

QUANTUM COMPUTING: A VIEW FROM THE TRENCHES

Part 1

Research note

September '21



Executive Summary

In the summer of 2021, Classiq commissioned market research firm Propeller Insights to conduct a survey of over 500 managers that are familiar with quantum technologies. The survey, conducted in July and August 2021, revealed that quantum computing is perhaps closer than conventional wisdom suggests, and that there is genuine excitement amongst the people in 'the quantum computing trenches' about the organizational benefits of quantum.

The survey also reveals two major roadblocks to quantum deployment: the lack of qualified manpower, and the availability of development environments that can address next-generation quantum computers.

Because of the wealth of insights uncovered in the survey, we divided the report into two parts. This is the first part. The second part will be released in October this year.

Key findings include:

- 61.9% of respondents reported that their company already allocated a budget for quantum computing.
- 98.6% believe that quantum computing is a necessity or is important to advance technology performance.
- 95.7% believe that quantum computing can bring performance breakthroughs.
- "Better development platform" is the most cited answer when asked the most important component to the evolution of quantum computing
- More than 60% say quantum computing will be a big trend in the next 5-10 years, second only to virtual and augmented reality.
- 89.8% believe IT departments should have a budget specifically for quantum computing technologies.

Methodology and Sampling Error

A national online survey of 509 US Managers+, was commissioned by Classiq and conducted by Propeller Insights, an LA-based market research firm, between July 26th and August 12th, 2021.

