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Protecting Quantum Innovation: IP Strategy in the Commercialization Era Transcript

Wayne Stacy 00:30
So, welcome everyone to this session of the Berkeley Center for Law and Technology's Expert Series webcast, and as always, we've got someone very interesting today on a topic that maybe is best described as science fiction. If you're hearing this 10 years ago, if you're hearing this today, it's not science fiction anymore. You know, I've got my own computer engineering background, and the idea of quantum was right up there with the idea of the Star Trek Enterprise when I was in school, which probably tells you how long ago that's been. But it's real, and we know that. But now the question is, how does the nature of legal advice need to start planning for the products that are coming? And when you talk to people, it seems that maybe we're a little behind in planning for this legal advice for cutting edge institutions. Berkeley Law is cutting edge institution, so I've been lucky enough to talk with Michael about this topic, and now he's been kind enough to share this material with us. It's good for Berkeley law, but it's good for Berkeley's engineering, but it's great for anybody that's going to start touching these types of high-end clients and high-tech clients. Because, like I said, this is no longer the realm of science fiction. If you don't understand it, you better learn it quickly. And Michael's a great introduction for that. So, Michael, with that, please lead us into quantum computing and how that's going to affect the way we need to practice law.

Michael Schallop 02:07
Thanks very much, Wayne, for the kind introduction. And I agree, it's very exciting times we live in. It's probably more exciting than in the past couple of decades of my practice. The pace of technology and scientific development with AI and quantum computing and the bidirectional feedback loop of both, as we'll discuss today, is just truly amazing. And we're already seeing some of the impacts of that in scientific discovery and technological development. And I think we're only going to continue to see rapid innovation, and so that's going to be the focus today. My name is, as Wayne said, Michael Schallop, and this is a Berkeley Law CLE [Continuing Legal Education] program that addresses IP [intellectual property] strategies, in particular for quantum technologies, as this sector is now moving from what had been primarily academic or scientific realm of research into commercialization. Any opinions that I express today are my own, and so I want to just emphasize that this presentation that I'm sharing with you now today is drawn and based in large part on a recent Law360 article that was published in July of 2026, entitled "Protecting Quantum Innovation as the Industry Enters the Commercial Era. The crux of that article is that quantum technology companies should now treat IP

strategy as part of commercialization planning rather than just late-stage legal formalities. Our focus today is practical. How should companies, including early-stage startups and university spinouts, investors, and inside and outside counsel, think about IP rights, publication practices, collaboration agreements, government funding issues, as well as international considerations in today's quickly evolving quantum technologies ecosystem? Quantum technologies are often discussed, as Wayne highlighted earlier, in sweeping, almost scientific terms. We hear claims about transformative computing, incredible new sensing capabilities using quantum sensors, national security implications like for cryptography and encryption, and possible long-term disruption of these commonly used crypto authentication and encryption schemes. While those themes are real, the legal and business strategy issues for our purposes are more pragmatic. Quantum innovation is becoming a commercial asset class. As that happens, IP strategy is no longer merely an academic defense, legal exercise. Rather, IP strategy becomes part of how a company captures value, attracts investment, structures collaborations, and preserves its strategic options for the future. The title of my recent Law360 article is "Protecting Quantum Innovation in the commercialization era. That framing was intentional. Many quantum technologies still have deep research roots, but the commercial environment around quantum computing, quantum sensing, quantum networking, quantum software, and quantum-adjacent AI is evolving rapidly. Increasingly, these technologies are being funded, licensed, spun out of universities, partnered, and evaluated as core business assets for startups and spinouts. IP strategy can affect, for example, fundraising, bargaining leverage, freedom to operate, and exit diligence for deep tech investors. The question is not simply whether a company has patents. The important questions are whether the patent portfolio maps to the company's technological differentiators, whether trade secrets are properly protected, whether collaboration and government-funded obligations are clean without unnecessary encumbrances, and whether the company has preserved international patent rights. For counsel, the practical challenge is that which makes quantum technology so interesting to folks like us, also presents perhaps new and unique challenges. Quantum innovation sits at the intersection of physics, mathematics, computer science, engineering, software, data, cryptography, even national security, as well as international regulation. A conventional IP checklist is inadequate. Quantum technology companies need an integrated IP strategy that accounts for how the technology is developed, who contributed to it, how it was funded, when and how it was disclosed, what parts may be patentable, what parts should remain confidential, and how global regulatory constraints can affect commercialization. The thesis for this presentation is that as quantum technologies move from laboratory research towards commercial deployment, IP strategy must be treated as a core commercialization infrastructure, not just a later-stage legal formality. For today's discussion, we will begin with the commercialization context. We will then separate realistic quantum opportunities from hype when discussing innovation and collaboration. We will finally focus on the core legal issues related to quantum technologies, including patent portfolio strategy, layered protection and governance, as well as global execution. The goal is not to suggest that every quantum advance should be patented. Rather, the goal is to identify where deliberate, early, and strategic IP decisions can materially affect long-term value. Let's turn now to slide three. We are witnessing a quantum commercialization inflection point.

