Bridging the Gap Between QIS Education and Industry

Executive Summary

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The University of Copenhagen (UCPH) and the Technical University of Denmark (DTU) collaborate to offer the two-year MSc in Quantum Information Science (QIS), a program designed to equip students with expertise in a field poised to revolutionize sectors like computing, cryptography, materials science, and logistics. Despite its potential, there is a significant gap between industry adoption and QIS education. To address this, the 16-member QIS-Industry Advisory Board convened in September 2025 to explore opportunities, obstacles, and solutions for incorporating QIS graduates into the workforce. Ten members from the industry and six representatives from UCPH and DTU make up the board. This summary presents their insights and proposes steps to match education with industry needs.[1]

Barriers and opportunities for QIS graduates entering industry

Key Barriers

Graduate potential is often underestimated because recruiters and businesses are not familiar with QIS competencies. One member observed that "Industry does not know the QIS programme and thus does not know what they get if they hire a QIS graduate." With unclear career paths, quickly evolving technology, and a preference for hiring PhD-level candidates over MSc graduates, the quantum industry is still in its infancy. Graduates frequently lack the practical skills required by industry sectors that are not taught in the curriculum, such as embedded programming, hardware knowledge, commercialisation, and soft skills. Additionally, businesses are not yet shaping QIS curricula to align with their needs, creating a mismatch between education and industry expectations.

Key Opportunities

Graduates in QIS can potentially become highly marketable in high-growth areas and contribute to the adoption of quantum technology in industries lacking expertise. One member noted, "QIS students have a strong background in understanding the context and setting the direction for quantum developments in industry." Opportunities exist for Application Developers (creating tools, compilers, and open-source software) and Ecosystem-Builders (bridging quantum and domain-specific problems). In partnership with academic institutions and research centres, graduates can also participate in R&D projects and set the course for quantum advancements.

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[1]This summary is based on the board members' responses to three questions: "What do you see as the biggest opportunities and barriers for QIS graduates entering industry?", "How is the need for quantum-related competencies evolving in your field?", and "What do you see as the most value-adding input, contact or similar from the industry?"

An Evolving Need for Quantum-Related Competencies

The need for expertise in quantum metrology, materials, photonics, and HPC+QC integration is driving up spending on quantum research and development. Professionals with a combination of quantum expertise, entrepreneurship, business development, and system engineering are sought after by industry. One member said that, “There’s a particular need for people with cross-disciplinary skills, combining quantum physics with entrepreneurship and management.” Furthermore, hands-on skills in error mitigation, hybrid computing, and real-world application development are becoming more and more important.

Due to a lack of knowledge about quantum's potential and maturity, the industry in Denmark is adopting it slowly and creating few job opportunities. Potential early adopters risk missing out on advances in computing, sensing, and materials science if they don't have a pipeline of experts who understand quantum technology.

Industry Recommendations

- Increased industry visibility, such as company talks, career path discussions, and clear communication of skill expectations, can influence education and student preparation. This would give students the possibility to be exposed to real-world workflows and gain practical experience through internships, mentorships, and collaborative projects.

- Industry input on curricula and career paths guarantees that they are in line with market demands. Encouraging students to engage directly with industry through events like site visits and networking gatherings demystifies industry roles and fosters relationships.

QIS Education Recommendations

- To close skill gaps, co-develop curricula with industry input. Increase the number of internships and collaborative research projects to obtain practical experience.

- Make a catalog of quantum use cases that showcases student contributions to business issues.

- Plan networking events to improve direct interaction and make career pathways more clear.

- Increase demand for QIS graduates by educating the industry about quantum's potential and timeline.

Key Actions

- **Important steps for QIS students are**: To obtain practical experience, look for industry projects and internships. To meet possible employers and learn about their needs, go to networking events.

- **Important steps for industry are**: Collaborate with QIS programs to provide opportunities for joint research, mentorship, and internships. Tell academics about your talent needs so they can help shape the curriculum. Showcase success stories to demonstrate the value of QIS graduates.