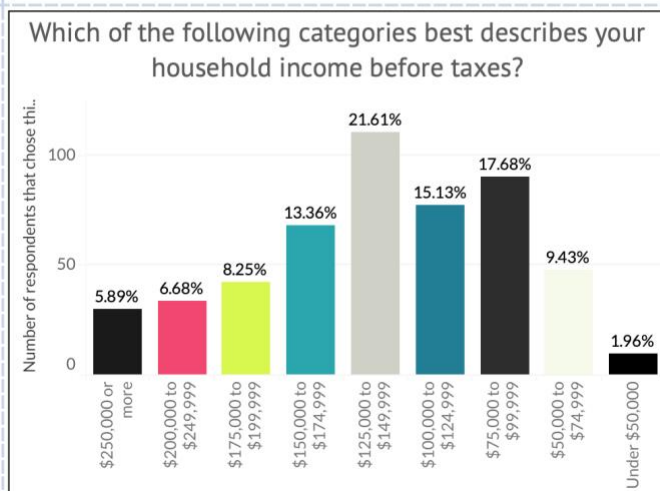
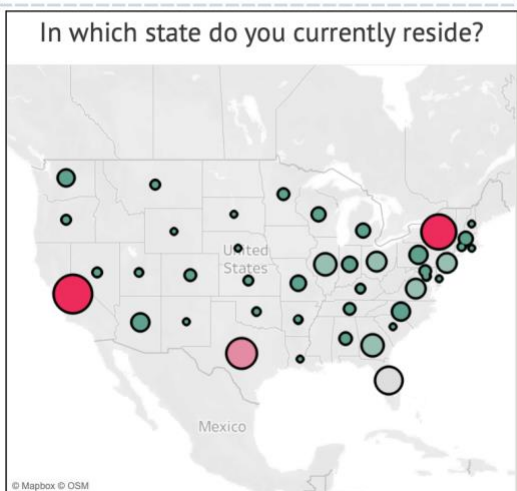
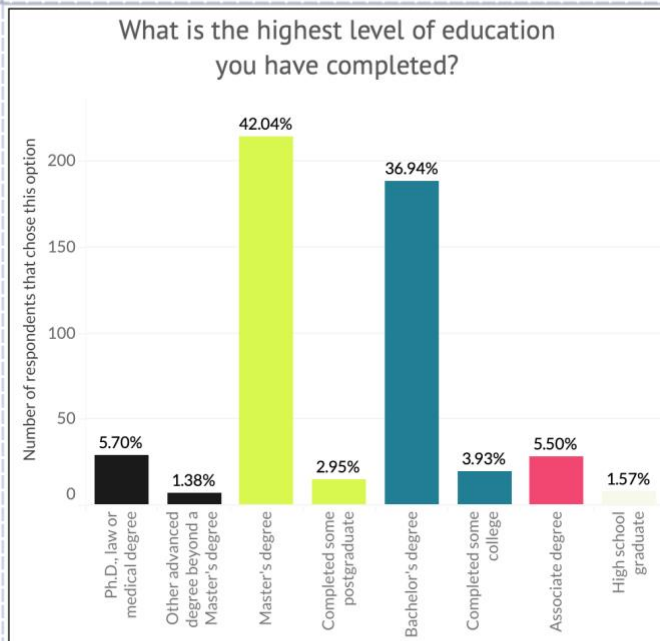
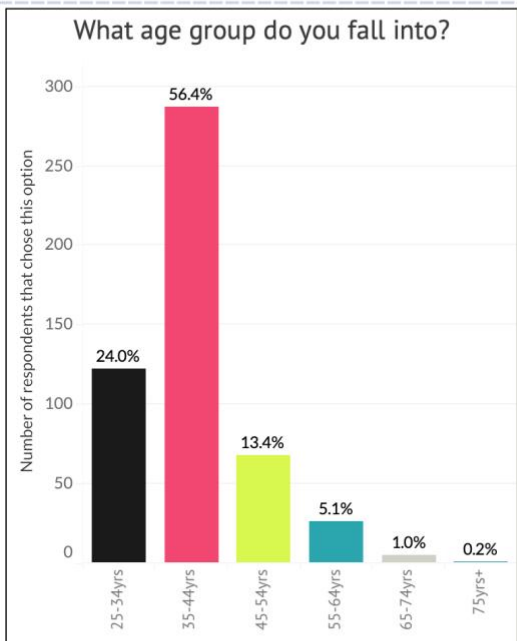
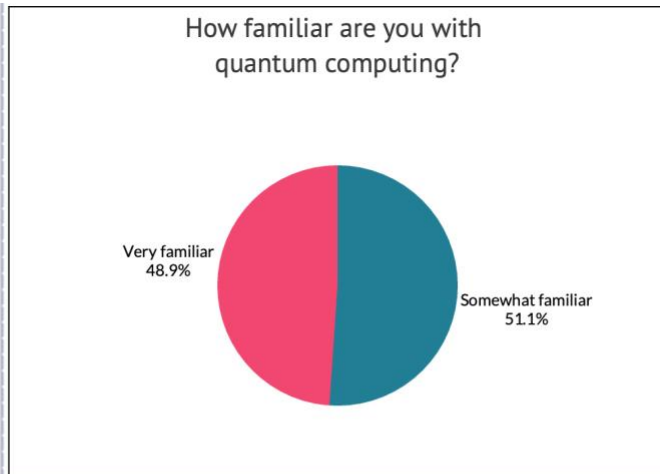
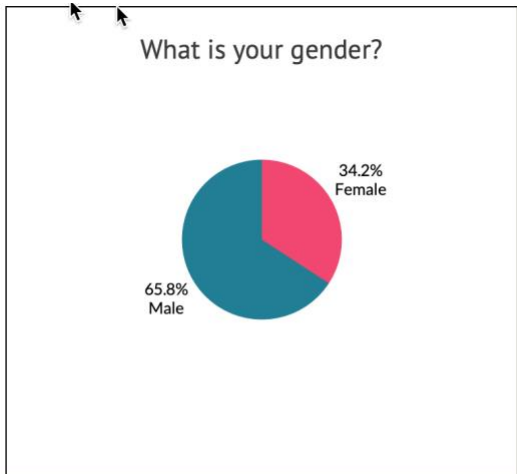
Respondents opted into an online database where they were targeted based on demographics. To further confirm qualifications, respondents were asked to verify their information in the survey itself, including title and industry.

As a qualification question, respondents were asked “how familiar are you with quantum computing?” Only those that responded “very familiar” or “somewhat familiar” were included in the analysis and constitute the 509 samples. Those that responded, “I’ve never heard of it”, “I’ve heard of it, but I’m unfamiliar” or “I’m vaguely familiar” were excluded from continuing the survey. Also excluded are respondents under 18 years of age.

The survey was conducted with the maximum margin of sampling error of +/- 4 percentage points at a 95 percent level of confidence. This means that all other things being equal, if the identical survey were repeated, its confidence intervals would contain the true value of parameters 95 times out of 100. Subsets of the data have a larger margin of error than the whole data set. As a rule, we do not rely on the validity of very small subsets of the data especially sets smaller than 50-75 respondents.

