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LONDON 2025

**UK FUTURE
FORUM
INDIA**

**APPLYING QUANTUM -
SECURING UK-INDIA VALUE
CHAIN FOR SUCCESS**

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CSR	➤ Corporate Social Responsibility
DSCI	➤ Data Security Council of India
DSIT	➤ Department for Science, Innovation and Technology (UK)
DST	➤ Department of Science and Technology (India)
FPGA	➤ Field Programmable Gate Array
FTA	➤ Free Trade Agreement
NQCC	➤ National Quantum Computing Centre (UK)
PMSTIAC	➤ Prime Minister’s Science Technology Innovation Advisory Council (India)
QETCI	➤ Quantum Ecosystems and Technology Council of India
QKD	➤ Quantum Key Distribution
QRF	➤ Quantum Regulators’ Forum (UK)
RFP	➤ Request for Proposals
TSI	➤ Technology Security Initiative



On 19 June, as part of IGF London 2025 – Forging Winning Partnerships, the UK-India Future Forum (UKIFF) hosted the fourth edition of its flagship Applying Quantum roundtable series at the Science Museum. Chaired by Dr Niladri Banerjee, Imperial College London, the session brought together key stakeholders from across the quantum ecosystem, including representatives from Orca Computing, Oxford Quantum Circuits, UKQuantum, Mphasis, QuNu Labs, and the Department for Business and Trade.

Building on earlier editions held in London, and most recently Mumbai in April 2025, the series continues to spotlight opportunities for UK-India collaboration in quantum technologies—across infrastructure, policy, skills, and commercialisation. Previous participants have included organisations such as HSBC, Three, Microsoft, Google, the Quantum Ecosystem and Technology Council of India (QETCI), the Data Security Council of India (DSCI), and the Reserve Bank of India, with interventions from the Chair of India’s National Quantum Mission, Dr Ajai Chowdhry.

Participants also had the opportunity to engage with **Lord Patrick Vallance, Minister of State for Science, Research and Innovation and Oxford-Cambridge Growth Champion**, during a special meet-and-greet following the session.

The strategic and critical nature of quantum technology applications have, paradoxically, slowed the maturation of collaborative models between the UK and India. Despite strong intent through the UK-India Technology Security Initiative (TSI) and a newly signed FTA, fragmented supply chains and weak R&D-to-industry linkages create significant gaps between quantum innovators and potential end-users.¹

This report examines how targeted collaboration across the quantum value chain can unlock more resilient and scalable UK-India models. Key findings reveal that India's Quantum Mission complements the UK's National Quantum Technologies Programme, creating opportunities beyond current near-term focus areas like quantum key distribution.

However, the absence of domestically built and commercially scalable quantum computing platforms present strategic risks for India, while regulatory barriers and limited industry engagement hinder bilateral progress. The quantum market is projected to grow from \$4 billion in 2024 to \$72 billion by 2035, yet India ranks among the lowest globally in quantum investments (~\$0.7 billion since 2023).

Critical recommendations include developing comprehensive value chain mapping, streamlined talent mobility, and expanded TSI frameworks for IP management. A bilateral quantum value chain mapping initiative emerges as the priority next step to identify synergies and connect stakeholders across both ecosystems.

Quantum Infrastructure and Supply Chain Integration

- India's Quantum Mission (National Quantum Mission: India's Quantum Leap, 2025), one of nine national technology initiatives under the Prime Minister's Science Technology Innovation Advisory Council (PMSTIAC), focuses on secure quantum communication, computing, and precision sensing. It complements the UK's more broadly scoped National Quantum Technologies Programme (National Quantum Strategy, 2023), with both missions establishing foundational structures for integration and shared initiatives. The Indian mission is aimed at positioning the country as a global leader in quantum technology, with applications spanning telecommunications, defence, finance, and healthcare.²³
- UK-India bilateral collaboration, however, should not be reactive or limited to near-term risk areas such as QKD (Quantum Key Distribution) and secure communications. While many of India's ~9-10 active quantum startups are currently focused on sensing and QKD, a greater strategic alignment is needed to expand into areas with long-term growth potential.
- Startups such as QuNu Labs have set ambitious patent goals (targeting 100 patents within two years, with 25 already filed and 10 approved), highlighting the potential for intellectual property growth through collaboration. These firms are also engaging more actively in international partnerships; QuNu Labs, for instance, is responding to multiple RFPs (Request-for-Proposals) across Europe.
- Practical examples such as HSBC's quantum financial modelling and the NHS's exploration of quantum sensing highlight how quantum technologies are already moving from lab to market in the UK. As have already been referenced in previous roundtables hosted at UKIFF, these use cases present clear opportunities for UK-India collaboration, particularly in adapting and scaling similar solutions for Indian sectors such as banking, healthcare, and logistics.⁴

Strategic Imperative for Quantum Computing in India

- The absence of a domestically built quantum computing platform (above 50-qubits) presents a growing strategic risk for India. Participants stressed that without sovereign computing infrastructure, India will remain dependent on foreign platforms for high-value quantum applications.
- This urgency is reinforced by NITI Aayog's Future Front: Quarterly Frontier Tech Insights (March 2025), which highlights India's lag in developing hard quantum infrastructure. The report calls for a multi-pronged national strategy, increased investment, and institutional coordination to close the gap with global leaders.⁵
- As one participant noted, the constraint is not one of infrastructure or power—but of intent. Sovereign quantum computing capability must become a national priority if India is to maintain digital autonomy and compete globally in this frontier technology, compared to countries such as Qatar and China. Qatar recently committed \$1 billion to Quantinuum in a landmark U.S.–Qatar investment deal, positioning the country as a major player in the global quantum technology race (Swayne, 2025a).⁶
- According to McKinsey's recent report, quantum computing is expected to account for the majority of the quantum market share, potentially growing from \$4 billion in 2024 to \$72 billion by 2035, while quantum communication and sensing are also poised for significant growth (Soller, 2025).⁷
- The recent launch of a project to build India's largest quantum computer (100-qubit system) in partnership with IBM and TCS in Andhra Pradesh by 2030 are promising steps in this direction (Sharma, 2025).⁸ This was followed by QpiAI's unveiling of a domestically developed 25-qubit quantum computer in April 2025, reinforcing the emergence of an indigenous quantum hardware ecosystem and signalling early steps toward technological self-reliance (Ministry of Science & Technology, 2025).⁹

