on surveyed data centers, data analysis was selected as running all the time by half (50%) of all respondents, followed by optimization (39%) and modeling and simulation (32%).

- Respondents from the US, Germany, Italy, and Spain reported the highest sum total percentage of all key computing tasks that were run all the time. For example, 60% of US organizations reported that they run data analysis jobs all the time.
- South Korea and Japan reported the lowest sum total percentage of all key computing tasks that were run all the time. Only 20% of Japanese organizations reported that they run data analysis jobs all the time.

TABLE 8

Frequency of Key Computing Tasks

Option (Select All that Apply)	All the time	Frequently	Occasionally	Rarely/Never	Don't know
Machine and/or deep learning	28%	44%	20%	4%	2%
Optimization	39%	42%	15%	3%	0%
Modeling and simulation	32%	39%	23%	5%	1%
Materials science	23%	36%	22%	11%	8%
Data analysis	50%	37%	10%	2%	0%
Other	19%	17%	14%	9%	17%

n = 415

Source: Hyperion Research, 2021

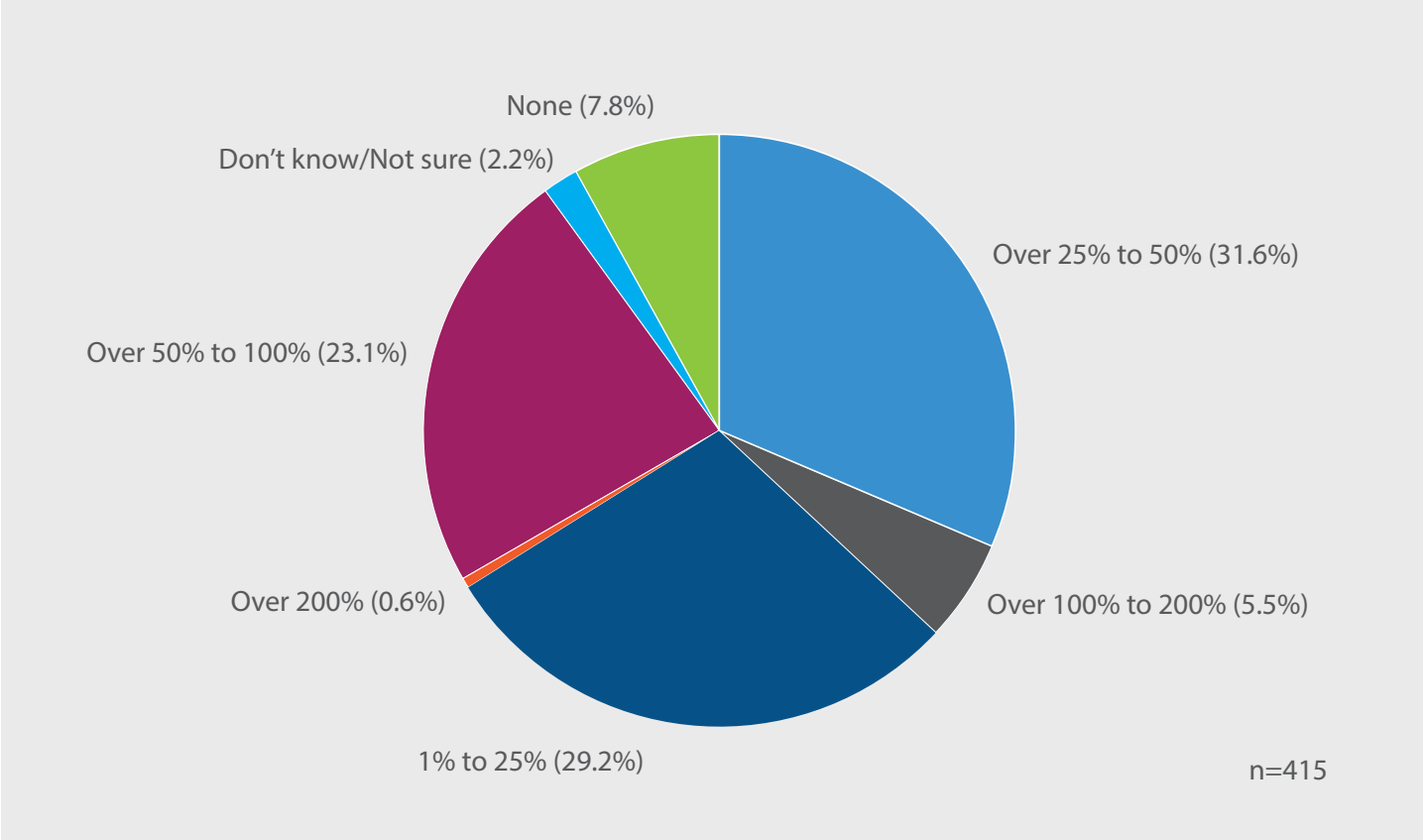
Figure 3 below captures the amount of unmet computational demand within the surveyed compute centers, measured as a percentage of the total current workload capability. Most prevalent, 29.2% of sites surveyed reported that they have over 25% to 50% of unmet workload, implying that almost as much as one third of those respondents' sought-after workload is not run. Likewise, about one quarter (23.1%) of the surveyed sites indicated that their unmet demands are between 50% to 100% of their current compute capabilities.

