TRAINING AND EDUCATION

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ADVANCING TOGETHER

A Unified Strategy for Scaling Midwest Quantum Talent

CHICAGO
QUANTUM
EXCHANGE

AWARENESS
PREPARATION
MOBILITY
EMPLOYER LEADERSHIP
COORDINATION

Above: Students worked in quantum research labs at Northwestern University during Summer 2025 as part of the CQE-led Open Quantum Initiative Undergraduate Fellowship. Credit: Anne Ryan for the Chicago Quantum Exchange.

On the cover: Scientists work in a lab at Argonne National Laboratory, which leads several regional workforce efforts including internships, coops, and summer schools across the Argonne Quantum Institute and Q-NEXT, a US Department of Energy National Quantum Information Science Research Center led by Argonne.

If you have questions, please contact quantum@uchicago.edu.

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EXECUTIVE SUMMARY

Anchored by leading research universities, national laboratories, advanced manufacturing capacity, and a large higher education system, the Illinois-Wisconsin-Indiana region has developed one of the most concentrated ecosystems for quantum research, education, and workforce development in the world. Universities across the three states collectively graduate roughly 2,200 PhD students and 14,000 master's students annually in disciplines relevant to quantum technologies, including electrical engineering, computer science, physics, and materials science. Undergraduate institutions across the region produce more than 31,000 degrees annually in quantum-relevant disciplines, while community and technical college systems collectively serve over one million learners, creating multiple entry points into engineering, computing, and technical careers.

As quantum technologies transition from research to commercialization, workforce demand is expected to expand significantly. A National Science Foundation–supported analysis estimates that 80,000 – 191,000 quantum-related jobs could emerge across Illinois, Wisconsin, and Indiana by 2035, spanning research, engineering, manufacturing, and supporting technical occupations. Notably, more than 70% of these roles are projected to be accessible without a graduate degree, underscoring the importance of coordinated workforce pathways.

With these strengths, the region faces key opportunities to focus its education and workforce systems on these critical and emerging needs. Awareness of quantum careers remains limited among students and educators, access to quantum-related coursework varies widely across institutions, and pathways between education, research environments, and employment remain fragmented. Without stronger coordination, the Midwest risks underutilizing its talent pipeline at a moment when global competition in quantum technologies is accelerating.

This report outlines a regional workforce strategy built around five strategic priorities designed to strengthen the quantum talent pipeline across Illinois, Wisconsin, and Indiana:

1. **Awareness:** Expand early exposure to quantum science and careers through K–12 outreach, teacher professional development, and public engagement initiatives that build interest and strengthen STEM preparation.
2. **Preparation:** Increase access to undergraduate coursework, hands-on research experiences, and shared experimental infrastructure to ensure students across a wider range of institutions build quantum-relevant skills.
3. **Mobility:** Reduce barriers between educational stages and employment by strengthening transfer pathways, expanding fellowships and internships, and scaling experiential learning opportunities that connect learners to research institutions and employers.
4. **Employer Leadership:** Align workforce development with industry needs through regional employer collaboratives and Talent Pipeline Management strategies that coordinate engagement across institutions.
5. **Coordination:** Establish shared regional structures, data systems, and partnerships to align programs, investments, and workforce outcomes across state lines.

Together, these priorities position the Midwest to move beyond strong individual programs toward a coordinated regional quantum workforce system. By aligning universities, national laboratories, community colleges, industry partners, and workforce agencies, the region can scale talent development, accelerate innovation, and ensure that the growth of the quantum economy translates into broad and lasting economic opportunity.

THE ACTION PLAN: FIVE KEY PRIORITIES

This action plan outlines a set of coordinated strategies designed to strengthen the region's quantum talent pipeline across Illinois, Wisconsin, and Indiana. Rather than creating entirely new programs, the plan focuses on connecting and scaling existing efforts, reducing barriers between institutions and career stages, and ensuring that learners and employers can navigate the emerging quantum ecosystem more effectively. The specific actions described in the following sections are intended to guide collaboration among educators, workforce organizations, research institutions, industry partners, and public agencies, helping the region translate its scientific leadership into long-term workforce capacity and economic growth.

Top: Students view a dilution refrigerator as part of the US Quantum Information Science Summer School, hosted at the US Department of Energy's Fermi National Accelerator Laboratory in 2023. Credit: Fermilab.

Left: Stacia Edwards, Deputy Provost at City Colleges of Chicago, speaks with other educators at the Quantum Education & Policy Summit, which convened quantum industry and education leaders from around the US. Credit: Greg Dohler / Asico Photo.

Right: A student and her instructors work in a lab during the Quantum Sensing Summer Program, which brings local high school students into labs at Chicago State University and other local institutions to learn about quantum technology. The program is administrated through the National Science Foundation Quantum Leap Challenge Institute for Quantum Sensing for Biophysics and Bioengineering (QuBBE), of which CSU is part. Credit: Anne Ryan for the CQE.

AWARENESS

Quantum careers remain unfamiliar to many students, families, educators, and community partners across the Midwest, particularly outside research-intensive environments. As a result, students often rule out quantum pathways early, well before they have the academic preparation or information needed to make informed choices. Early, accessible awareness is critical to broadening participation in quantum while strengthening the foundational STEM preparation these careers require.

This strategic priority aims to develop visible, motivating entry points that introduce students and educators to quantum concepts, applications, and career pathways. By anchoring early exposure in concrete examples of how quantum connects to real-world problems, awareness-orientated action items will help students and caretakers understand what quantum is, who works in the field, and how strong preparation, especially in mathematics and core STEM subjects, supports access to quantum opportunities.

WHY: A 2024 survey of undergraduate STEM students showed that most students "know very little about quantum," despite general interest in related careers, indicating an awareness gap early in the STEM pipeline.

ACTION ITEMS

1. **Align quantum-focused professional development for teachers with regional and state-level requirements for educators across Illinois, Wisconsin, and Indiana to support accurate, engaging introduction of quantum concepts and careers.**
2. **Coordinate early exposure efforts across classroom and extracurricular opportunities so students encounter quantum-related learning experiences at multiple points across grade levels and settings, creating a clear pathway from interest to experience.**
3. **Establish a Quantum Teaching Center of Excellence to align and convene quantum-focused teacher preparation across the region, helping to build a community of practice across K–12 STEM teachers.**
4. **Develop and deliver cross-agency training for workforce professionals to ensure they are equipped to connect jobseekers and incumbent workers to available education, training, and career opportunities.**
5. **Use participation and outreach data to identify gaps in access to early quantum exposure and refine engagement strategies.**

HOW: Regional education initiatives currently reach 17,000+ students in classrooms, with an additional 16,000+ students participating in out-of-school activities, providing a strong foundation to scale across the region.

OUTCOMES: As a result of these actions, hundreds of teachers and workforce professionals across Illinois, Wisconsin, and Indiana will be prepared to introduce quantum concepts, reaching thousands of students earlier in the pipeline and increasing the share who remain on track in math-intensive STEM pathways relevant to quantum careers.

PREPARATION

As awareness of quantum careers grows, learners need accessible ways to begin building relevant skills through coursework and experiences. Across the Midwest, quantum preparation is emerging through undergraduate courses, short-term programs, and internships, but access varies widely by institution and geography. Without clearer visibility and coordination, college students who are interested in quantum may struggle to identify how to prepare or where to start.