Michael Schallop 08:41
Quantum technologies are attracting substantial public and private investment. Federal initiatives and national strategy efforts in the United States and many other countries and regions around the globe

reflect recognition that quantum capabilities may be important for national security, advanced manufacturing, scientific discovery, and of course economic competitiveness. At the same time, private capital continues to flow into quantum startups at increasing rates. Publicly traded quantum companies now exist, and new IPOs [initial public offerings] are in the works. Strategic partnerships continue, and university-linked ventures are happening daily. This matters for IP strategies because the technology sector behaves differently once it moves from research-focused orientation to commercial deployment. In the early research phase, publication prestige, grant funding, and technical proof of concept are vital. As commercialization emerges, other questions become more salient. Who owns the invention? Has a patent application been filed before relevant publications? Are there government rights in these inventions? Did a university retain certain rights, such as prosecution or enforcement, litigation control over patent rights? Is the critical know-how better protected potentially as a trade secret rather than patenting? Are there export control or foreign filing issues? Is there a clean chain of title for investors or acquirers of those assets? Quantum technologies also present a distinctive mix of long-term promise and near-term uncertainty. For example, some quantum technology computing platforms may still require years to mature into commercially viable products and services if they ever become viable, and not every technical advance will justify patent protection. But commercialization does not wait for every technical question to be solved. Companies are forming, employees are moving, research collaborations are being signed. Investment rounds are closing. IPOs are happening now and in the near future, as said before. And IP assets are being created now. The practical takeaway is that IP strategies have to move in parallel with this technical development. If the IP analysis happens only at financing, licensing, or for example acquisition due diligence stages, potentially many important choices may have already been made, and rights may have been inadvertently forfeited. Commercialization therefore turns IP timing into a strategic issue. Let’s now address quantum computing. As a potentially genuinely important technological development, we also see that it is prone, as noted on slide four, to overstatement or quantum hype. We see this in many media headlines and clickbait online media content. One of the most important messages for legal and business audiences is that quantum computers are not expected to replace our daily computers across the board. They're not likely to be general-purpose replacements, for example, for your laptop or your smartphone or conventional cloud servers in the foreseeable future. Rather, quantum advantage is expected to be highly application specific. Potential meaningful areas for quantum computing applications include, for example, quantum chemistry, materials discovery, drug development, optimization of certain problems, selected AI machine learning workloads, and certain cryptographic applications. As previously discussed, the historical motivation goes back in part to the idea that quantum systems may be particularly well suited to simulating other quantum systems, as our universe, our world, is built on quantum physics. This was the original foresight of the Nobel Prize-winning Caltech physicist Richard P. Feynman in his seminal 1982 article. That was a powerful insight because conventional computers can struggle with the complexity of modeling quantum behavior in, for example, chemistry, materials, and physical systems, which can grow exponentially complex to compute. At the same time, the most famous algorithm for legal and policy purposes today is still Shor's factoring algorithm, which many of you may have heard of, because sufficiently advanced quantum computers could undermine widely used public-key cryptographic systems such as RSA [Rivest-Shamir-Adleman] for authentication and encryption of confidential data and transmissions of that data. The possibility has contributed, of course, to national investment across the globe in quantum computing technologies, and it has increased the urgency of post-quantum cryptography migration by NIST [National Institute of Standards and Technology] in the

U.S. and other agencies around the world. But even there, the timing, the scale, and engineering requirements still remain critical and relatively uncertain as to when this so-called Q day will happen. For patent strategies, the key implication is that durable patent portfolios should be grounded in practical and strategic technological advances, not speculative promises of future technologies. Patent claims need to be tied to real.

Michael Schallop 14:59
Technological improvements, for example, improved gate fidelities, better quantum error correction, also called QEC, reduced calibration time, more stable qubit control and fidelity, better quantum circuit execution, quantum networking interconnect improvements, and other application-specific implementations, just to name a few examples. In other words, the strongest IP portfolios in the quantum tech space are going to likely be directed to concrete technological differentiators rather than broad aspirations about using quantum computing to solve hard problems. Slide five turns us to the intersection of quantum technology and AI and machine learning. This is a fascinating area where there is significant excitement and maybe even greater risk of hype, sometimes referred to as hype squared, but there already exists some practical near-term use cases. For example, machine learning is already being explored for calibration, error correction characterization, decoding, and quantum error correction workflows. These are not merely abstract potential AI applications to quantum computing. In many quantum computing systems, calibration and control are continuous technical challenges, and machine learning tools are already being effectively applied to characterize and improve such quantum computing system behaviors. There is also a longer-term possibility that quantum simulation can be used to generate data unavailable or prohibitively expensive for us to obtain through classical methods. That could, for example, be applied in rare disease modeling, such as where a sparsity of real-world data hampers existing AI machine learning solutions, which, as we know, require lots of data to be able to potentially identify interesting connections. It can also be applied to materials discovery. In fact, IBM has recently announced using this technique to identify a new improvement in materials in lithium ion for solids for battery technology such as batteries that can be used for electric vehicles and so forth, as well as other complex physical simulations. So, quantum machine learning also seeks to use quantum phenomena such as superposition and entanglement, kind of the weirdness aspects that we all have heard of for quantum physics, to accelerate selected workloads. Although that field remains highly application specific and maybe a little further off, it is an example where quantum technologies and AI can create an amazingly effective bidirectional feedback loop to advance science and technology innovation. The broader legal implication is that AI and quantum together can accelerate these innovation cycles. If AI tools can help researchers generate more designs, identify more parameters, test hypotheses more quickly, or improve, for example, quantum control systems, companies are likely to face a larger volume of potentially patentable innovations. That raises practical questions about invention harvesting, inventor interviews, documentation, disclosure obligations, and patent filing cadence and cost issues. This is also where inventorship and ownership can become more complicated. Counsel should ask whether AI or machine learning tools were used in ways that materially contributed to the conception or reduction to practice of an invention. The legal analysis should remain focused on human contributions of inventorship, but the factual record may need to document how the work was actually performed. In short, AI may increase the speed of quantum technology-related innovation, but that speed also makes disciplined IP processes more important and not less important. Slide six addresses the collaborative ecosystem behind much of the quantum