- Only a small percentage (7.8%) of sites accounted for in the survey report that all of their current computational workload requirements are met by their existing compute capabilities.

The combination of Table 8, which shows the frequency of jobs run that have QC-ready counterparts, combined with data from Figure 3, which shows a significant pent-up demand for more computational capability, provides a strong indication that many of the organizations surveyed could benefit from quantum computing alternatives to augment or even supplant their existing computational hardware and software complement.

FIGURE 3

Current State of Unmet Computation Demand



Note: Unmet demand is the amount of additional work users would run if computer resources were available, expressed as a % of current compute capability.

Source: Hyperion Research, 2021

Table 9, below, captures the range of chief obstacles facing respondents' organizations in meeting their recent computationally-dependent business problems. The concerns cited most often were too much time needed to implement solutions (41%) and concerns with costly computer resource requirements (41%). In contrast, only about 7% of all respondents indicated that they faced no significant computer-related obstacles and that all compute projects were successfully implemented.

However, the results indicate that there are a wide range of concerns that present challenges to any compute-dependent process, and that no single solution will likely address all of these concerns.

- US organizations, more so than non-US counterparts, selected too much time needed to implement solution (53%) as their major hurdle, with less concern over long computational time to solution once implemented. These US companies, perhaps more so than foreign counterparts, appear to be more focused with implementing new solutions then they are with the length of run time once implemented.
- Concerns with potential solutions being too costly were highlighted by only about 15% of all respondents, while concerns with costly computer resources were much more widely cited (41%). This seemingly mixed message could indicate the respondent's recognition of the financial importance of solving key business problems coupled with the belief that simply committing more budget to classical compute solutions may not considered cost-effective.

TABLE 9

Chief Obstacles to Solving Computationally-Dependent Business Problems

Option (Select All That Apply)	% Selected	# Responses
Too much time needed to implement solution	43%	177
Concerns with costly computer resources requirements	41%	172
Concerns with long time computational times to solution once implemented	36%	149
Too complex (too many variables, constraints)	28%	117
No relevant in-house expertise to develop	24%	99
Too costly	15%	63
None, all projects were successfully implemented	7%	31
Other	1%	3
Don't know/Not sure	1%	2

n = 415

Source: Hyperion Research, 2021

LOOKING FORWARD

The combination of general commercial interest in QC technology as a driver of technological, business, and competitive advances coupled with near-term applicability of QC technology bodes well for the future of the QC sector writ large. As seen in these study findings, current and interested QC end-users are considering a wide range of QC technology and use-case options. Additional Hyperion Research analysis has shown that QC buyer/user use case expectations vary widely, but in general buyers/users favor new QC-specific applications not previously possible on classical systems with near equal interest in those that could speed up existing applications based on classical algorithms. Ultimately, these end users were generally open to almost any available QC-driven option that offered some performance benefit over classical counterparts.

Most commercial organizations, either current or planned QC users, however, will be looking to QC suppliers to roll out a series of steady advances that can provide some assurance that the QC sector is successfully moving to achieve stability and reducing the risk of being an early adopter. Near-term demonstrations of real-world use cases that can clearly demonstrate adequate return on investment or sector-relevant competitive advantage will be a key confidence building mechanism.

APPENDIX: ADDITIONAL RESPONDENT AND ORGANIZATION DEMOGRAPHICS

This appendix contains additional details about the roles and responsibilities of the survey respondents as well as more detailed descriptions the total revenue and IT budgets of the organizations participating in the survey.

As seen in Table 10 and 11, the majority of survey respondents play a major role in deciding what new computer-related technologies are appropriate for inclusion in their overall IT environment and that they are in a good position to ensure that those decisions translate into successful procurements and ensuing business processes.

- Table 10 shows the significant role respondents have in strategic technology planning and purchasing within their organization, with almost two-thirds (61%) indicating that they were a decision maker involved in the final call on what or what not to purchase.
- About one-quarter (24%) indicated that they were influencers with an active role in the planning and purchasing process, informing decisions but not involved in making final decisions for their organization.
- Table 11 outlines the various job titles of survey respondents: 36% were CIOs or IT directors, 20% were CTOs, and 13% were VPs of Innovation or Directors of Innovation.

