
To BCG's network around the world,

One of the most important responsibilities of a business leader is to prepare not just for what's right in front of us but for what's around the corner. Of the fundamental shifts on the horizon—for business and society—quantum computing has the potential to be one of the most transformative. And while most experts believe that the technology will not fully mature for quite a few years, it is gaining momentum fast, and we don't want to be caught unprepared by a sudden breakthrough.

One of BCG's leading experts on quantum computing, Matt Langione, recently gave a truly illuminating TED talk on this topic. As Matt explains, supercomputers—after years of incredible advances in processing power—will soon hit physical limits, unable to get any smaller or faster. Some of the biggest problems we'll face in this decade and beyond, such as climate change, public health, and issues of inequality, can't be solved fast enough by the supercomputers we have today.

Quantum computers, however, because of their ability to explore a huge number of potential solutions at the same time, will be the key to solving some of the puzzles that are maze-like in nature—such as simulation and optimization problems. Matt gives the example of fertilizer production, which comes at a high cost to business and the planet. If we tasked today's fastest supercomputer with developing a more efficient, less damaging chemical process, it would take about 800,000 years. For a quantum computer: fewer than 24 hours.

The same kind of staggering speed-up would be true for drug discovery, saving millions of lives; and risk simulations for banks, freeing up $1 trillion in investable capital every year. The possibilities are incredible.

As business leaders, it's easy to see quantum solutions as part of the distant future—a science fiction we can't focus on today, when we have so many other challenges to tackle.

But the truth is, we're already decades ahead of where we imagined we'd be only a few years ago on the development timeline, and we have to start thinking now about how to build a quantum advantage.

What business problems should we prioritize, scope, and develop solutions for? What workflow changes will we need to consider, upstream and downstream? How can we upskill employees so they're ready to put the technology to use?

Putting off investing the time and money to answer these questions would be a huge mistake. A quantum future, after all, is not as far off as we may think. And as business leaders, we have a role to play in making it happen.

Please see below for Matt's talk and related publications.

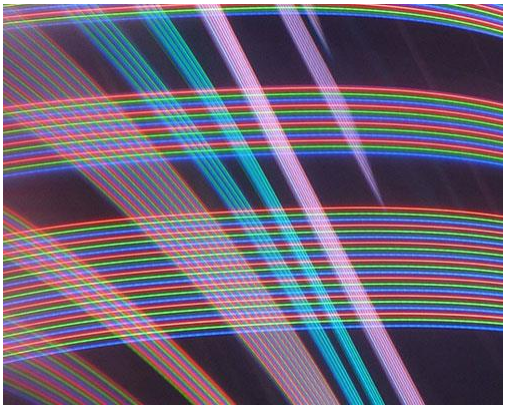
Rich Lesser
Chief Executive Officer


## The Promise of Quantum Computers

What if tiny microparticles could help us solve the world's biggest problems in a matter of minutes? That's the promise—and magic—of quantum computers. Speaking next to an actual IBM quantum computer, Matt

Langione explains how these machines solve complex challenges like developing vaccines and calculating financial risk—and shares why industries should prepare now for this new leap in computing.

CLICK TO WATCH ON TED.COM



## Where Will Quantum Computers Create Value—and When?

The radical new technology promises to create value of more than $450 billion annually. But the gains will be far from equally distributed.

## A Quantum Advantage in Fighting Climate Change

In the coming decade, quantum computing could improve existing zero-emission technologies and contribute to the creation of new ones.