commercialization that we see today. A significant portion of today's quantum industry originates in university laboratories, national laboratories, federally funded research, and collaborations among startups, universities, government agencies, as well as large technology companies. That ecosystem can be highly productive, but it also creates ownership and diligence complexities. Government funding is an example of a common issue in today's quantum tech space when inventions are conceived or first actually reduced to practice under federally funded agreements. Bayh-Dole obligations and implementing regulations may require disclosure and election obligations, as well as government rights statements in any filed patent applications. Patent applications arising from such federally funded quantum research may need to identify, for example, the grants from certain agencies of that funding, such as the National Science Foundation, DARPA [Defense Advanced Research Projects Agency], the Office of Naval Research, the Army Research Office in the United States, as well as other agencies in the United States or abroad. For transactional due diligence, counsel should evaluate invention reporting requirements under those agreements, government licenses, march-in rights considerations, data rights provisions, as well as funding-related restrictions. University spinouts could present additional recurring sets of issues.

Michael Schallop 21:24
These companies may depend on, for example, exclusive licenses from those universities, sponsored research agreements, faculty consulting agreements, student inventorship questions, publication rights, as well as university-controlled decisions related to patent prosecution and/or enforcement and licensing. A promising startup can encounter serious problems later if ownership, prosecution control, sub-licensing rights, enforcement rights, or field-of-use restrictions were not carefully structured early. Inventorship and joint ownership of patent rights require particular intention. Quantum innovation often involves interdisciplinary teams. Incorrect inventorship can affect patent ownership, validity, enforceability, and standing for enforcement. Joint ownership can be especially problematic under U.S. patent law because, absent contractual modification, each joint owner may generally practice or license the patent without accounting to the others, and all co-owners are generally needed for standing to enforce in federal district courts. For that reason, collaboration agreements should address these licensing rights, enforcement authority, revenue sharing, and prosecution control before potential disputes can arise. Slide seven focuses on patent portfolio development issues. The guiding principle is quality over quantity. A large number of patent filings is not necessarily the most valuable approach if the claims are not mapped to the company's technical advantages or commercial roadmaps. For quantum companies, strategic patent targets may include, for example, hardware architectures, qubit control and calibration systems, quantum error correction and decoding schemes and solutions, hybrid classical-quantum architectures, quantum networking, application layer inventions, just to name a few. For example, hardware claims may be important, but the underlying physics varies significantly across modalities such as superconducting, trapped ion, neutral atom, photonic, and other architectures in development or to be developed in the future. That means claim strategy should be tailored to the platform. A claim that makes sense for one modality may not translate technologically to another platform. Process and system claims may cover calibration, optimization, control, error mitigation, error suppression, and quantum error correction. System claims may address hybrid architectures in which classical computing resources orchestrate or support such quantum resources. Software claims may be appropriate where they are tied to concrete technological improvements rather than abstract data processing. Ensuring that your patent counsel properly understands the technologies and how they can

be applied across different modalities, and structures your specifications and claims accordingly, can be critical. Application-specific claims can also be important. A quantum sensing company may protect sensor architectures, signal processing, calibration, deployment methodologies, and application-specific implementations. As another example, a cloud quantum computing company may emphasize orchestration, error correction, QEC decoding, scheduling, access control issues, and integration with classical high-performance computing systems. As such, patent portfolio mechanics are important. Companies should think about core patent families, continuations and divisional practices, PCT [Patent Cooperation Treaty] and foreign filing strategies, as well as selective use of accelerated examinations in the U.S. Patent Office and foreign patent offices, as well as targeted defensive publications. The strongest IP and patent portfolios usually reflect business objectives. The question is not simply "Can we file a patent? It is "What protection will matter if and when our company succeeds. Slide eight addresses patentability issues that should be considered with quantum technologies. Quantum technology-related inventions may raise issues under patent eligibility, written description, and enablement. Many quantum-related inventions involve algorithms, mathematical techniques, optimization methods, physics-based principles, and/or other scientific laws and principles. Those features can invite scrutiny under U.S. Patent Law, 35 U.S.C. § 101, if the claims are framed, for example, too abstractly. As such, for eligibility purposes in the U.S. and abroad, applicants should, for example, try to anchor claims to specific technological improvements, well-defined practical applications. Examples include improving gate fidelity, reducing error rates, improving qubit control, reducing calibration time, improving quantum circuit execution, providing novel quantum hardware architectures, improving quantum networking interconnects, improving QEC decoding techniques, or implementing a quantum sensor in a concrete technical environment. By contrast, patent claims directed merely to non-technical fields, such as noted in my Law360 paper, applying it to financial vehicles, or abstract mathematical concepts, or other merely desired results of using quantum computing technologies, may be more susceptible to patent eligibility challenges. Written description and enablement also deserve heightened attention because quantum technologies remain complex and relatively unpredictable fields, which is somewhat unique in our high-tech patent field. Broad functional claiming can be vulnerable if the specification does not teach the full scope without undue experimentation. The more unpredictable a given field of technology, the more important it is to support any patent claims with real technological details."