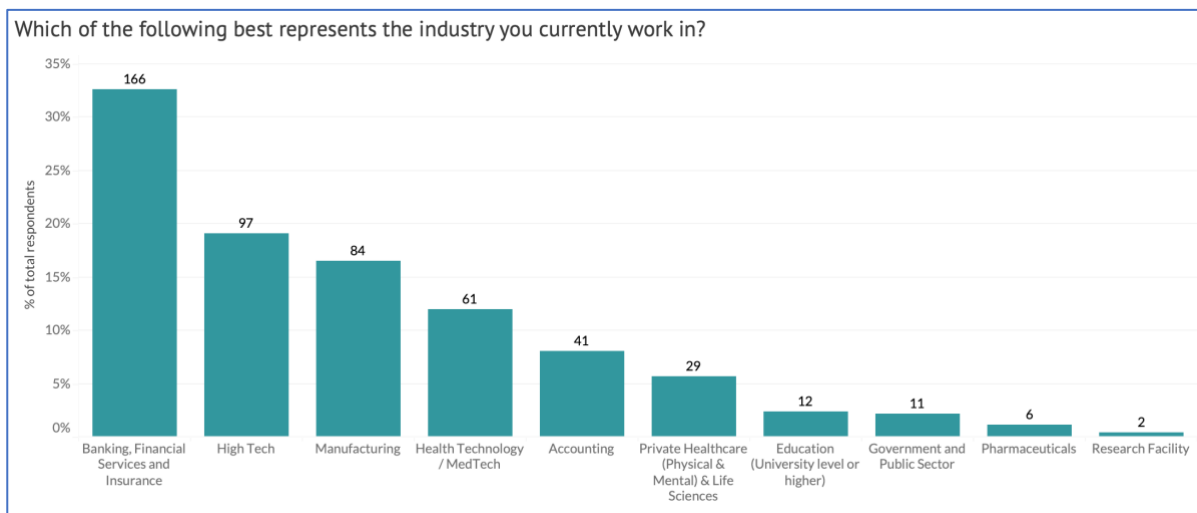
Demographics and Other Attributes

The survey demographics including gender, age, education, US state of residence and household income are summarized in the chart below

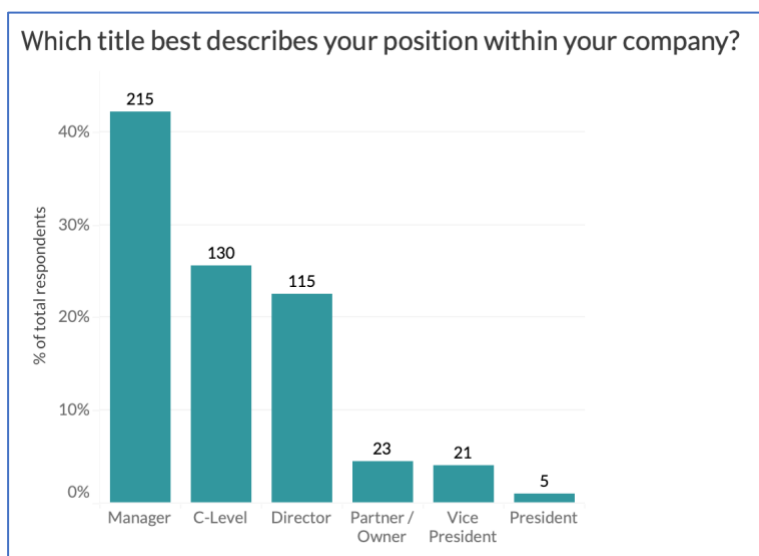


We see that survey respondents are, in general, highly educated. 52.1% have at least some postgraduate education and over 42% have a Master's degree. Respondents also come from all regions of the US and, most commonly, have a pre-tax household income of \$125K-\$150K.