TABLE 10

Respondents Role Within Organization

Option	% Selected	# Responses
Influencer: active role in the planning and purchasing process, informing decisions but not making final decisions.	24%	100
Stakeholder: internal partner with a vested interest in the final outcome of plans and purchases	15%	62
Decision maker: make the final call on what or what not to purchase	61%	253

n = 415

Source: Hyperion Research, 2021

TABLE 11

Respondents Job Title/Role Within Organization

Option	% Selected	# Responses
CIO or IT director	36%	149
CTO	20%	82
VP of Innovation or Director of Innovation	13%	52
System administrator	6%	26
Program manager	6%	24
Computer scientist	4%	17
Data scientist	3%	11
Design engineer	2%	7
Data center staff	1%	6
Quantum computing professional	1%	4
Scientific researcher	0.39%	2
Prefer not to say	0.20%	1
Other end-user of computing capabilities	1%	5
Other	7%	30

n = 415

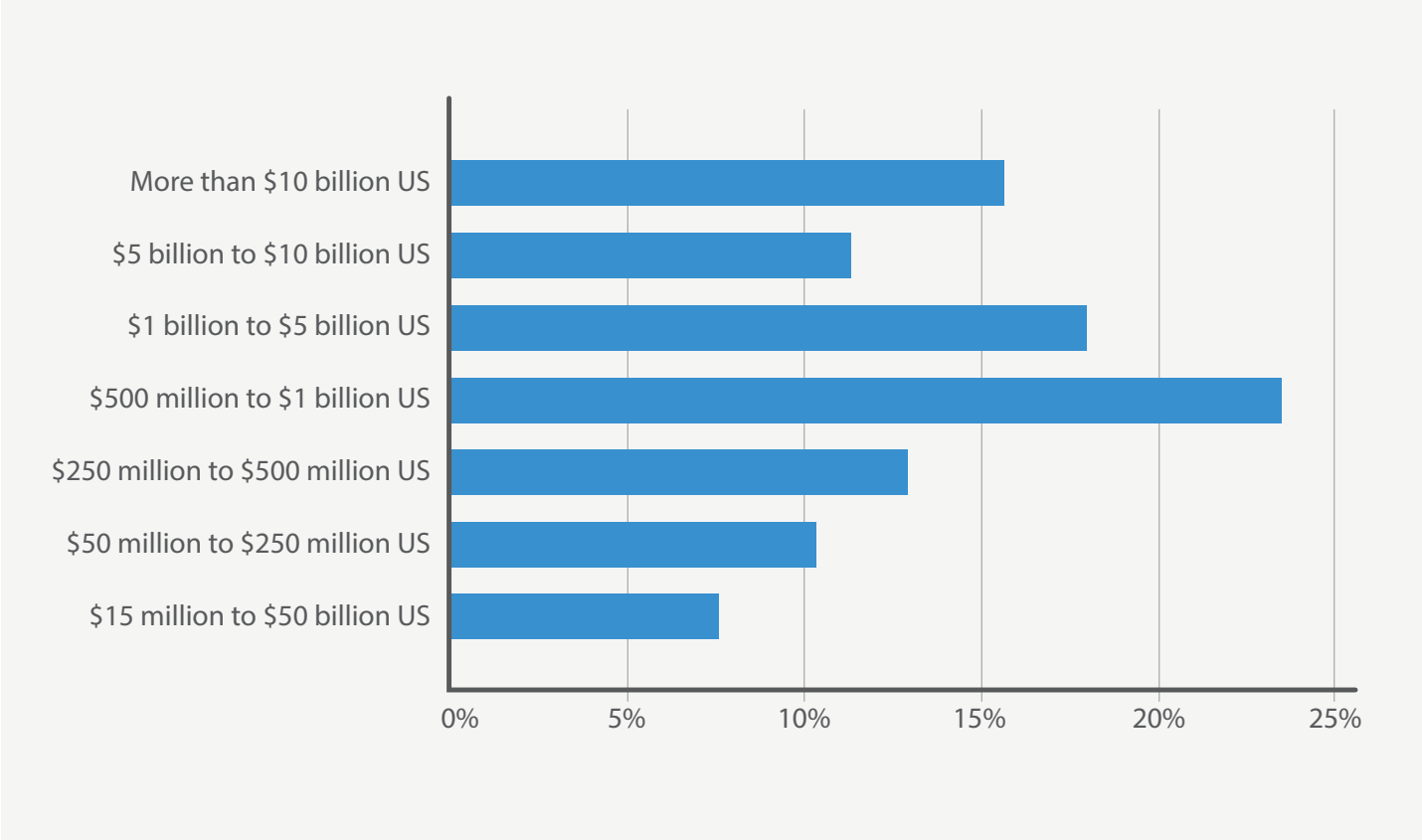
Source: Hyperion Research, 2021

Figure 4 and Figure 5 array the surveyed organizations' estimated 2021 total revenue and estimated 2021 overall IT budget respectively. Although the largest group of respondents had an estimated total revenue between $500 million US and $1 billion US, the survey captured a wide range of company revenue from $15 million US to over $10 billion US.

