



The Deloitte On Cloud Podcast

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Title: Are You Ready for Quantum? Navigating Enterprise Futures

Description: In this Knowledge Short, Deloitte's Natasha Buckley and Dianna Kearns-Manolatos explore how quantum computing could reshape business in the near future. They discuss the signals driving quantum investment, industry readiness, and transformation, and share four likely scenarios for quantum evolution. Finally, they outline steps—like talent strategies, leadership engagement, and road-mapping—that companies can take now to thrive amid uncertainty and prepare for the coming disruption.

Duration: 00:16:06

Natasha Buckley:

Welcome back to the On Cloud podcast. I'm Natasha Buckley, senior research leader in emerging issues at the Deloitte Center for Integrated Research, and I'm your host for today's Knowledge Short episode. Today, we'll be diving into the future of enterprise quantum computing, touching on enterprise readiness and how we can all redefine tomorrow. I'd like to introduce my colleague, Dianna Kearns-Manolatos, and ask her to explain how we decided to explore this fascinating subject of enterprise quantum computing readiness.

Dianna Kearns-Manolatos:

Thanks so much, Natasha. And I'm so glad to be joining everyone today for this discussion. I'm Diana Kearns-Manolatos, and I lead the Deloitte Center for Integrated Research's technology transformation research. I have the really fun job of getting to explore some of the most critical issues that are facing organizations related to technology strategy, the future of AI and engineering, and digital innovation. And as part of that, quantum computing has always been a topic area of interest, but it really came on to our research agenda this year because of a few key signals that we've been tracking over time that really piqued my interest.

So, first off, we have our annual technology value survey. And the edition that we published last fall showed us a couple of key signals related to quantum computing. So, first off, we looked at enterprise investments in quantum computing and saw that the number of respondents had meaningfully increased year over year, with more of our survey respondents believing that they were getting high ROI from their investments in quantum computing. Second, we saw that quantum readiness was a particularly high priority on the agenda of global cyber leaders that we surveyed as part of the 4th edition of Deloitte's Global Future of Cyber survey. And then the third signal that we saw that really caught our attention was just the evolution of high-performance computing in the market.

And so, that includes everything from AI infrastructure modernization to high-performance cloud and GPU models that are really reshaping the way that we think about the entire technology ecosystem, and big technical advancements with quantum computing itself in terms of many announcements that have been made over the past year related to quantum error correction.

So, all of these signals together converging at the same time, had us asking ourselves how can organizations better plan for the quantum future? Because it's going to take them years, not months, to really develop the talent and the technical infrastructure that they need to be quantum ready.

Natasha Buckley:

Yeah, absolutely. Thanks, Diana. And that's where foresight analysis can be helpful. So, questions regarding the emergence of enterprise quantum computing, like, when will scalable enterprise quantum computing occur? What modality or what technical approach will win the day is difficult, if not impossible, to predict despite the numerous advancements that we've been hearing about thus far.

But with tools like foresight analysis and scenario modeling, leaders can imagine and navigate fluid, unpredictable environments, not by trying to predict the future, but by purposely considering what strategies can best support an organization to navigate multiple, plausible futures. And quantum computing, we should emphasize that it's poised to profoundly transform industries over the next decade, with potential to revolutionize sectors like pharmaceuticals, manufacturing, and finance through breakthroughs in simulation, optimization, and material science.

So, working with subject matter experts and interviewing a number of industry leaders, we explored four plausible scenarios for the evolution of enterprise quantum computing, and provide strategic insights for companies to prepare effectively, regardless of how the future may unfold. We considered opportunities and risks for business, technology teams, and workforces.

And to help develop these scenarios, we collaborated with quantum computing subject matter experts at Deloitte, as well as interviewing executives at a number of the pioneering quantum computing companies today. And we also utilized a process called horizon scanning to look for and organize our signals that hint at or suggest emerging paths that quantum computing could follow. And importantly, what those different paths mean for the decisions companies are making today that can help them better prepare. So, first, let's talk about quantum computing and its potential.

Dianna Kearns-Manolatos:

In terms of potential, the transformative potential is huge, and that's not an exaggeration, quantum computing promises really disruptive innovation. Whether that is for complex calculations, like you were discussing before, for therapeutics, material science, or investment management. The use cases for transforming our collective understanding of the natural world are significant, but they also require certain technical milestones to be achieved in order for organizations to reach commercial viability. Whether that's 200 or 1,000 logical qubits, it's going to require a significant leap from the 50 or so qubits that are the standard today.

And so, that all makes it hard to plan for 2030. On the one hand, there's major technical progress being made and on the other, there's complexity. And I'll be the first to say that this is not an easy topic to wrap your head around. There are commercial goals, and there's no shortage of major tech transformation initiatives that are keeping the CTO busy. And this may not rise to the top of the agenda.

So, why should having a quantum computing road map matter now? Simply put, early preparation with a road map that outlines commercial risks and opportunities, builds tech ecosystem relationships and forward plans around talent is the best way to get ahead with exponential technologies. And as we discussed in the paper, organizations often don't see the run up to an exponential technology until it hits the J-curve, and by then it's too late.

Hence, the value of scenario of thinking is really being able to use a technique like foresight analysis to identify the critical uncertainties that you as an organization really need to be paying attention to. In this case, how the quantum talent and operating environment will develop over time, and how technical capabilities mature are relative to an organization's three- to five-year planning cycles.