The preparation priority focuses on supporting and expanding postsecondary preparation for quantum careers to ensure that undergraduates at 2- and 4-year institutions can access foundational preparation, understand how it connects to roles in the quantum workforce, and take next steps into further study or employment.

WHY: A 2025 analysis of 1,456 U.S. higher-education institutions found that roughly one-third do not offer a single course mentioning quantum, and dedicated QISE courses are concentrated primarily at PhD-granting universities, highlighting stark inequities in access that limit broader student preparation and reinforce the need for more distributed quantum course options.

ACTION ITEMS

1. **Support the delivery and expansion of undergraduate quantum-related courses and modules across institutions, including introductory and application-focused offerings that provide early entry points for students, with a specific focus on community and technical colleges, liberal arts institutions, and rural-serving institutions.**
2. **Establish a shared-access framework for quantum experimental set-ups and specialized equipment, enabling students from institutions without dedicated infrastructure to participate in structured, hands-on training through coordinated regional partnerships.**
3. **Increase access to applied learning experiences, including internships, lab-based projects, and research experiences, to build practical skills alongside coursework.**
4. **Coordinate visibility of preparation opportunities regionally, making it easier for students to identify relevant courses, programs, and experiences regardless of institution.**

HOW: With roughly 600 courses teaching quantum concepts across the region, the Midwest already supports a substantial population of students with early quantum exposure, positioning programs like the Open Quantum Initiative to scale hands-on research and workforce-aligned training.

OUTCOMES: Learners across the rural and urban areas across all three states have clearer, more consistent access to coursework and applied experiences that build foundational quantum skills and position them for successful transitions into advanced training, research, and employment.

MOBILITY

Even with exposure to quantum topics, courses, and training, individuals encounter friction at key transition points: transferring between institutions, into research-intensive environments, or toward employment. For students at two-year colleges, transfer pathways into major research universities can be informal or opaque. Funding for students looking to continue their training in a master's degree or PhD program is unevenly distributed. And, for current members of the workforce, it can be challenging to find affordable opportunities to learn new skills and develop an understanding of a complex topic such as quantum. These gaps limit who advances and how effectively talent connects to opportunity across the Midwest, creating a bottleneck that negatively impacts economic development and growth.

The mobility priority focuses on enabling movement across the quantum ecosystem by making pathways into research institutions, graduate training, and employment more visible, supported, and navigable. The goal is to reduce friction at critical transition points while aligning student readiness with the needs of employers and research partners across the region.

WHY: A 2025 QED-C report notes the quantum talent pipeline currently suffers from gaps in practical training, mentorship, and clear career pathways and explicitly calls for scalable experiential learning models, apprenticeships, and tailored educational pathways to strengthen workforce readiness for critical quantum-related positions.

ACTION ITEMS

1. **Formalize transfer pathways into major Midwest research institutions for quantum-relevant fields, including clear guidance on course alignment, advising handoffs, and research entry points for transfer students.**
2. **Expand funded graduate fellowships, internships, and research placement opportunities that support transitions into advanced quantum training, particularly for students from institutions with limited research infrastructure.**
3. **Deploy coordinated regional opportunities for universities, colleges and two-year institutions to partner on training, structured professional development, employer engagement, and career navigation, and aligned with capstone recruiting events and programs.**
4. **Develop coordinated pre-, during-, and post-apprenticeship supports for quantum and quantum-related roles, including pre-apprenticeship readiness programming, structured mentorship and employer engagement during apprenticeship, and post-completion advancement pathways into higher-skill technical or supervisory roles.**
5. **Scale technical quantum upskilling for STEM professionals alongside applied quantum literacy courses for policy, education, business, and public service professionals to expand the technical workforce while strengthening the region's capacity to coordinate and scale the quantum ecosystem.**

HOW: The Quantum Recruiting Forum already attracts 600+ jobseekers, making it the largest in-person gathering of quantum talent in the nation.

OUTCOMES: Learners experience clearer, supported transitions into research, graduate study, and employment, while employers and research institutions gain access to a broader, better-prepared quantum talent pool drawn from across the Midwest.

EMPLOYER LEADERSHIP

The Midwest has a dense concentration of employers, research institutions, national laboratories, and education providers engaged in quantum, but too often these stakeholders operate in parallel rather than as a coordinated system. Employers face repeated, fragmented engagement requests, institutions duplicate effort, and learners experience uneven access to opportunities depending on where they are enrolled. Without stronger integration, the region risks inefficiency and missed opportunities, even as investment and activity increases.

The employer leadership priority focuses on integrating industry, research institutions, and education partners into a more coordinated regional ecosystem for quantum workforce development. By leveraging the US Department of Commerce Foundation's Talent Pipeline Management framework, the goal is to ensure that employer engagement, research access, and education pathways are aligned across institutions, reducing duplication, improving clarity for learners, and increasing the return on investment for employers and participating organizations.

WHY: A U.S. Department of Labor (DOL) brief found that employers choose to participate in regional workforce partnerships because those collaboratives help align training with employer needs, address shifting skill demands, and sustain engagement, suggesting that coordinated regional collaboratives are more effective than isolated, duplicated efforts.

ACTION ITEMS

1. **Build a quantum employer collaborative to coordinate employer engagement across the Midwest with education partners, align expectations around roles and skills, and reduce duplicative outreach across institutions.**
2. **Collaborate with state and regional business attraction teams and workforce agencies to integrate workforce development into incentive and policy strategies, ensuring that employer recruitment efforts are matched with proactive, data-informed talent pipeline planning.**
3. **Create shared access points to employer and research opportunities, enabling students from a range of institutions to participate in site visits, research experiences, and employer-led programming regardless of home campus.**
4. **Use integrated planning and feedback mechanisms to ensure insights from employers and research partners inform preparation, mobility, and professional development activities across the system.**
5. **Build a full-scale regional quantum talent agency to support employers and jobseekers with recruitment, career advancement, and retention, ensuring talent remains and grows within the Midwest quantum ecosystem.**

HOW: Across Illinois, Wisconsin, and Indiana, more than a dozen employer-led workforce collaboratives are already operating across advanced manufacturing, construction, aerospace, and information technology, providing an existing foundation for aligning talent pipelines with emerging quantum industry needs.

OUTCOMES: Employers and research institutions engage with a more coordinated, efficient regional workforce system, while learners gain clearer, more equitable access to quantum opportunities across institutional boundaries.

COORDINATION

A regional quantum workforce system cannot function effectively without shared coordination, visibility, and feedback across secondary and post-secondary institutions, employers, community partners, and states. As activity scales across the Midwest, the risk is fragmentation rather than lack of effort. Coordination ensures that investments are aligned, partnerships are leveraged, and the system can adapt and grow as needs evolve.

The coordination priority focuses on the structures that enable alignment and shared direction across Illinois, Wisconsin, and Indiana, supporting collaboration without centralizing control, and ensuring the region operates as a coherent system rather than a set of parallel efforts.

WHY: Research on regional talent partnerships shows that collaborative, cross-sector approaches that align education with employer demand not only strengthen workforce readiness and career pathways but also attract broader investment and support inclusive economic growth.