The survey covered a variety of industries, the most common of them were banking, financial services, and insurance:



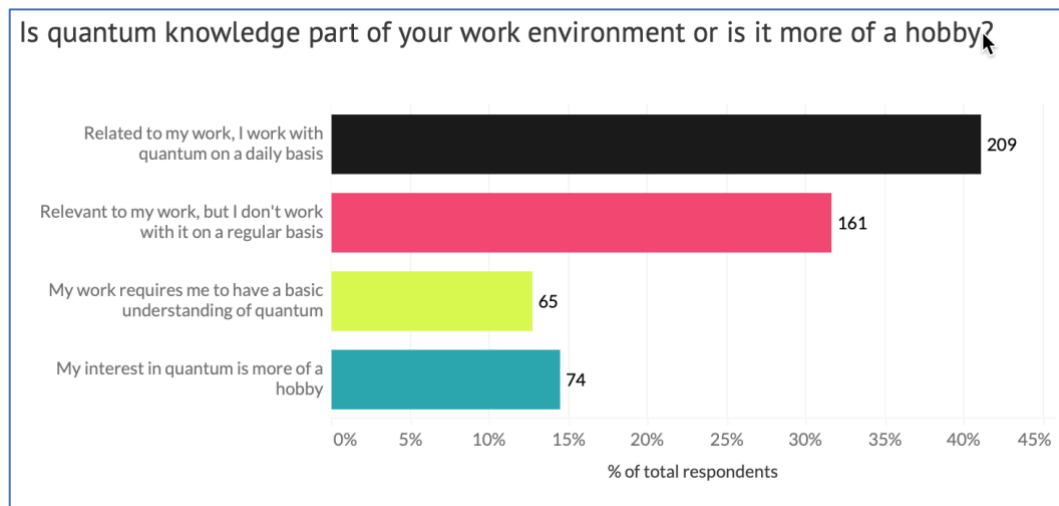
Survey participants hold a wide range of managerial roles:



A word-cloud describing the exact job title is:



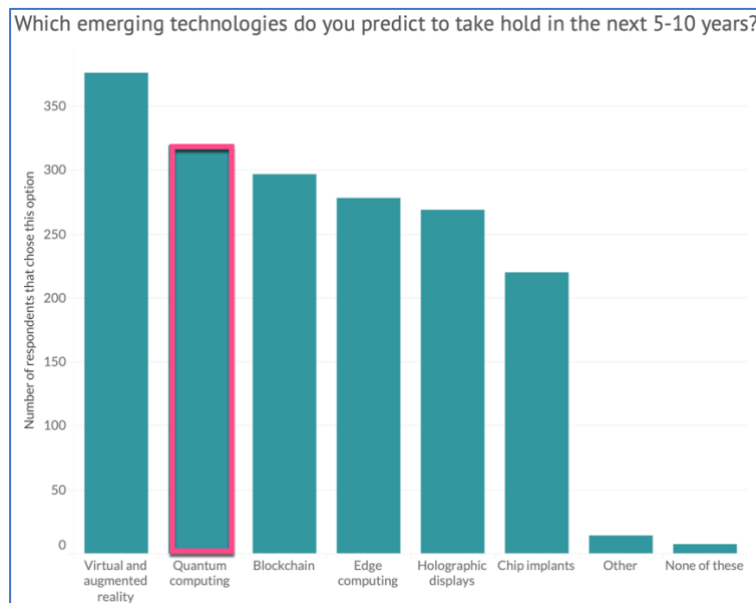
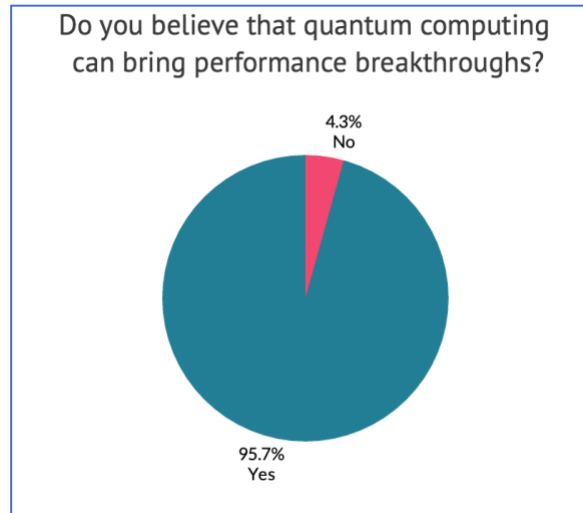
In contrast with other surveys that focused primarily on C-level perceptions, this survey captured the opinions of many that do the actual work “in the trenches”:



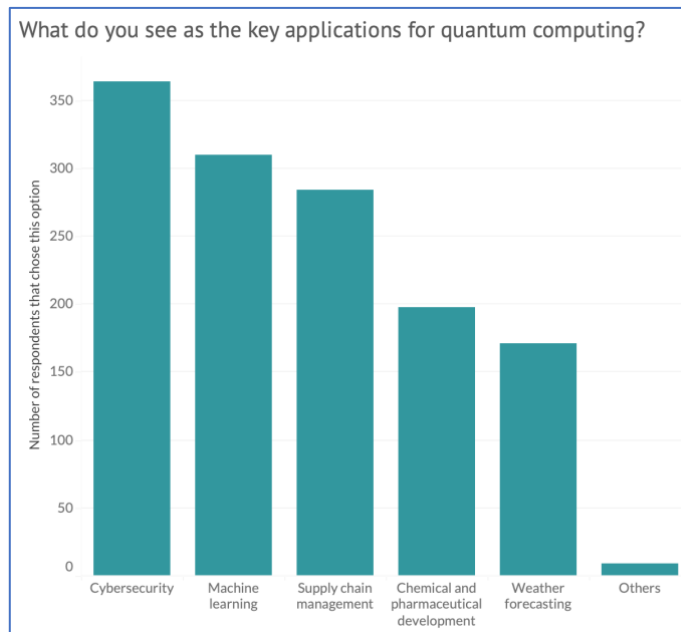
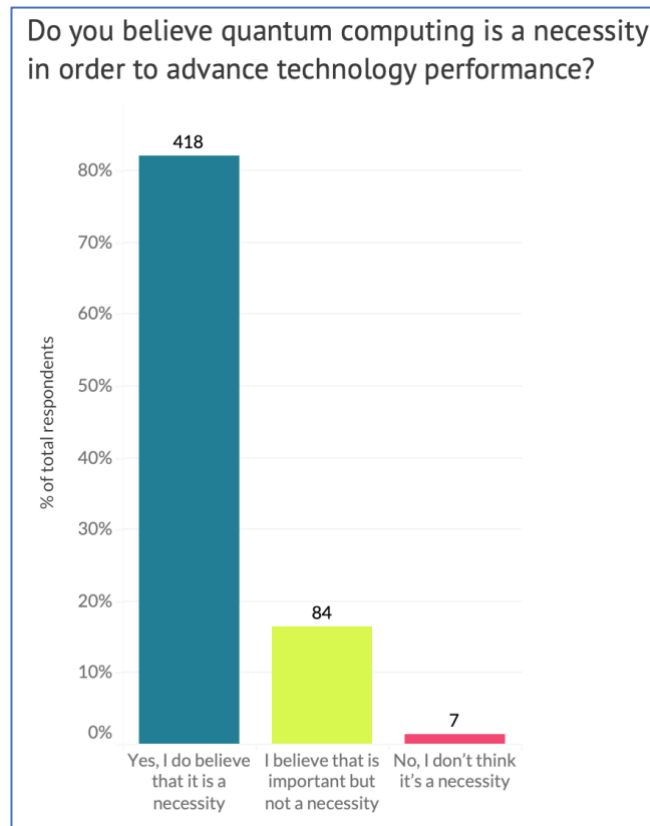
Over 40 percent of respondents report that they work with quantum on a daily basis.

The Quantum Opportunity

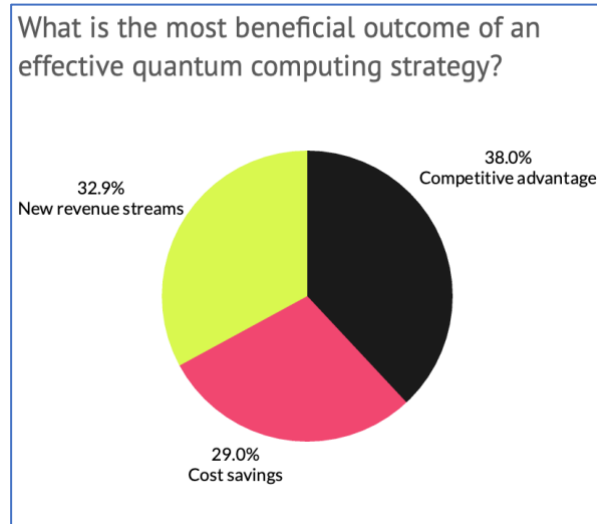
We asked a series of questions centered on the opportunity of quantum: how organizations would benefit from quantum computing and in what fields.



We were not surprised that this cohort believes that quantum computing will provide performance breakthroughs and expects quantum computing and predicts it will go mainstream in the coming years (second only to virtual and augmented reality).