Michael Schallop 28:27
In practice, therefore, patent specifications should consider including, for example, experimental data, detailed technological architectures, device parameters, fabrication techniques, calibration methodologies, operational examples, performance measurements, and alternative embodiments, where available. The goal is to make the disclosure commensurate and supportive of your preferred claim scope. For emerging technologies, courts and examiners are more likely to scrutinize whether the applicant has actually possessed or shown that they are in possession and enabled what is being claimed in the patent application. The drafting theme, therefore, is simple: quantum patent claims should not be framed merely as mathematical transformations or desired quantum outcomes using functional or abstract plain language. They should be anchored to concrete hardware control, calibration, sensing, networking, or data processing improvements. At slide nine, we now turn our focus from patents to trade secrets. One of the most important strategic choices for quantum companies is deciding what not to patent. Patents require disclosure that is going to be published, and in some

cases, such public disclosure may be counterproductive. If the innovation, for example, is difficult to reverse engineer, likely to remain valuable internally and not necessary to disclose for patent protection, trade secret treatment may be the more appropriate vehicle of IP protection for that asset. Trade secret candidates in quantum technology can include, for example, fabrication processes, proprietary calibration parameters, certain types of error mitigation techniques that may be particular to your quantum computing hardware stack, for example, internal control software and firmware for your particular hardware stack, manufacturing recipes, customer-specific implementations, of course, and other operational know-how that cannot easily or readily be reverse-engineered by competitors. Photonic-based quantum computing platforms, for example, may involve certain fabrication recipes, packaging techniques, tolerances, and manufacturing practices that may be better protected through trade secrets than through patent publication processes. Similarly, neutral atom quantum computing platforms may involve atom transport, coherence preservation techniques, certain optical trap configurations for that particular stack, calibration parameters for that computing hardware, and other operational know-how, where the patent versus trade secret decision requires careful analysis. Trade secret law generally requires that the information derive independent economic value from not being generally known, and that reasonable measures are put in place and maintained for that secrecy of those assets. For quantum technology companies, reasonable measures should be tailored to that risk profile for that asset. That may include, for example, NDAs [non-disclosure agreements], access controls, laboratory security, of course, cyber security controls, employee exit procedures and audits, documentation protocols, and clear internal classification of confidential information. Of course, workforce mobility makes this especially important. The quantum talent pool today is particularly competitive, and employees may move among universities, startups, large tech companies, and government-linked research institutions. A trade secret program that exists only on paper is not adequate. The practical objective is to combine patents and trade secrets in a layered strategy: patents for innovations that should be disclosed and claimed and cannot be otherwise maintained as trade secrets, and trade secrets for certain valuable know-how that is better and easily maintained as confidential. Slide 10 addresses publication and open science. Given that quantum research has a strong publication culture, conference presentations, preprints, dissertations, journal articles, open-source releases, and technical blog posts are common, and these all advance scientific progress. Individual researchers gain recognition from such activities, and organizations benefit their reputation from such activities, but public disclosure can also affect patent rights, of course, especially outside the United States, where there is not a one-year grace period. So, the strategic balance is not simply publish or protect. A better framing is sequencing. Prior to public disclosure, the organization should ask whether a patent application should be filed, whether foreign patent rights may be affected, whether the disclosure would reveal trade secrets, whether open-source licensing creates potential complications, whether defensive publication is desirable, and whether competitive risks may justify delay or tailoring of what is to be disclosed. In particular, for university spinouts and research collaborations, this can be a delicate balance. Academic researchers reasonably value rapid publication, while companies invest. Investors often prioritize preservation of proprietary rights. The balanced solution is not to suppress publication categorically, but rather to create a rapid review process that respects publication norms while identifying IP-sensitive material early enough to act strategically to protect such IP. For example, a practical publication review process should evaluate patent filing readiness, foreign filing implications, trade secret considerations, competitive risks, and defensive publication opportunities.