ACTION ITEMS

1. **Leverage regional conveners to align education, workforce, employer, and research partners across all three states.**
2. **Coordinate collaborative funding and resource development, building on existing practice to pursue grants and investments jointly across institutions and states.**
3. **Develop a shared set of indicators to track and publish participation, progression, and outcomes across pathways, including establishing benchmarks and reporting conventions that enable tracking across the US.**
4. **Create regular feedback loops with employers, educators, and learners to inform adjustments to exposure, preparation, mobility, and integration activities over time.**
5. **Explore opportunities to collaborate with additional Midwestern states to expand the reach of quantum workforce and economic development.**

HOW: The Chicago Quantum Exchange serves as the coordinating hub for the Midwest quantum ecosystem, bringing together universities, national laboratories, and industry partners to collaborate on workforce development programs and multi-institution quantum initiatives.

OUTCOMES: Partners across the Midwest operate with shared visibility and coordination, enabling more strategic investment, stronger partnerships, and a quantum workforce system that is aligned across state lines and positioned to scale.

Above: A lab at the University of Chicago’s Pritzker School of Molecular Engineering, which launched one of the first PhD programs in quantum science and engineering.

REGIONAL ASSETS

Across the Midwest, research-intensive universities and national laboratories have established one of the most concentrated quantum research ecosystems in the United States. Institutions including the University of Chicago, the University of Illinois Urbana-Champaign, Northwestern University, Purdue University, and the University of Wisconsin–Madison work in close partnership with Argonne National Laboratory and Fermi National Accelerator Laboratory to anchor the region's quantum research and workforce infrastructure. The region hosts four federally funded quantum research centers and a designated Tech Hub of the US Economic Development Administration, The Bloch Quantum, a cross-sector coalition that leverages Midwest assets to drive US leadership in quantum technologies. Together, these initiatives connect institutions and industry partners across Illinois, Wisconsin, and Indiana and provide shared infrastructure for research, technology translation, and workforce development.

This research ecosystem is supported by a deep and diverse talent pipeline. Universities across Illinois, Wisconsin, and Indiana collectively graduate roughly 2,200 PhD students and 14,000 master's degree students annually in disciplines such as electrical engineering, computer science, physics, and materials science. These programs feed into one of the largest concentrations of quantum-relevant research and development activity in the world. Colleges across the region also produce more than 31,000 undergraduate degrees annually in quantum-relevant disciplines, forming the core pipeline into graduate study and quantum research careers. Community and technical college systems across the three states further strengthen this pipeline. Across Illinois, Wisconsin, and Indiana, these systems collectively serve more than one million learners across degree and non-degree programs, providing entry points into engineering and technical programs and acting as key transfer partners for students continuing into four-year institutions. These pathways expand access to the engineering, computing, and physical science disciplines that underpin the quantum workforce.

Above: A quantum lab at the University of Wisconsin–Madison. Credit: Paul Gero for the CQE.

The scale of the region's workforce opportunity is also substantial. A National Science Foundation-funded analysis conducted through the Chicago Quantum Exchange estimates 80,000 – 191,000 quantum-related jobs could emerge across the Illinois-Wisconsin-Indiana region by 2035, spanning roles in research, engineering, manufacturing, and supporting technical occupations. Notably, more than 70% of these roles are projected to be accessible to workers without graduate degrees, underscoring the importance of coordinated workforce pathways across universities, community colleges, and industry partners. In addition to college-led training programs, the Midwest benefits from a growing set of state-led and regional workforce initiatives designed to expand participation in technology careers. These initiatives complement university-based programs and industry partnerships, helping align workforce training with the needs of emerging technology sectors.

Together, this combination of federally funded research centers, national laboratory infrastructure, strong university training pipelines, and large-scale community college and workforce systems positions the Midwest as one of the most robust regions in the world for developing the quantum workforce. The region's ecosystem spans the full talent pipeline, from early exposure and technician training to advanced graduate education and research careers. Building on this foundation, the Midwest has a unique opportunity to move from strong individual programs toward a more coordinated regional strategy. By aligning institutions, workforce systems, industry partners, and public investments, the region can take its quantum ecosystem in new directions, scaling talent development, accelerating innovation, and ensuring that the growth of the quantum economy translates into broad and lasting economic opportunity across the Midwest.

WORKFORCE IMPACT | Detailed breakdown of roles by job type

"Low" scenario for jobs created or requiring quantum upskilling

Number of jobs by role type (1000s)

Category	Role type	2027	2030	2035
R&D	Scientist	<1	2	9
	Engineer	1	3	17
	Technician	<0.5	1	9
Business/ translation	Applied scientist	Few	<0.5	24
	Consultant	Few	<0.5	1
	Support	<0.5	1	8
Adjacent	Constr./Manuf.	1	2	12
Total		3	10	80

"High" scenario for jobs created or requiring quantum upskilling

Number of jobs by role type (1000s)

Category	Role type	2027	2030	2035
R&D	Scientist	2	6	26
	Engineer	3	10	52
	Technician	<1	3	26
Business/ translation	Applied scientist	Few	<1	26
	Consultant	Few	<0.5	3
	Support	<1	3	23
Adjacent	Constr./Manuf.	2	7	35
Total		9	29	191

THE OPEN QUANTUM INITIATIVE

The Open Quantum Initiative (OQI) is a national undergraduate research fellowship that brings talented students from across the United States to the Midwest for hands-on research and professional development in quantum science and engineering. Through partnerships with universities, national laboratories, and quantum companies across Illinois, Wisconsin, and Indiana, OQI places fellows in research environments where they gain experience working on real quantum projects while building connections across the regional ecosystem.

By recruiting students nationally and placing them with research groups and employers across Illinois, Wisconsin, and Indiana, the OQI introduces emerging talent to the Midwest's quantum ecosystem and creates pathways to graduate study and regional careers. The program intentionally recruits broadly, with one-third of fellows coming from high-access institutions such as community colleges and universities serving large numbers of Pell Grant recipients. Outcomes show strong impact: 92% of fellows report improved understanding of quantum science and 80% see themselves pursuing quantum careers. Among alumni who have graduated, 63% have gone on to master's or PhD programs and 19% have secured full-time roles in quantum and related STEM fields. OQI strengthens the Midwest's quantum talent pipeline while increasing national awareness of the region as a leading destination for quantum research, training, and careers.

QUANTUM DEGREE AND TRAINING PROGRAMS IN THE MIDWEST

Doctoral Programs

- University of Chicago — PhD in Quantum Science and Engineering

Master's Programs

- University of Chicago — MS in Quantum Engineering
- Indiana University Bloomington — MS in Quantum Information Science
- University of Wisconsin–Madison — MS Physics: Quantum Computing
- Northwestern University — MS in Electrical and Computer Engineering with specialization in Quantum Computing, Sensing & Communications

Undergraduate Degrees and Concentrations

- University of Chicago — BS Track in Quantum Engineering
- Purdue University West Lafayette — BS Electrical Engineering with concentration in Quantum Technology
- Purdue University Fort Wayne — BS Physics with concentration in Optoelectronics and Photonics

Certificates, Minors, and Credentials

- University of Chicago — Certificate in Quantum Science, Networking, and Communications
- Purdue University West Lafayette — Undergraduate Certificate in Quantum Information Science & Technology
- Chicago State University — Certificate & Minor in Quantum Information Science & Engineering
- Purdue University (Online) — MicroMasters in Quantum Technology: Computing and Sensing

A quantum lab at Chicago State University. Credit: Anne Ryan for the CQE.

