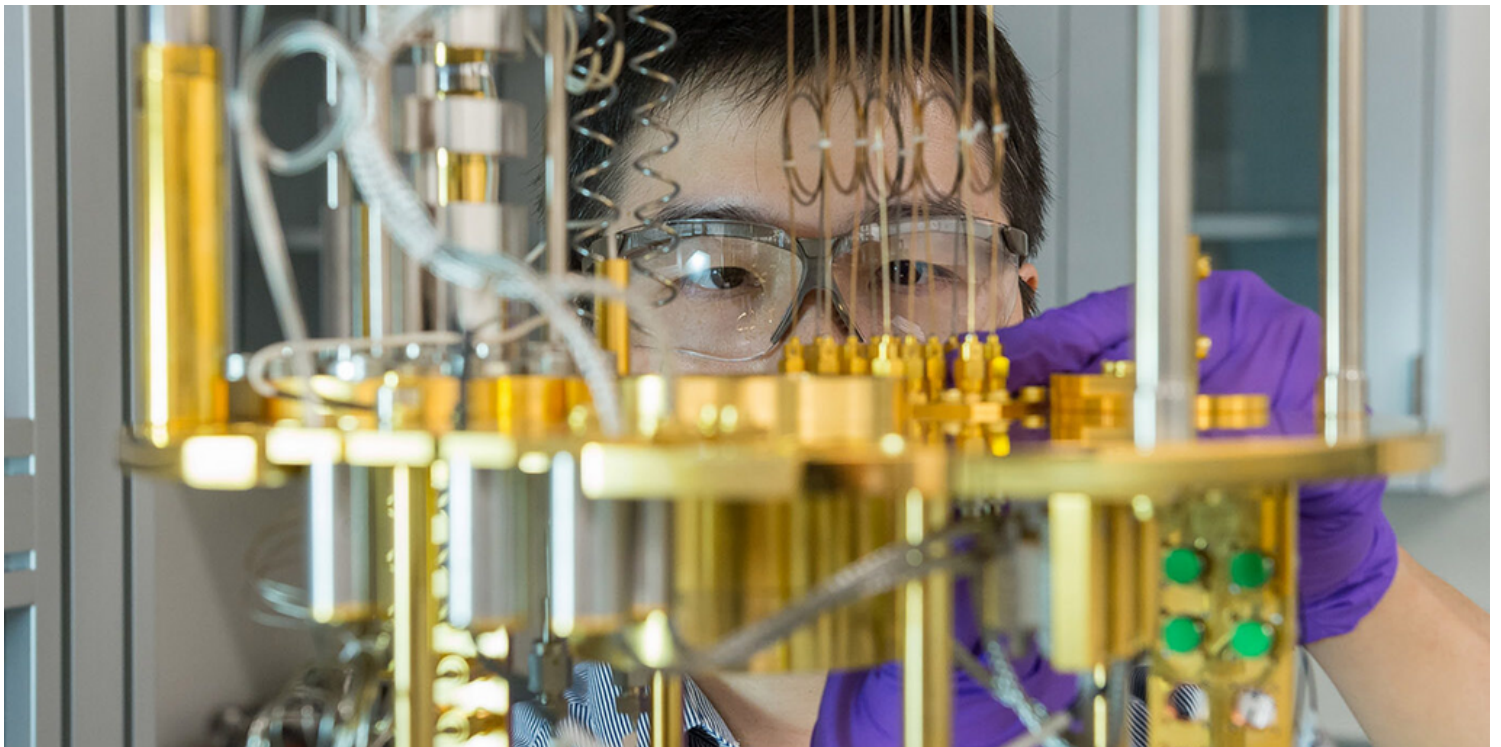




Opinion

Opinion: Why students and society benefit when universities collaborate with industry

By David Awschalom



Credit: University of Chicago

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Last year, scientists from the University of Chicago's Pritzker School of Molecular

Engineering and Argonne National Laboratory [teamed up](#) with researchers from JPMorgan Chase and other companies on a paper that explained how quantum computers could accelerate solutions for the finance sector.

The paper, published in a leading scientific journal, intentionally brought together experts from different sectors to write something that would be accessible to a wide array of audiences.