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Michael Schallop 34:58
It should also be fast enough, be workable for researchers. If the process is too slow or opaque, it will encourage those researchers to bypass the protocol. For counsel, the goal is to make IP review a normal part of scientific and technological communication for your company, not an emergency intervention, such as after the conference slides have already been uploaded to the conference submission page or the paper submitted for potential publication. Let's turn to our final slide, 11. We conclude with a brief summary of the global regulatory overlays in the quantum technology space. Quantum technologies exist within this broader legal and geopolitical framework today. Export controls, foreign filing licenses, technology transfer restrictions, supply chain considerations, open-source governance, data privacy, cybersecurity, national security reviews, as well as antitrust and competition law, may all affect IP strategies. This matters because IP rights are not evaluated in isolation. A company may have a valuable patent portfolio but still face constraints on where that technology can be transferred, where their patent applications can even be filed, what technical details can be shared with foreign collaborators, how open-source quantum software is governed, or how standards setting collaborations are structured. Many quantum technologies also have dual-use characteristics, meaning that civilian commercial applications may overlap with national security concerns, such as in the quantum cryptography space. For example, if there is an international collaboration, or your entity has international divisions or subsidiaries, companies need to be cognizant of international filing clearance rules for their inventors based in various local jurisdictions. Organizations therefore should monitor and understand jurisdictional differences in patent eligibility, AI-assisted invention issues, trade secret protections, enforcement mechanisms, government funding rules, open-source controls, standard setting issues, as well as antitrust and competition issues. Multiple entity collaborations and standard setting activities, for example, deserve particular attention because the same cooperations that accelerate a technological ecosystem can also give rise to potential competition law issues. Let's close with five key takeaways. First, treat IP as a core business asset, not a legal afterthought. Second, align patent filings with product strategy and technological differentiators. Third, combine patents and trade secrets rather than assuming one tool fits all situations. Fourth, understand and resolve collaboration, inventorship, ownership, publication, and funding issues early, and act strategically. Fifth, plan globally from the outset because foreign filing, export controls, technology transfer, and regulatory constraints may shape the value of the IP assets in the future. To conclude, in the emerging quantum economy, the companies that best integrate innovation, IP protection, trade secret management, publication controls, collaboration governance, and international strategies will be better positioned to capture long-term value from their assets. Thank you for attending this Berkeley Law CLE session today.

Wayne Stacy 39:11
Michael. Thank you. Fascinating, and a lot of work for us going forward. I look forward to the next installment as we learn more about the technology and as the law develops. So, thank you.

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Protecting Quantum Innovation

in the Commercialization Era

IP strategy for quantum startups, university spinouts, investors, and technology counsel

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See Michael Schallop, *Protecting Quantum as the Industry Enters the Commercial Era*, **Law360** (July 17, 2026), https://www.law360.com/articles/2499399 (copies available upon request).

AGENDA

Today’s discussion

01	**Commercialization context**	Market inflection point and where quantum value is real
02	**Innovation & collaboration**	Innovation cycles, funding, spinouts, and ownership
03	**Patent portfolio strategy**	Defensible claims, technical specificity, and portfolio mechanics
04	**Layered protection & governance**	Patents, trade secrets, publication review, and disclosure sequencing
05	**Global execution**	International and regulatory overlays, plus five strategic recommendations

The quantum commercialization inflection point

Public funding

National strategy and domestic capability-building are accelerating demand for commercialization-ready IP.

Private capital

Startups, public companies, and strategic partnerships are turning research into products.

Strategic value

Quantum capabilities increasingly matter for national security, manufacturing, discovery, and competitiveness.

Implications

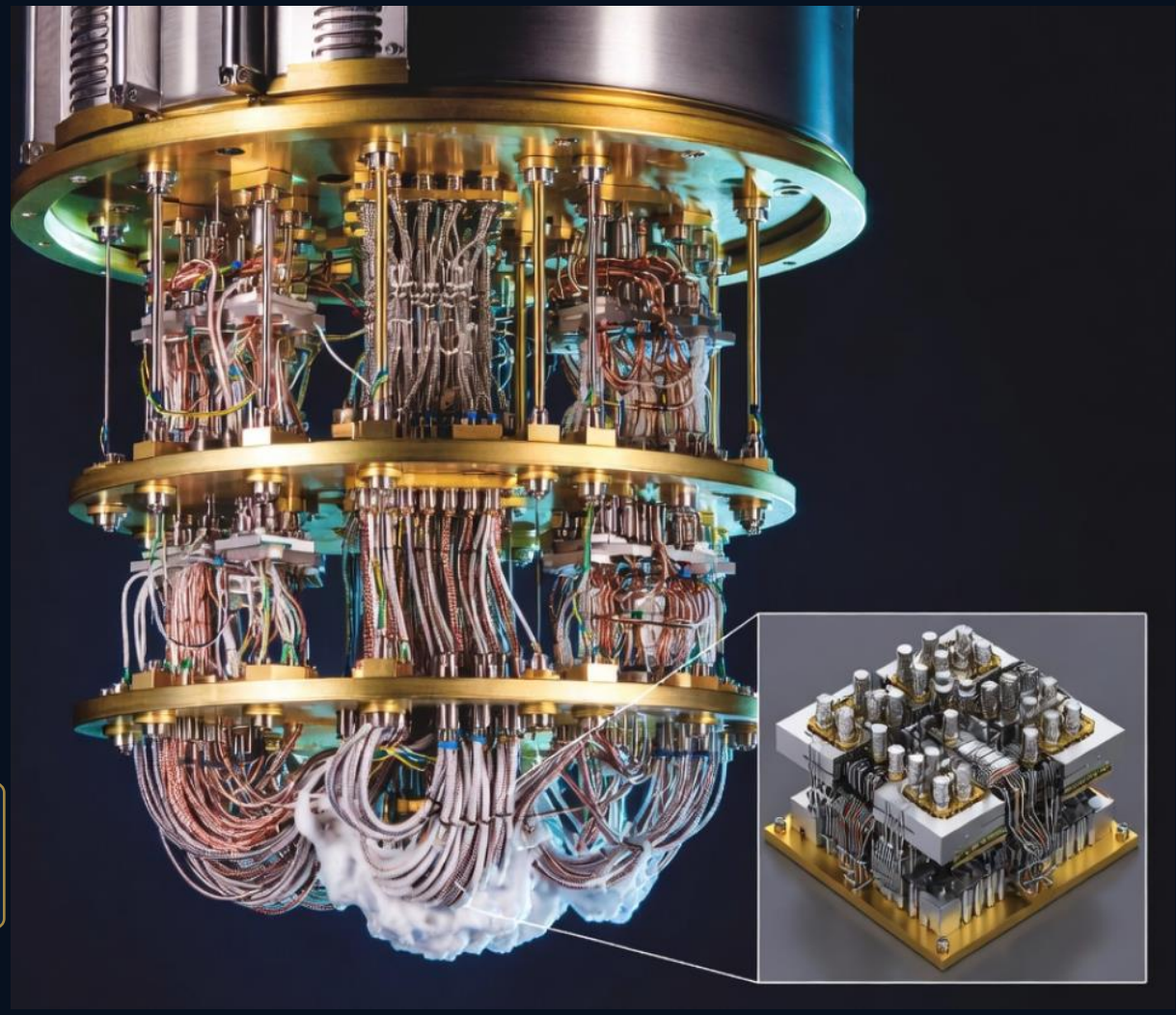
IP is shifting from a legal formality to commercialization infrastructure. Early portfolio choices can affect fundraising, partnerships, licensing, and exit diligence.