ILLINOIS

Illinois enters the next phase of quantum workforce development with one of the largest and most comprehensive talent ecosystems in the country. Anchored by world-class research universities, federally funded quantum research centers, national laboratories, a strong public higher education system, statewide community college infrastructure, secondary education engagement, and coordinated economic development leadership, Illinois has built a vertically integrated workforce pipeline spanning early exposure through advanced degrees, supporting career development across research, engineering, manufacturing, and commercialization.

At the research level, Illinois institutions lead two of the inaugural NSF-funded Quantum Leap Challenge Institutes — HQAN led by the University of Illinois Urbana-Champaign, and QuBBE led by the University of Chicago — and two US Department of Energy National Quantum Information Science Research Centers — SQMS at Fermilab and Q-NEXT at Argonne National Laboratory. Together, these centers anchor cutting-edge quantum research while investing directly in workforce development, training programs, and public engagement. Their consortia-based structures connect universities, laboratories, and industry partners, strengthening both discovery and talent preparation.

Illinois has built one of the nation's strongest ecosystems for quantum education and training, led by research universities and their dedicated quantum research centers. The University of Chicago established one of the nation's first quantum-focused PhD programs and, through the Chicago Quantum Institute, supports graduate, master's, and undergraduate training that prepares students for leadership in quantum science and engineering, including industry-funded PhD fellowships. The University of Illinois Urbana-Champaign's Grainger College of Engineering trains engineering talent at significant scale through top-ranked programs in physics, mechanical engineering, electrical engineering, and computer science, with coordination through the Illinois Quantum Information Science and Technology Center (IQUIST). Northwestern University contributes doctoral and research-intensive training across materials science, applied physics, and related disciplines through the Institute for Quantum Information Research and Engineering (INQUIRE). Collectively, these institutions provide depth in both foundational science and translational research.

Illinois' public university system extends workforce development capacity statewide. The University of Illinois Chicago, Chicago State University, Northern Illinois University, Illinois State University, and Western Illinois University each contribute quantum-related research, coursework, and applied learning initiatives that reach broad and diverse student populations. Their geographic distribution ensures that quantum education and workforce preparation are not confined to flagship campuses but are accessible across urban, suburban, and rural communities. Private institutions, including Monmouth College, Augustana College, Illinois Wesleyan University, and the Illinois Institute of Technology, offer courses that cover quantum concepts, as well as broader, foundational training in physics and computer science. Illinois' distributed institutional presence strengthens the state's ability to scale participation while advancing inclusive access to emerging fields.

The Illinois Community College System further amplifies this reach. With 45 community colleges serving approximately half a million for-credit students annually and nearly one million residents overall, the system provides statewide access to foundational STEM education and technical training. Strong transfer pathways statewide demonstrate how community colleges can serve as structured on-ramps to bachelor's-level engineering degrees. As demand grows for engineers prepared at the bachelor's level, Illinois' statewide transfer model represents a scalable mechanism for expanding talent while maintaining affordability and access.

Early exposure initiatives reinforce the state's educational backbone. Saturday Morning Quantum at Fermilab connects high school students to quantum concepts and career pathways at formative stages, helping demystify advanced science and build confidence in the mathematics and STEM preparation required for quantum fields. Broader public engagement initiatives, including LabEscape, the Public Quantum Network, and programming through the STAGE Center and EPiQC, extend awareness through innovative outreach experiences that make quantum science tangible for students, families, and educators across the state. These efforts strengthen the front end of the talent pipeline while increasing statewide visibility of quantum careers.

Illinois' ecosystem is further anchored by Argonne National Laboratory and Fermilab, both global leaders in quantum research and advanced science. These laboratories provide not only discovery environments but also research placements, internships, and industry partnerships that directly integrate education and workforce development with federally funded research priorities. Their presence strengthens connections between undergraduate preparation, graduate training, and applied innovation.

Commercialization and employer growth reinforce this foundation. The Illinois Quantum and Microelectronics Park (IQMP) is designed to support quantum company scale-up and ecosystem co-location, linking research, manufacturing, and workforce preparation, with companies already beginning to make regional hiring commitments. As the IQMP is being built, on-ramp facilities throughout Chicago help to support early engagement and create training and job opportunities. Duality, the nation's first quantum-focused startup accelerator, supports early-stage company formation and talent attraction. P33 contributes to the broader technology ecosystem by aligning inclusive economic growth strategies, employer engagement, and competitiveness initiatives across the region. Together, these entities help translate research strength into employer growth and high-skill job creation.

State-supported workforce infrastructure further strengthens readiness for quantum-enabled manufacturing and supply chain roles. The Illinois Department of Commerce & Economic Opportunity's Manufacturing Training Academies invest in community-college-based facilities and equipment for hands-on training in advanced manufacturing, precision machining, and related technical skills. Recent capital investments to expand this network demonstrate a sustained commitment to preparing residents for high-quality technical careers aligned with emerging industries.

Taken together, Illinois' research centers, public universities, community colleges, national laboratories, commercialization platforms, and workforce infrastructure form a coordinated ecosystem capable of supporting quantum workforce growth at multiple entry points. The state's combination of research depth, institutional scale, geographic reach, and aligned economic development assets positions Illinois to sustain and expand its leadership in the quantum economy in the years ahead.

ENGINEERING PATHWAYS: A STATEWIDE TRANSFER ENGINE FOR ENGINEERING TALENT

As Illinois prepares for projected growth in quantum-related roles, many of which require bachelor's-level engineering preparation, Engineering Pathways provides a scalable, proven model for expanding the state's engineering talent pipeline while maintaining access and affordability across the community college system.

Engineering Pathways is a cohort-based transfer program that provides students beginning at any Illinois community college with a streamlined route into the University of Illinois Urbana-Champaign's Grainger College of Engineering. Students who successfully complete articulated coursework and program requirements are guaranteed admission to their first-choice engineering major.

The Engineering Pathways program combines personalized advising, cohort-based learning, major exploration, and structured academic planning to ensure credits transfer smoothly and students complete foundational coursework at lower cost and with targeted support. Open to students statewide, Engineering Pathways has demonstrated strong completion and transfer outcomes, with a 92% transfer degree completion rate.

ILLINOIS INSTITUTIONS WITH QUANTUM COURSES

- Bradley University
- Chicago State University
- DePaul University
- Dominican University
- East-West University
- Elgin Community College
- Elmhurst University
- Greenville University
- Illinois Institute of Technology
- Illinois State University
- Lewis University
- Loyola University Chicago
- Moraine Valley Community College
- North Central College
- North Park University
- Northeastern Illinois University
- Northern Illinois University
- Northwestern University
- Olive-Harvey College
- Olivet Nazarene University
- Roosevelt University
- Saint Xavier University
- Southern Illinois University-Carbondale
- Southern Illinois University-Edwardsville
- University of Chicago
- University of Illinois Chicago
- University of Illinois Urbana-Champaign
- University of St Francis
- Waubonsee Community College
- Western Illinois University
- William Rainey Harper College

Above: The University of Illinois Urbana-Champaign's Public Quantum Network launched in 2023 at the Urbana Free Library to expand awareness of quantum technologies. Visitors of all ages can run hands-on quantum measurements and explore phenomena like entanglement for themselves. Credit: Lloyd DeGrane for the CQE and IQUIST.