And so, given these two uncertainties we built out four visions for the future. Each has distinct implications, and to get us started, I want to talk a little bit about the first one, which is the surprise scenario. Here, imagine it's 2030 and commercial quantum computing arrives with a major breakthrough sooner than your organization has expected, but the talent ecosystem remains underdeveloped.

In this scenario early adopters who invested in quantum computing before 2025 really gain significant competitive advantages. They're shaping the technology and business ecosystem, getting ahead of commercial opportunities and really securing and cornering the market on scarce quantum experts that have the expertise in quantum information science that's needed. While others face talent wars and struggle to access quantum processing capacity due to limited tech partnerships and expertise being in place. This surprise scenario is an unwelcome surprise for those who aren't prepared with an understanding of and a plan for how they might be disrupted by quantum computing.

Natasha Buckley:

Yeah. Thanks, Diana. That's fairly helpful. I'll talk then about our second scenario, which we call recall quandary. And here both scalable quantum computing and the talent ecosystems develop much more slowly than expected. So, in contrast to scenario one, where scalable quantum arrives sooner, here in the quandary scenario it's much slower.

Here organizations face limited innovation budgets, and most budgets remain focused, likely, on AI; and that's driving delayed quantum breakthroughs beyond 2030. Only a few enterprises maintain meaningful investment, which isn't surprising, and this could lead the quantum computing vendor market to consolidate and the talent gap to intensify as expertise will likely remain scarce. Companies in this scenario that continue quantum experimentation, though, can maintain a knowledge advantage, while others could lose anywhere up to a decade of infrastructure development and risk scrambling when quantum breakthroughs ultimately do occur. So, this scenario highlights the risk of underestimating the complexity and long timelines needed to build enterprise quantum computing capabilities.

Dianna Kearns-Manolatos:

To take us somewhere different, the third scenario we envisioned is a quantum computing explosion, here rapid quantum technical innovation converges with a mature talent environment. This future may feel very much like what the market is experiencing right now with AI. Organizations would need to quickly adapt to new business models and competitive dynamics with many caught off guard by the scope and scale of transformation needed.

But there is a silver lining and for organizations, that is being able to tap into the mature talent environment, here there is a greater opportunity for public private partnerships, tapping into emergent talent hubs, and potentially a lower barrier to entry for organizations with quantum information science talent. On the flip side, the need for speed to market could cause strategic missteps, especially for organizations acting without strong foundations and an ecosystem in place to support and guide their decisions.

Natasha Buckley:

Absolutely. So, last, our fourth scenario, we call the leap scenario. In this scenario, while scalable quantum is delayed beyond expectations, here the talent and operating environment mature more robustly, likely driven in part by the AI technology boom and sustained investment to date in STEM skills. So, in

this world, the quantum computing vendor markets likely consolidating and companies with early quantum investments are realizing incremental advantages. The workforce grows motivated to solve complex problems however, despite the slower technology timeline. And this potentially benefits other technical areas where there's spillover effects.

So, this scenario suggests a technology that we like to say is all dressed up with nowhere to go, where readiness outpaces hardware availability. Now we've talked about these four scenarios that are all plausible in their own way. And as we noted at the beginning of our discussion, scenario modeling helps provide insights into steps that companies can take to be agile and resilient regardless of which future unfolds.

More often than not too, we have to say that in scenario analysis, the actual future actually turns out to be a blend of the different scenarios. This isn't a matter of, again, trying to predict one scenario that we think will occur, but thinking about the potential plausible futures collectively. So, we recommend, coming through with this research, a number of actions companies can take today that could be useful across a number of the scenarios that we talked about.

And so, these include, first, develop a quantum road map if you haven't already, create strategic road maps that incorporate your capabilities today and future potentials. And this can include quantum-inspired projects that apply quantum principles to classical computers and explore ecosystem partnerships.

Secondly, engage your organization leadership. So, appoint executive sponsors to champion quantum initiatives, educate your board and the C-suite on risks and opportunities, and consider this education overtime as well. This isn't a one-and-done" effort, as the technology will continue to advance and new executives will be joining the leadership team.

Thirdly, develop your internal skills and talent. So, invest in cross-training, quantum information science education, which is a real growing area, and build internal expertise while leveraging the emerging quantum talent folks. And on that note, fourth, participate in the emerging quantum computing ecosystems. Quantum computing ecosystems, we've learned, which are composed of government, academic, and corporate organizations, are emerging across the US and offer great opportunities for companies for learning, research, and development. And organizations can deepen their relationships with vendors and monitor, for example, quantum-as-a-service development which they can enable on early access and integration pathways.

So, these foundational steps can shorten the distance to competitive quantum advantage and mitigate risks associated with delayed action, and they can provide short-term value as well, regardless of when scalable quantum computing arrives.

And then lastly, just a point of emphasis, regarding scenario modeling, it can be a really powerful tool to help leaders navigate disruptive change. It's again not about predicting single outcomes, but equipping leaders to consider multiple plausible futures and make decisions today that position their company to thrive no matter which future unfolds.

Dianna Kearns-Manolatos:

Thanks for joining us on this week's Knowledge Short on quantum computing. If you enjoyed this podcast, make sure to like us, rate us, and subscribe. Until next time, thanks for having us and stay safe everyone.

Operator:

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