Practical protection strategy should move in parallel with technical development.

Separate quantum opportunity from quantum hype

Quantum value is likely to be application-specific, not universal.

- Quantum chemistry
- Materials discovery
- Optimization
- Drug development
- Selected AI/ML workloads
- Cryptographic applications



IP principle: build portfolios around concrete technical advances, not speculative promises.

Quantum + AI may accelerate invention cycles

AI supports quantum R&D

Calibration, control, error characterization, decoding, and QEC workflows.

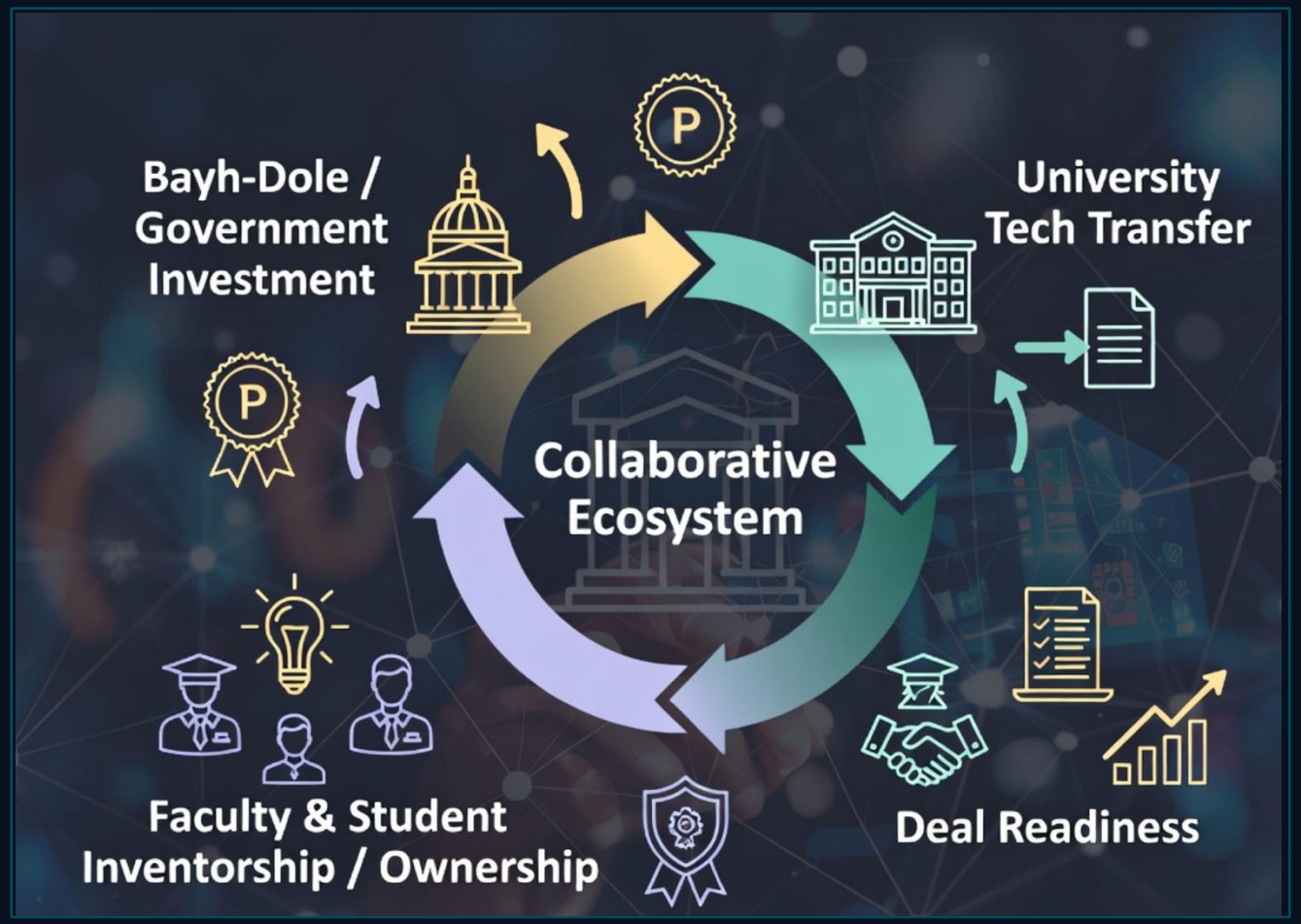
Quantum supports AI

Simulation-generated data and quantum machine learning may create new discovery and invention pathways.