Above: A quantum lab at the University of Wisconsin–Madison. Credit: Paul Gero for the CQE.

WISCONSIN

Wisconsin's assets for developing the quantum workforce combine research leadership, statewide workforce infrastructure, and growing industry activity that together support talent development across multiple entry points. The Wisconsin Quantum Institute (WQI) at the University of Wisconsin–Madison sits at the center of these efforts, coordinating quantum research and education across disciplines while preparing students for emerging careers in quantum computing, sensing, and related technologies. WQI also supports the nation's first professional Master of Science degree in Quantum Computing, which combines graduate coursework with hands-on research experience and exposure to real-world applications.

This research and education foundation is reinforced by a growing set of companies operating in quantum and quantum-adjacent domains within the state. Firms such as Dirac Labs, Qolab, and Mad City Labs reflect activity in quantum sensing, computing, and precision instrumentation, while companies like Infleqtion maintain a regional presence through offices and research partnerships. FlexCompute contributes to the broader advanced computing landscape that supports simulation and design in quantum-adjacent applications. Together, these companies create opportunities for students and researchers to engage with industry, gain applied experience, and transition into technical and scientific roles.

Wisconsin's workforce pipeline is reinforced by the Wisconsin Technical College System (WTCS), the largest higher-education system in the state. WTCS includes 16 public technical colleges serving nearly 294,000 enrollments annually, providing workforce training in engineering technologies, advanced manufacturing, information technology, and related technical fields. Workforce outcomes demonstrate the strength of the system: 93% of graduates seeking employment are employed within six months, 82% are working in jobs related to their training, and 93% of those reporting employment location remain in Wisconsin, helping retain technical talent within the state. Because WTCS campuses are distributed across urban and rural communities, the technical college network enables students from rural communities to enter engineering and technical career pathways that support advanced industries, including quantum technologies. Several institutions within the WTCS contribute directly to advanced technology training. Gateway Technical College offers programs in engineering technologies, robotics, and advanced manufacturing that support emerging industries, while the Milwaukee School of Engineering (MSOE) adds additional engineering capacity through applied engineering programs and strong partnerships with regional employers. Madison Area Technical College (MATC) has received funding from the U.S. Economic Development Administration to expand workforce training infrastructure and develop new pathways aligned with advanced technology industries.

Employer-led workforce strategies further strengthen alignment between training and industry demand. Wisconsin supports registered apprenticeships in information technology and related fields, alongside Wisconsin Fast Forward grants that fund employer-driven training, equipment investment, and educator development. State and regional workforce entities, including the Council on Workforce Investment, local workforce development boards, and Job Center of Wisconsin Business Services, serve as connectors between employers, education providers, and job seekers, helping align training programs with workforce needs and supporting career entry and advancement.

Industry collaboration and technology development are also supported through statewide convening and investment organizations. The Wisconsin Technology Council provides a platform for collaboration across business, investment, and research communities, while the recently launched Wisconsin Frontier Technology Consortium, supported by a $950,000 grant from the Wisconsin Economic Development Corporation, brings together universities, technical colleges, startup accelerators, and industry partners to accelerate development in frontier technologies, including quantum computing and sensing.

Wisconsin also invests in early workforce exposure to build long-term STEM pipelines across the region. Programs such as Wonders of Quantum Physics, developed at UW–Madison, introduce quantum concepts to K–12 classrooms through hands-on learning kits and teacher training initiatives that help educators bring quantum science into middle- and high-school STEM education.

Together, Wisconsin's research leadership at UW–Madison, statewide technical college system, entrepreneurial research environment, and early STEM pipeline initiatives create a workforce ecosystem capable of supporting the growth of quantum technologies. These assets position Wisconsin to train talent across research, engineering, and technical roles while expanding access to emerging technology careers across both urban and rural communities.

WONDERS OF QUANTUM PHYSICS: HANDS-ON QUANTUM EXPLORATION ACTIVITIES

The Wonders of Quantum Physics program, developed by the University of Wisconsin–Madison, introduces elementary, middle, and high school students to core concepts in quantum science through hands-on classroom activities. Created in partnership with the Hybrid Quantum Architectures and Networks (HQAN) NSF Quantum Leap Challenge Institute (QLCI), the program provides educators with ready-to-use instructional materials designed to make complex quantum ideas accessible to students.

To expand access beyond local programs, Wonders of Quantum Physics ships classroom kits directly to schools, enabling educators across the region to conduct experiments and demonstrations without specialized equipment or prior expertise in quantum science. Each kit includes materials for multiple classroom activities, along with teacher guides and supporting resources.

In 2025, 100+ classrooms across the region received Wonders of Quantum Physics kits, reaching 6,200+ students. By combining teacher support with physical classroom materials, the Wonders of Quantum Physics kits help introduce quantum concepts earlier in the education pipeline and broaden participation in quantum science education across the Midwest.

WISCONSIN INSTITUTIONS WITH QUANTUM COURSES

- College of Menominee Nation
- Marquette University
- Milwaukee School of Engineering
- University of Wisconsin-Eau Claire
- University of Wisconsin-Green Bay
- University of Wisconsin-Madison
- University of Wisconsin-Milwaukee
- University of Wisconsin-Oshkosh
- University of Wisconsin-Platteville
- University of Wisconsin-River Falls
- University of Wisconsin-Stevens Point
- University of Wisconsin-Stout
- University of Wisconsin-Whitewater
- Viterbo University

Above: A tour of quantum labs at the University of Wisconsin–Madison. Credit: Paul Gero for the CQE.

Above: Purdue University’s Department of Physics and Astronomy hosted Quantum Open House 2025, an annual outreach event celebrating discovery and curiosity in quantum science. Students, educators, and community members experienced an afternoon filled with interactive demonstrations, lab tours, and conversations with Purdue scientists who are pushing the boundaries of quantum science and technology. Credit: Emily Kinsell for Purdue.

INDIANA

Indiana has made quantum technology a priority for workforce and industry growth through its Comprehensive Economic Development Strategy (CEDS), a state-level strategy to formally identify quantum technology as a targeted economic development sector, connecting research leadership with workforce preparation and industry growth and technical careers across computing, sensing, communications, and advanced manufacturing.

Indiana's Center for Quantum Technologies (CQT), an NSF Industry–University Cooperative Research Center, has brought together Purdue University, Indiana University, and the University of Notre Dame with industry partners to advance quantum computing, sensing, and communications. Purdue University's Quantum Science and Engineering Institute supports advanced research and experiential training that prepares students for careers in quantum science and engineering. Indiana University's participation in CQT reinforces their developing expertise in quantum information science, while the University of Notre Dame contributes physics research and STEM engagement initiatives that introduce students to emerging quantum applications. Rose-Hulman Institute of Technology strengthens Indiana's quantum workforce pipeline through hands-on undergraduate training in physics, optical engineering, and nanoengineering that aligns with quantum and related advanced technology careers. Together, Indiana's institutions create a distributed network of research laboratories and training environments that help prepare the next generation of scientists, engineers, and technical specialists.