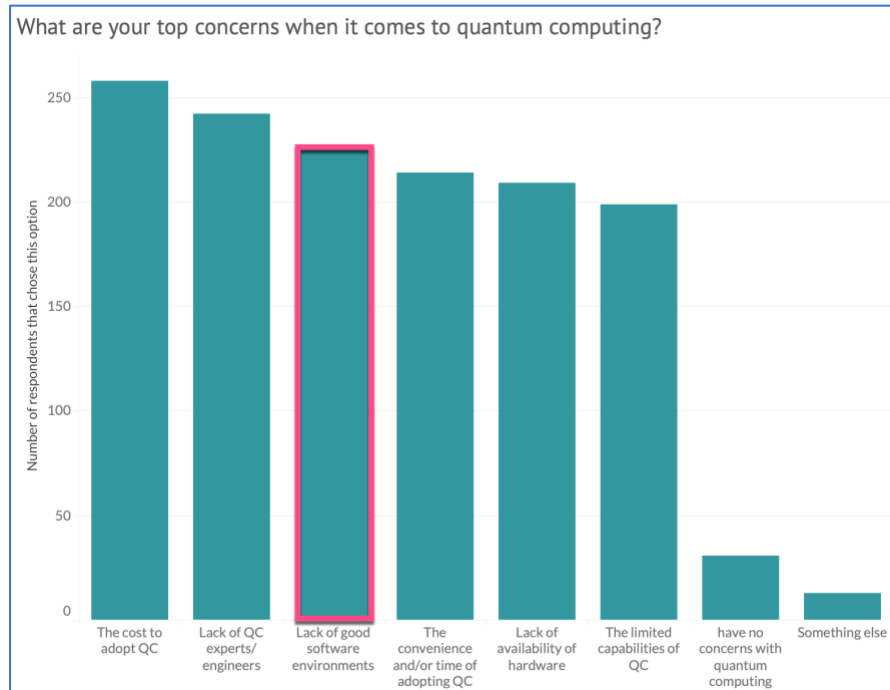
We see a wide range of applications, headlined by cybersecurity, machine learning and supply-chain management (likely driven by quantum optimization solutions)



Responses are quite evenly distributed between competitive advantage, cost savings, and new revenue. All of these will improve the positions of companies that properly deploy quantum computing solutions.

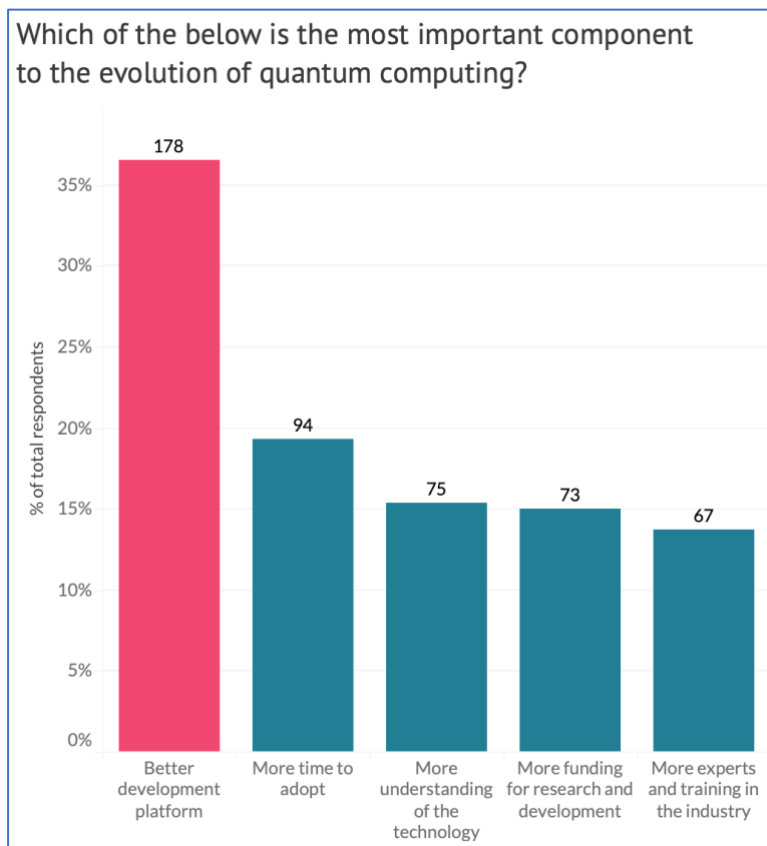
Quantum Roadblocks

The next set of questions focused on the roadblocks: what needs to be solved so that quantum computing becomes mainstream.