Last summer, a coalition of university, government, and industry partners [advanced](#) to the final round of the National Science Foundation Regional Innovation Engine (NSF Engine) competition with a plan to build quantum-enabled security that could someday protect individuals' financial information, health records, and more. That effort also includes both academia and industry because that's the most productive way to scale an application of that magnitude.

And this fall, when UChicago researchers announced success at turning a protein found in living cells into a functioning quantum sensor, they attracted interest from the pharmaceutical and medical imaging communities. Respectively, these industries saw potential uses for ultra-targeted drug delivery and molecular-level disease detection. These discussions between scientists and potential end users may well stimulate new research and help shape applications that ultimately save lives.

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Each of these reflects the foundational role that partnerships between universities

and companies can play in advancing a revolutionary sector like quantum technology. These collaborations accelerate the testing and scaling of new discoveries and enable important commercialization efforts by leveraging the strengths and resources of each sector. They can pave the way for funding of new directions in both fundamental and applied research, which benefits the work of our academic community and society at large.

I was reminded of these advantages with the recent announcement that IonQ will partner with UChicago on a groundbreaking initiative that will fund collaborative research space, seed more than 140 research and technology development projects, and support the management and expansion of the quantum testbed that connects UChicago, CQE, and the national labs in the western suburbs.

IonQ's support will help scale and develop the quantum network — already one of the nation's longest. Applications of utility-scale quantum networks include unbreakable encryption, distributed quantum computing and ultra-precise, connected quantum sensing — technologies that have the potential to transform how we fight disease, detect fraud, secure personal health and financial information, and more, making them worthy of our combined attention.

Developing transformative technologies with the potential to improve lives is not easy. Moonshot efforts come with daunting hurdles that we surmount by joining forces across academia, industry, and government. In quantum, one of those hurdles is the need to prepare a large future workforce. UChicago, for instance, has partnered with IBM and four universities in South Korea and Japan to prepare 40,000 students for careers — an effort that is significantly strengthened by close cross-sector cooperation. This has been true as other sectors have emerged, too, including computing and biotech in the 1960s through 1980s and the internet in the 1990s and 2000s.

Collaboration across sectors, borders, and disciplines is fundamental to innovation.

Free flowing inquiry gives rise to big ideas. Debate among people with different goals and constraints enables nuanced problem solving.

Partnerships with industry can make this region and the quantum sector as whole more attractive to government, philanthropic, and corporate institutions that are investing in our future, and they can spur the development of new discoveries. Boeing, for instance, funds a quantum creators program through the CQE that offers new avenues of support for scientists whose work is pushing the field in new directions.

Corporate partnerships benefit students, too, offering engagement opportunities that lead to hands-on experiences, help guide future career decisions, and open doors to jobs. These partnerships can provide training or access to specialized equipment or tools; the international quantum education described above includes efforts by IBM to facilitate classroom use of Qiskit, an open-source software development kit for working with quantum computers.

When UChicago launched the Chicago Quantum Exchange in 2017, creating a robust quantum ecosystem was key. We knew we couldn't scale quantum technologies, develop the future workforce, or drive a robust quantum economy without deep collaboration and an integrated approach. Over the years, we have seen the benefits of those partnerships in many ways, from the work of coalitions like The Bloch Quantum Tech Hub and the NSF Engine team to the funding of [postdoctoral research fellowships](#) to the expansion of opportunities for students pursuing careers in quantum technologies.

A few years ago, an undergraduate student at the University of Texas Rio Grande Valley who was part of the CQE's Open Quantum Initiative struck up a conversation with a CQE industry partner after presenting the quantum devices research he had done that summer at Argonne National Laboratory. The conversation ultimately led the student to an internship at HRL Laboratories. It was one of many such connections we have seen over the years. All have been important reminders that learning is about more than what happens in the classroom.

University education, academic research, and industry innovation are not siloed

projects — and nor should they be. By crafting responsible, mutually beneficial collaborations between university and industry research, we enhance both. We create an academic world that is as connected as the real world, opening up new opportunities for exploration and innovation.

In doing so, we expand our thinking, our experiences, and ultimately, our future.

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