The state's research ecosystem is reinforced by a strong innovation and commercialization environment. The Purdue Research Park network, including the flagship 725-acre park in West Lafayette, is the largest university-affiliated research park in the United States and hosts nearly 200 technology-focused companies, including Quantum Research Sciences, which focuses on quantum software for military applications. The nearby Discovery Park District integrates research facilities, startup incubators, and industry partnerships that provide students and researchers opportunities to work directly with companies translating emerging technologies into products and services. Purdue University Northwest's Roberts Impact Lab, currently under development in downtown Hammond, will house advanced manufacturing facilities, makerspaces, scientific laboratories, and a quantum computing testbed linked to the regional Bloch Quantum Tech Hub.

Indiana's workforce pipeline is supported by one of the largest technical education systems in the country. Ivy Tech Community College, the largest singly accredited institution in the United States which serves as Indiana's community college system, serves more than 200,000 students across 41 locations annually and provides workforce-aligned training in engineering technologies, advanced manufacturing, and applied technical fields that support emerging industries. The state also offers pathways for experienced professionals to transition into quantum-related roles. Purdue's Quantum MicroMasters program, a stackable online credential, provides graduate-level training in quantum technologies and allows professionals with prior technical experience to gain foundational knowledge in quantum systems, computing, and sensing.

Early-stage workforce development includes multi-state initiatives such as Innovation in Quantum Pedagogy, Application, and its Relation to Culture (IQ-PARC), a collaboration between Purdue University and Northwestern University that works with middle- and high-school STEM teachers to introduce quantum concepts into classrooms through professional development and hands-on instructional materials.

Indiana's industrial economy provides the applied workforce base needed to support quantum hardware and supply chains. The state has the highest concentration of manufacturing employment in the United States, with manufacturing accounting for roughly 17% of Indiana's workforce and more than one-quarter of the state's GDP. Advanced manufacturing and logistics together employ approximately one-quarter of the state's workforce, creating a strong foundation for roles in quantum hardware development, materials engineering, and specialized production.

ROBERTS IMPACT LAB: INNOVATION AND TRAINING CAPACITY

The Roberts Impact Lab at Purdue University Northwest (PNW) in Hammond will combine advanced manufacturing labs, makerspaces, and a quantum computing testbed connected to the Bloch Tech Hub to give students and regional companies hands-on access to emerging technologies. The lab builds on PNW's role as a regional workforce engine: graduates with bachelor's degrees from PNW earn about $22,200 more annually than workers with only a high-school diploma in Indiana. By linking applied laboratories with industry collaboration, the Impact Lab will expand opportunities for students and technical workers to gain hands-on experience with quantum technologies and prepare for roles in quantum engineering, computing, and advanced manufacturing.

INDIANA INSTITUTIONS WITH QUANTUM COURSES

- Ball State University
- Calumet College of Saint Joseph
- Goshen College
- Grace College and Theological Seminary
- Hanover College
- Indiana State University
- Indiana University-Bloomington
- Indiana University-Northwest
- Indiana University-Indianapolis
- Ivy Tech Community College
- Purdue University Fort Wayne
- Purdue University-Indianapolis
- Purdue University Northwest
- Purdue University-Main Campus
- Rose-Hulman Institute of Technology
- Taylor University
- Trine University
- University of Evansville
- University of Indianapolis
- University of Notre Dame
- University of Southern Indiana
- Valparaiso University
- Vincennes University

Above: Purdue's Quantum Open House. Credit: Emily Kinsell for Purdue.

NEXT STEPS

The strategy outlined in this report provides a framework for strengthening the Midwest quantum workforce across Illinois, Wisconsin, and Indiana. Moving from strategy to implementation will require sustained coordination among universities, national laboratories, employers, workforce agencies, and education partners across the region. The immediate next phase should focus on establishing shared structures for collaboration, expanding stakeholder engagement, and launching early actions that demonstrate progress while informing longer-term development.

First, the Chicago Quantum Exchange will convene a core group of workforce implementation partners representing research institutions, community and technical colleges, workforce organizations, employers, and state economic development leaders. This group would help prioritize near-term actions, identify institutions best positioned to lead specific initiatives, and ensure alignment with existing regional and state workforce strategies. Establishing clear points of contact across participating organizations will be critical to maintaining momentum and avoiding duplication of effort.

Second, the plan will be shared broadly across the Midwest quantum ecosystem to invite additional perspectives and participation. Expanding engagement to include educators, workforce development practitioners, employers, philanthropic partners, and policymakers will help refine the vision outlined here while building the coalition needed to implement it. Listening sessions, regional convenings, and targeted stakeholder briefings will also help surface practical insights about barriers, opportunities, and priorities across different parts of the ecosystem.

Third, partners will establish a lightweight but consistent reporting framework to track progress and ensure accountability. A shared set of indicators, such as participation in exposure programs, course enrollments, research placements, internships, apprenticeships, and employment outcomes, will provide visibility into how the regional workforce system is evolving. Regular updates will also help partners identify gaps, adjust strategies, and highlight successes that can attract further investment.

Finally, several early initiatives offer opportunities to begin implementation while the broader system takes shape. Near-term opportunities include expanding teacher professional development aligned with quantum education, improving visibility of quantum courses and regional training opportunities, streamlining transfer pathways, and launching a regional employer collaborative to better align workforce preparation with emerging industry demand. Starting with tangible projects will allow partners to test coordination models, build trust across institutions, and demonstrate the value of a regional approach.

Together, these next steps will help translate the strategy presented in this report into a living regional effort that continues to evolve as the quantum ecosystem grows. By building shared ownership, maintaining open communication, and aligning investments across institutions and states, the Midwest can position itself not only as a global center of quantum research, but also as a leader in developing the workforce that will power the quantum economy for the nation.

"We don't mind hiring young and teaching and training. We needed somebody who has got the creativity and a good way of thinking about how to approach problems."

— Jennifer Flatté, CEO and co-founder of QuantCAD

Above: Undergraduate and graduate students meet with employers at the annual Chicago Quantum Recruiting Forum. Photos by Anne Ryan and Lloyd DeGrane for the CQE.

ROLES IN THE QUANTUM WORKFORCE

In the short-term, scientists and engineers with experience remain in high demand across industry, academy, and government work. However, as quantum technologies continue to expand and commercialize, projections indicate a growing need for technicians capable of taking on more specific tasks, applied scientists and consultants to drive applications and end-use adoption, construction professionals to develop specialized facilities, and manufacturing professionals to support both the quantum supply chain and large-scale hardware production. Roles can be further clustered into research and development, business and operations, and construction and manufacturing.

Research and development roles span scientists, engineers, and technicians working across academia, government laboratories, and industry. Scientists bring advanced quantitative and programming expertise together with specialized theoretical, experimental, and computational research skills, and are distinguished by strong technical communication, independent problem-solving, and mentorship capabilities. Quantum engineers design, test, build, and implement quantum hardware and software systems, drawing on core technical foundations such as circuit design, signal processing, cryogenic engineering, advanced programming, and nanofabrication, with specialized strengths in hardware (e.g., precision engineering, measurement techniques) or software (e.g., machine learning, quantum programming languages). Technicians support these efforts by building, assembling, operating, testing, and maintaining quantum systems and components; depending on the role, this may include tasks such as soldering and wiring, laser alignment, and maintaining cryogenic and vacuum systems.