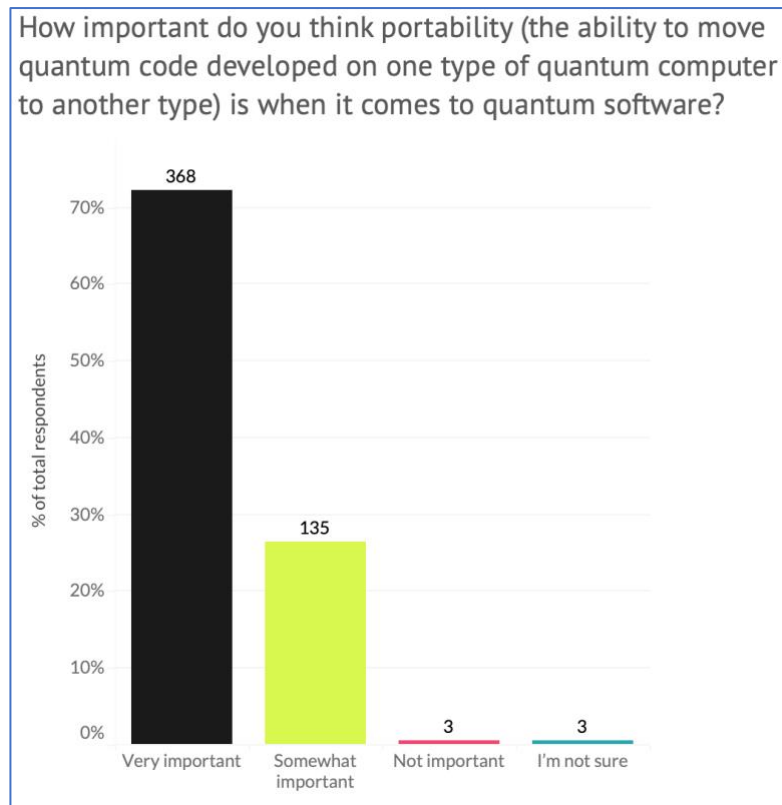
There is no single dominant concern. In this question, respondents were asked to mark all the items they were worried about. Cost, availability and 'the limited capabilities of quantum computing' are what one would expect at this nascent stage of the market. The hope is that all of these are resolved concurrently: better hardware that is more accessible and more cost-effective.

The next question did not provide the option to select multiple answers and inquired about the most important component to help the evolution of quantum computing.



When respondents were asked to pick the single most important component, we do see a better development platform as a dominant item.

One important attribute of an advanced software platform is the ability to transition software from one quantum computer to another. This is understandable. Today, it is unclear who the winners will be in the hardware race and organizations may be reluctant to commit to one particular hardware architecture without a way to easily port it to another when necessary.



We conclude that respondents see portability as a nearly-unanimous critical issue, with 98.8% identifying portability as 'very important' or 'somewhat important'.

Quantum Computing Budgets

Because of the quantum opportunity and despite the roadblocks, we were curious to understand whether organizations are budgeting for quantum computing projects. This is summarized in the following graphs



Nearly 90% believe that IT departments should have quantum computing budgets, and over 83% indicate that their company either has a budget or is planning to add it.

The industries that lead in terms of having quantum budgets are accounting and finance, health and pharma, and high technology. Educational facilities, private healthcare organizations and government organizations are behind.

Summary

The benefits of quantum computing appear to be both significant and around the corner. Organizations are taking notice and are budgeting for quantum projects. While there are roadblocks – notably effective development environments – they appear to be surmountable.

Forward-looking organizations cannot afford to ignore quantum computing and need to chart a coherent strategy to take advantage of this new method of computing, or risk being left at a significant competitive disadvantage.

The logo for CLASSIQ, featuring a stylized quantum circuit symbol (a square with a dot and a line) followed by the word "CLASSIQ" in a bold, sans-serif font.

REVOLUTIONIZING THE DEVELOPMENT OF QUANTUM SOFTWARE

In this research note, we reviewed the results of a survey conducted in the summer of 2021. We believe that the adoption of quantum computing is accelerating. To help, we are developing a unique software platform to help expedite the design and deployment of sophisticated quantum

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