IP pressure points

Inventorship and human contribution
Ownership of AI-assisted outputs
Disclosure timing and patent-filing cadence
Portfolio triage given higher invention pace and volume

Commercialization through a collaborative ecosystem



Bayh-Dole / government rights
Disclosure, election, license, march-in, and data-rights diligence.

Technology transfer
Licenses, sponsored research, publication rights, and patent prosecution control.

Inventorship + ownership
Student/faculty contributions, collaboration records, and default joint-ownership rules.

Deal readiness
Clean chains of title and early risk allocation for financing, licensing, and exit.

***Practical Guidance*: resolve ownership, publication, funding, and control rights before the diligence moment.**

PATENT STRATEGY

Build a defensible & strategic quantum patent portfolio

***Quality over quantity*: protect the technical differentiation that maps to *strategic* business value.**

Hardware architectures

Modality-specific device and system designs

Qubit control + calibration

Control loops, tuning, stability, and execution improvements

Error correction + decoding

Fault-tolerance, mitigation, suppression, and QEC stack inventions

Hybrid systems

Classical-quantum orchestration and cloud workflows

Quantum networking

Interconnects, routing, repeaters, and secure applications

Application-layer inventions

Commercial uses in sensing, chemistry, materials, security, and optimization

Portfolio mechanics: core families + continuations/divisionals + global filing strategy + selective acceleration + defensive publications.

Patentability requires technical specificity

Section 101 patent eligibility

Algorithms, optimization methods, mathematical techniques, and fundamental math/physics principles may invite abstraction challenges.