While the technical focus and level of academic preparation differ by role, scientists typically hold a PhD in a field directly related to quantum science (e.g., physics, chemistry, mathematics, computer science); engineering roles are often open to bachelor's degree holders; and technician positions may be accessible with an associate degree or technical training. Across all three roles, competencies in communication, collaboration, and problem-solving are essential.

Business and translation roles encompass positions that identify, translate, and develop applications for quantum research and technologies, while also operationalizing the business functions that enable organizations to run effectively. Applied scientists focus on developing use cases and real-world applications for quantum technologies, typically drawing on deep expertise in another discipline (e.g., chemistry, cancer biology) or sector (e.g., insurance, financial services) and bringing complementary competencies in applied quantum research. Quantum consultants serve as translators between researchers, engineers, and end users by combining fluency in scientific and technical concepts with business acumen and knowledge of a specific industry; these roles are also valuable in government and policy contexts, where consultants also help interpret emerging technologies for decision-makers.

Organizations also depend on a wide range of business support roles, such as project managers, human resources professionals, and operations staff, whose functional expertise is often more critical than deep technical knowledge of quantum science. Educational expectations vary by role: applied scientist positions often require a graduate STEM degree, consultant roles may call for at least a bachelor's degree, and business and operations positions depend on function-specific training rather than formal quantum credentials. Sales and customer-facing roles typically benefit from familiarity with quantum concepts and the practical applications of relevant products.

Advanced manufacturing and construction roles provide the skilled, hands-on foundation needed to build, equip, and scale the physical infrastructure and components that enable quantum technologies. Both areas rely on precision fabrication, strict adherence to safety and quality standards, teamwork, and consistent execution in technical environments, often working in or around cleanrooms, laboratories, or specialized industrial facilities.

Advanced manufacturing roles focus on using specialized technologies and production processes to fabricate, assemble, and test components and materials that support quantum systems (e.g., semiconductors, optical fibers, precision hardware). Core skills include machining, welding, casting, molding, assembly, quality-control processes and standards (e.g., ISO 9001), workplace safety and PPE practices, and basic computer proficiency. Sub-specializations include optical-fiber fabrication, requiring expertise in glass fiber and protective coatings, mechanical splicing, durability testing, and cleanroom protocols, and semiconductor manufacturing, drawing on skills in photolithography, etching, deposition processes and equipment, and microscopy.

Construction roles complement this work by building and preparing the facilities, utilities, and infrastructure required for quantum research, manufacturing, and laboratory operations. Core skills include blueprint reading; safe operation of power tools and heavy machinery; wiring and circuitry; and knowledge of OSHA regulations and safety standards. Sub-specializations include heavy-equipment operation for site preparation and structural installation, as well as semiconductor-facility construction, where familiarity with cleanroom environments and integration of specialized process equipment is essential.

Across both domains, success depends on attention to detail, communication, coordination across multidisciplinary teams, and strong workplace-safety practices, ensuring that quantum environments and components are built to rigorous technical and operational standards.

Above: A Quantum Game Night held at Chicago's Bowen High School in 2024 helped introduce young people and their parents to quantum science — an important first step in scaling the future quantum workforce. Credit: Anne Ryan for the CQE.

R&D | QUANTUM SCIENTIST OVERVIEW

ROLE DESCRIPTION	EDUCATION	COMPENSATION
Performs quantum-oriented R&D in academia, national labs, tech industry or start-ups (including pure and use-inspired research)	PhD	$150k to $200k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Advanced math, statistics, physics, chemistry or closely related STEM fields, advanced programming language fluency (e.g., SQL, Python, C/C++)

- Algorithms and computational research sub-field skills: computer science, numerical optimization, quantum and classical cryptography, simulations
- Experimental research sub-field skills: materials science, semiconductors, spectroscopy, atomic physics, optics & laser manipulation
- Theoretical research sub-field skills: condensed matter, solid state, atomic & molecular physics

Competencies: Verbal and written technical communication, independent problem solving, mentorship

POTENTIAL FOR MOBILITY

Lead quantum scientist

- What: Experienced researcher with 2-4 years of quantum R&D-specific skillset in industry or start-ups, with greater responsibilities and in charge of mentorship / leadership of junior counterparts
- How: On-the-job experience primarily, however targeted instructional trainings can support faster mobility

R&D manager

- What: Manager of science teams, overseeing multiple R&D programs in industry or coordinating multiple grant executions in academia & national labs
- How: Upskilling with management courses and on-the-job progressive experience in mentorship, stakeholder and project management

Quantum consultant

- What: Consulting role aimed at developing QISE applications across different industries by providing technical and business advisory services
- How: Direct move with optional business and management trainings

Start-up founder

- What: Entrepreneurial leader with expertise in the development and commercialization of quantum technologies
- How: Entrepreneurial training (e.g., connecting with entrepreneurs-in-residence, taking entrepreneurship classes etc.)

R&D | QUANTUM ENGINEER OVERVIEW

ROLE DESCRIPTION
Designs, tests, builds, and implements quantum hardware and software components and systems

EDUCATION
PhD, Master's or Bachelor's

COMPENSATION
$120k to $150k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Varies by hardware or software specialization

- Hardware sub-field skills: Circuit design, signal processing, cryogenic engineering, superconducting materials, precision engineering, precision measurement techniques, RF/microwave engineering, vacuum systems
- Software sub-field skills: Quantum programming frameworks (e.g., Qiskit, Cirq), compiler design, quantum error correction implementation, classical simulation of quantum systems, noise modeling, machine learning, data analysis

Competencies: Problem solving, communication, collaboration with multidisciplinary teams

POTENTIAL FOR MOBILITY

Director of quantum software / hardware engineering

- What: Engineer in charge of managing a portfolio of product development lines in coordination with executive team
- How: On-the-job experience primarily, corporate upskilling via specialized trainings

Quantum hardware consultant

- What: Consulting role aimed at developing R&D capabilities for quantum industries (including tech providers and end-users)
- How: Upskilling with management courses and on-the-job progressive experience in mentorship, stakeholder and project management

R&D | QUANTUM TECHNICIAN OVERVIEW

ROLE DESCRIPTION
Supports quantum scientists and engineers by performing technical tasks (e.g., soldering wires, aligning lasers, maintaining cryogenic and vacuum systems, stocking lab)

EDUCATION
Associate's or technical training

COMPENSATION
$50k to $70k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Wiring and soldering, vacuum systems, cryogenics, optics, measurement, fabrication, control, circuits, safety, programming, lab management (e.g., chemicals stocking)

- Cryogenics sub-field skills: systems design, cryopump operation, pressure vessel safety, vacuum systems
- Fabrication sub-field skills: precision machining, welding, 3D printing, mechanical assembly
- Theoretical research sub-field skills: condensed matter, solid state, atomic & molecular physics

Competencies: Teamwork, communication, problem solving, project management, attention to detail