Likewise, overall IT budgets for the organizations surveyed centered on those with between $10 million US and $25 million US, although the total span of estimated 2021 IT budgets was from $5 million US to more than $ 50 million US.

FIGURE 4

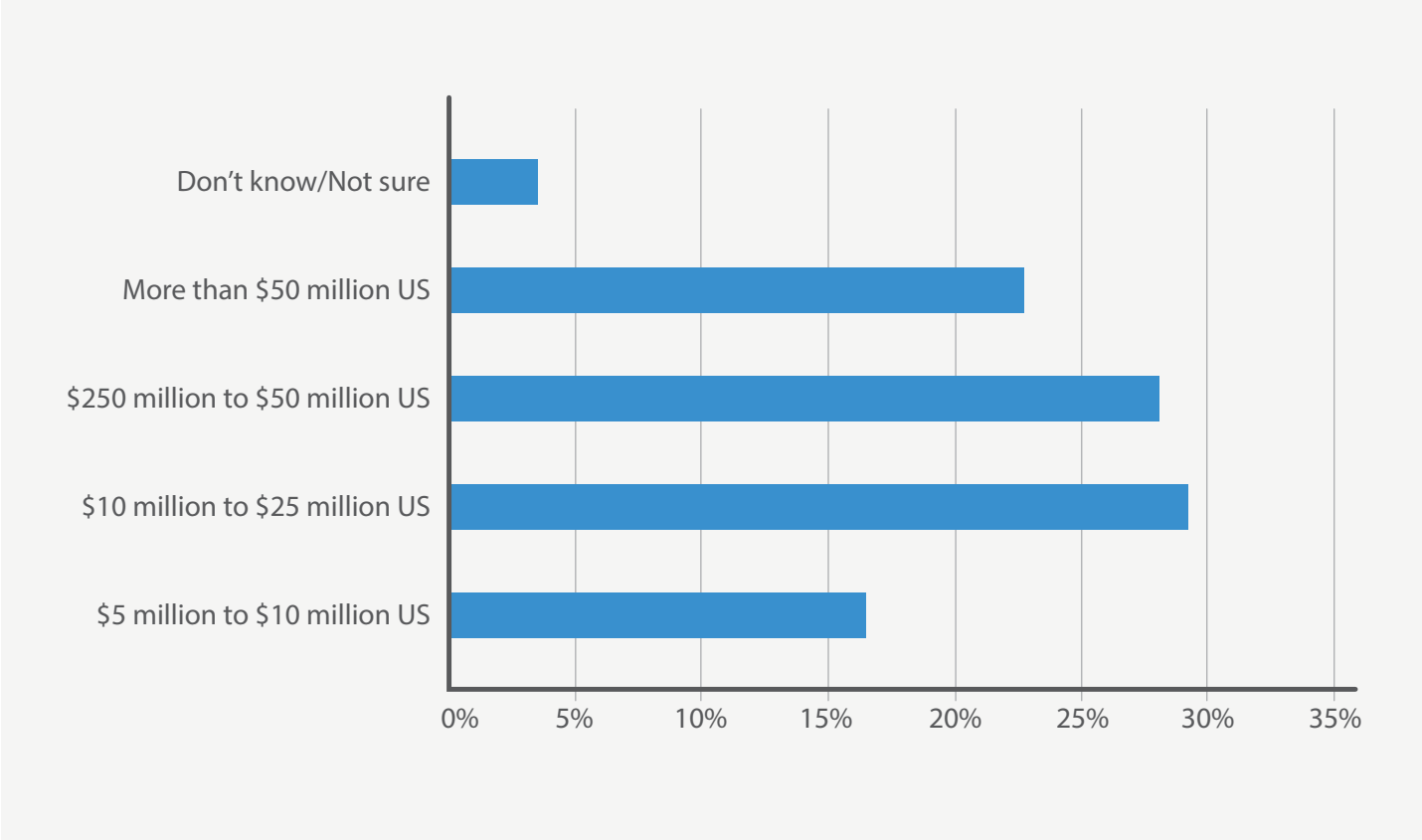
Organizations' Estimated 2021 Total Revenue



Source: Hyperion Research, 2021

FIGURE 5

Organizations' Estimated 2021 Overall IT Budget



Source: Hyperion Research, 2021

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About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology, and related trend analysis, and both user and vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). Hyperion Research provides thought leadership and practical guidance for users, vendors, and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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