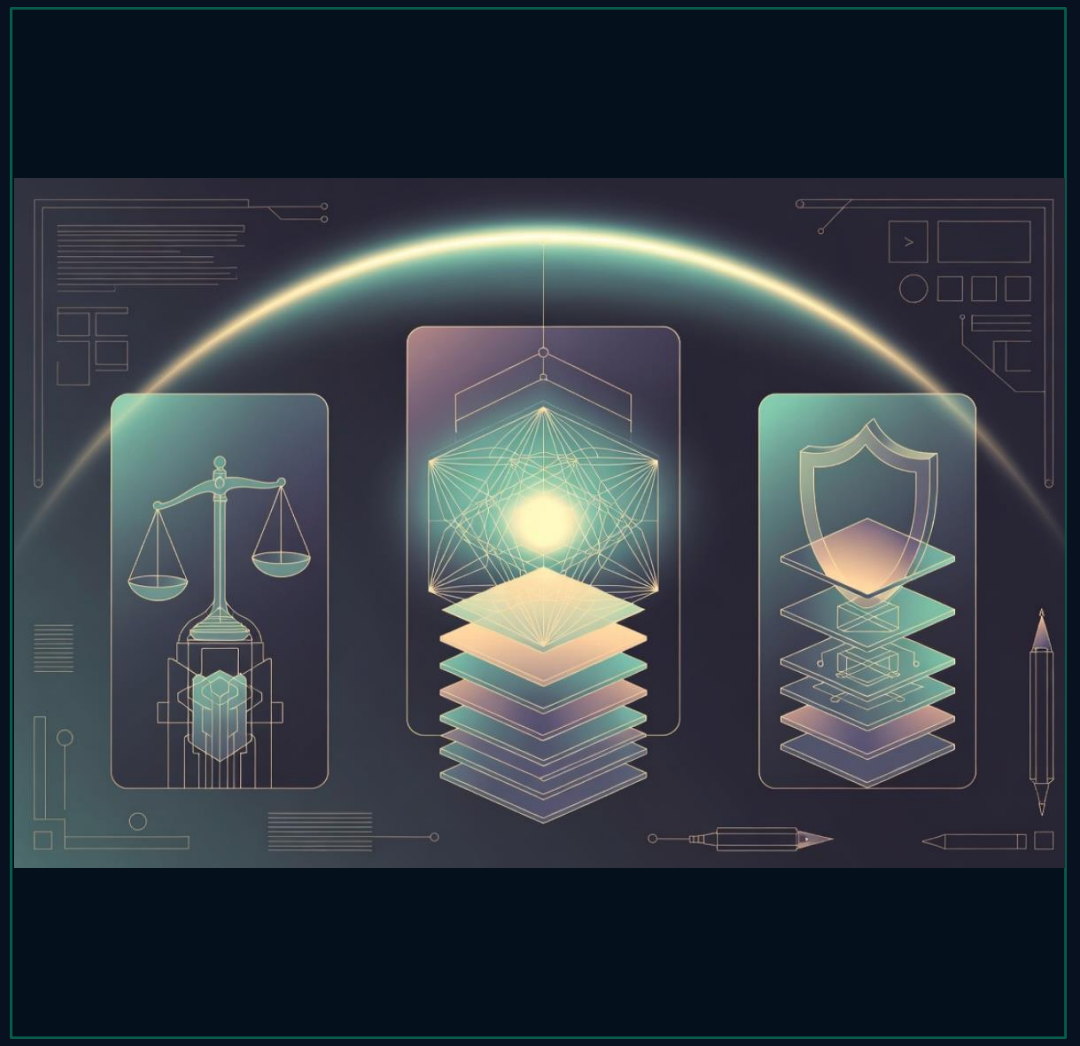
Enablement / written description

Overbroad functional claiming can be vulnerable when disclosure does not support the full claim scope.

Strategic claims drafting to the center of gravity

Tie claims to concrete hardware, control, calibration, sensing, networking, or data-processing improvements.

Specification support examples: experimental data, architectures, device parameters, fabrication techniques, calibration methods, operational examples, and performance measurements.



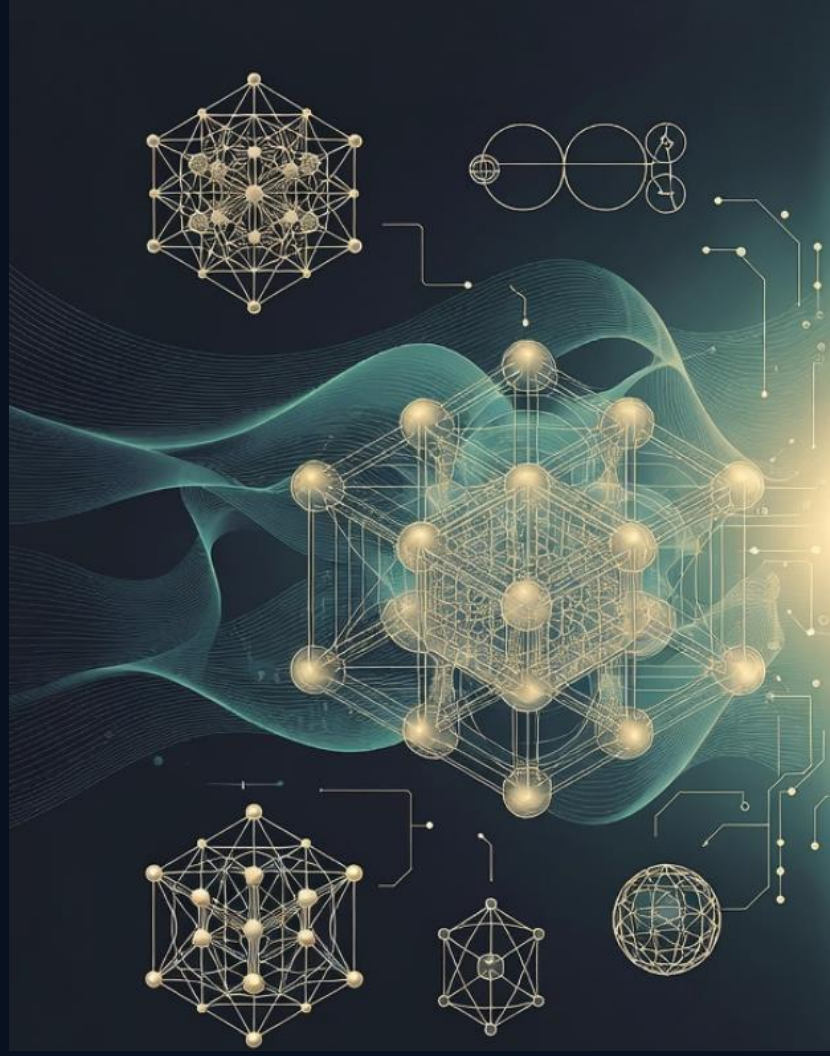
Trade secrets protect what patents should not disclose

Patent protection

Publicly discoverable / reverse-engineerable
Core architectures and systems
QEC, calibration, control methods
Claims mapped to commercial embodiments

Trade secret protection

Fabrication recipes
Calibration parameters
Manufacturing tolerances
Customer-specific implementation know-how



***Governance Guidance*: NDAs | access controls | cybersecurity | lab security | exit procedures | audits | documentation protocols**

GOVERNANCE

Publication, open science, and competitive advantage

The strategic balance is not "publish or protect." It is sequencing publication, patent filing, confidentiality, and defensive disclosure to preserve commercial flexibility.

Establish pre-publication review before conferences and preprints.
Evaluate foreign-filing implications before public disclosure.
Use defensive publications deliberately, *not* inadvertently.

Global and regulatory overlays shape IP strategy

- Export controls
- Foreign-filing licenses
- Technology transfer
- Open-source governance
- AI-assisted invention
- Competition / standards

Executive takeaway

As quantum technology matures, regulatory and international constraints may become as strategically significant as the underlying technical invention.

Five strategic recommendations

1. Treat IP as a core business asset. 2. Align filings with product strategy. 3. Strategically utilize patents and trade secrets. 4. Resolve collaboration rights early. 5. Plan globally from the outset.