POTENTIAL FOR MOBILITY

Senior quantum technician

- What: Managerial role aimed at leading and mentoring a team of quantum technicians
- How: On-the-job learning coupled with management trainings to ensure technicians are ready to assume managerial responsibilities

Business support (e.g., HR program employee, facilities manager)

- What: Broad range of junior administrative roles aimed at supporting different business units (e.g., HR, customer service, operations)
- How: Apprenticeship programs and part-time business education (e.g., Associate's in business management) to provide technicians business acumen to grow into new career path

BUSINESS & TRANSLATION | APPLIED SCIENTIST OVERVIEW

ROLE DESCRIPTION	EDUCATION	COMPENSATION
Facilitates the application of QISE in diverse industry use-cases (e.g., insurance, pharma)	PhD or Master's	$150k to $250k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Programming, industry-specific knowledge (e.g., insurance, pharma, chemistry)

- Industry sub-field skills: Varies by industry (e.g., knowledge of classical numerical methods and computational chemistry for supporting QISE applications at a pharma company)
- Applied research sub-field skills: computer science, quantum computing, quantum and classical cryptography, quantum algorithms, numerical optimization, simulations

Competencies: Scientific technical writing/research, problem solving, analytical thinking, teamwork, teamwork

POTENTIAL FOR MOBILITY

Quantum consultant

- What: Consulting role aimed at developing QISE applications across different industries by providing technical and business advisory services
- How: Lateral move with optional business and management trainings

Start-up founder

- What: Entrepreneurial leader with expertise in the development and commercialization of quantum technologies that meet specific industry needs
- How: Entrepreneurial training (e.g., connecting with entrepreneurs-in-residence, taking entrepreneurship classes etc.)

BUSINESS & TRANSLATION | QUANTUM CONSULTANT OVERVIEW

ROLE DESCRIPTION
Supports development and commercialization of quantum technology by providing advisory services across various use-cases

EDUCATION
Master's or Bachelor's

COMPENSATION
$90k to $150k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Fluency in science and technology concepts, market trend analysis, data analytics, strategic planning, accounting, risk management, data privacy and security, financial modeling

- Sub-field skills: Varies by industry (e.g., financial services or cybersecurity knowledge to identify relevant applications of QISE technologies)

Competencies: Analytical thinking, problem solving, executive-level communications, teamwork, influence, stakeholder management

POTENTIAL FOR MOBILITY

Quantum product manager

- Oversees product development in coordination with quantum engineers, scientists, marketing and sales teams, and defines product strategy in alignment with business goals and customer needs
- How: On-the-job learning and experience working across diverse teams in the quantum value chain (e.g., through case work, conferences, symposia, workshops)

Quantum policy advisor

- What: Advisor to government agencies on QISE-related policy, grant funding, development of regulation and national tech advancement strategies
- How: Continued education (e.g., public policy degree programs, law school) and/or consulting experience

Tech entrepreneur

- What: Identify and pursue new business opportunities related to QISE technologies, building relationships with potential clients and partners
- How: Training on entrepreneurship-specific skills (e.g., venture capital), connections to key players and resources across quantum ecosystem (e.g., technical co-founders, funding opportunities)

BUSINESS & TRANSLATION | BUSINESS SUPPORT OVERVIEW

ROLE DESCRIPTION	EDUCATION	COMPENSATION
Enables quantum company success by supporting the day-to-day (e.g., project management, HR, administrative assistants, sales, and customer support)	Bachelor's or Associate's	$60k to $100k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Productivity software (e.g., spreadsheet/presentation software), function-specific knowledge (e.g., sales, Agile), data management

- Sales sub-field skills: CRM software (e.g., Salesforce, HubSpot), customer data management & analysis, financial software (e.g., QuickBooks, SAP), grant writing
- Project management sub-field skills: standard methodologies (e.g., Agile, Scrum), business reporting, financial principles and budgeting

Competencies: Problem solving, teamwork, verbal and written communication, project management, stakeholder management

POTENTIAL FOR MOBILITY

Senior project manager

- What: Oversees project planning, execution, and completion within the quantum companies, ensuring projects and quantum tech meet deadlines and budgets
- How: Earn credentials such as Certified Business Analysis Professional (CBAP) or Agile Analysis Certification (AAC), advanced training in business analytics (e.g., Microsoft Visio, Tableau)

HR manager

- What: Manages employee relations, develops recruitment programs for quantum professionals, develops internal upskilling and training programs
- How: Take courses in HR management, employment law, and organizational development

ADJACENT ROLES | MANUFACTURING OVERVIEW

ROLE DESCRIPTION
Uses advanced technology and processes to fabricate and test quantum technology supplies (e.g., semiconductors, fiber optics cables)

EDUCATION
Associate's or technical training

COMPENSATION
$40k to $60k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Machining, welding, casting, molding, assembly, quality control processes and standards (e.g., ISO 9001), workplace safety, understanding of personal protective equipment (PPE) requirements, basic computer skills

- Optical fiber specialist sub-field skills: glass fiber and protective coating expertise, mechanical splicing, durability testing, cleanroom protocols
- Semiconductor specialist sub-field skills: photolithography, etching techniques, deposition processes and equipment, microscopy

Competencies: Communication, attention to detail, workplace safety

POTENTIAL FOR MOBILITY

Production supervisor

- What: Manager of production teams, overseeing daily operations, ensuring safety and productivity
- How: Courses in leadership and management, certification in supervisory skills (e.g., Certified Production Supervisor), inventory control training

Manufacturing engineer

- What: Designs and improves manufacturing systems, implementing new technologies, and enhancing production efficiency
- How: Degree in engineering (e.g., Associate's or Bachelor's in Manufacturing Engineering), courses in CAD software, robotics, and automation

ADJACENT ROLES | CONSTRUCTION WORKER OVERVIEW

ROLE DESCRIPTION
Performs technical tasks to build quantum technology infrastructure (e.g., laboratory space, excavation for underground fiber network)

EDUCATION
Associate's or technical training

COMPENSATION
$50k to $70k per year

SKILLS AND COMPETENCIES REQUIRED

Core technical skills: Blueprint reading, power tool and heavy machinery usage, wiring and circuitry, knowledge of OSHA regulations and safety standards

- Heavy equipment operator sub-field skills: site preparation techniques with excavators, graders, bulldozers, basic mechanical repair and maintenance

Competencies: Teamwork, project management, workplace safety

POTENTIAL FOR MOBILITY

Foreman/Site supervisor

- What: Manages on-site activities, liaising between workers and project managers, ensures workers safety
- How: Courses in site management and construction management, Site Management Safety Training Scheme (SMSTS) certification, on-the-job experience in supervision and coordination

Independent contractor

- What: Runs a self-owned construction business, managing clients, projects, and employees
- How: Pursue courses in business administration, obtain contractor licenses and certifications, build a professional network

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IBM
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Illinois Institute for Rural Affairs
Illinois Institute of Technology
Illinois Manufacturing Excellence Center
Illinois Quantum & Microelectronics Park
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Infleqtion
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Ivy Tech Community College
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Jupiter Machine Tool
Kankakee Community College
Knox County Partnership for Economic Development
Lake County Partners
Lake County Workforce Development Board
LandScan
LanzaJet
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World Business Chicago
YMCA of Metropolitan Chicago