Workforce and Skill Development

- India's engineering and electrical capabilities significantly complement the UK's quantum research infrastructure, particularly through its extensive base of FPGA (Field Programmable Gate Array) engineers, device engineers, and photonics specialists.
- While the UK has launched several initiatives to bridge academic research and commercial readiness—such as the Quantum Catalyst Fund (2023) and sector-specific skills programmes—critical skills gaps persist (Thompson, 2025).¹⁰ These need to be mapped in coordination with industry to enable focused talent pathways. For India, regional governments such as Karnataka and innovation hubs like QETCI and T-Hub present strong implementation partners.
- The UK Quantum Skills Taskforce Report (2025), propelled by Department for Science, Innovation and Technology (DSIT), outlines a comprehensive roadmap for developing a skilled, industry-ready quantum workforce. It argues that the UK and its global talent network needs to attract and recruit quantum specialists from India, along with an emphasis on modular training, interdisciplinary education, and industry placement.¹¹ This aligns well with India's evolving talent landscape.
- Successful models like TCS's collaboration with Microsoft for quantum skilling and Mahindra University's industry-integrated curriculum offer templates for applied quantum education that links academia to real-world applications (India Global Forum Reports, 2024).

Policy and Regulatory Alignment

- Regulatory barriers—including export controls, restrictive IP frameworks, and gaps in the UK-India TSI—continue to hinder seamless collaboration, slowing commercialisation and limiting talent and IP mobility.
- For instance, UK researchers working on Innovate UK-funded technologies may face limitations in exploring commercial opportunities abroad, even while remaining institutionally affiliated. These constraints complicate IP co-creation and limit the ability of skilled researchers to support international scaling.
- NITI Aayog has established a detailed quantum technology roadmap stretching to 2047, clearly defining strategic goals and identifying key technology priorities (Future Front: Quarterly Frontier Tech Insights - March 2025 | NITI Aayog, 2025). Leveraging this institutional clarity can provide a structured approach to align quantum collaborations between UK startups who want work with Indian research institutions and vice-versa.
- Historical precedents in telecommunications and biotech sectors illustrate successful cross-border collaboration models that can guide quantum technology partnerships.
- The UK’s DSIT was noted during the roundtable as playing an increasingly active role in shaping quantum policy and ecosystem development. DSIT must take a more visible lead in aligning regulatory and innovation policy with international partners, including India.

Industry Engagement and Adoption

- A recurring theme across the roundtable series was the shift from a hardware-first to a solutions-oriented mindset. Indian startups and global players alike are developing vertical-specific applications—particularly in logistics, finance, and healthcare—supported by the emergence of software tools and system integrators (India Global Forum Reports, 2024). This trend reflects a maturing ecosystem increasingly focused on practical, commercially viable quantum use cases, as also observed in McKinsey’s recent report (Soller, 2025).
- Industry involvement in quantum technology adoption remains limited, with many businesses relying on governmental grants rather than genuine market-driven integration in India.
- Effective industrial champions, such as companies that have successfully integrated quantum computing into AI and logistics optimisation, are necessary to demonstrate commercial viability and strategic benefits to large-scale enterprises. Mphasis, through its Quantum Lab, is developing quantum algorithms for use cases like supply chain optimisation, fraud detection, and portfolio risk modelling—illustrating how quantum capabilities can be embedded into enterprise-grade solutions.¹²
- Quantum startups in India continue to face significant funding barriers. Venture capital largely favours AI ventures with clearer commercial pathways, and many investors lack the technical capacity to evaluate quantum opportunities. According to McKinsey, India’s quantum sector is still heavily reliant on public funding and ranks among the lowest globally in total investment (~\$0.7 billion since 2023), underscoring the urgent need for diversified and increased private capital inflows (Soller, 2025).

INDUSTRY ENGAGEMENT AND ADOPTION

REGULATORY BARRIERS



INDIA

India lacks voice in global quantum regulation



Engage Indian regulators in UK's Quantum Regulators' Forum (QRF)

UK

UK export controls limit global IP deals



Create TSI provisions for trusted quantum IP transfer and explore joint quantum cloud platforms

INSTITUTIONAL BARRIERS



India's R&D needs defined industry linkages



Support industry-linked PhDs and public-private quantum testbeds

UK institutions needs accessibility to Indian counterparts



Map UK-India value chain to improve ecosystem visibility and import talent from India

COMMERCIAL BARRIERS



Indian startups rely on public grants



Launch activities for more CSR and VC-backed funding and incentivise cross-border funding

UK industry lags due to shortage of commercially deployable quantum talent



Develop industry-linked skilling pipelines and bilateral mobility tracks with India

Strengthening Infrastructure and Supply Chain Collaboration

- Developing joint quantum cloud platforms linking the UK's National Quantum Computing Centre (NQCC) with Indian quantum technology hubs can strengthen research-academia-innovation corridors, offering bilateral access to quantum computing infrastructure and co-developing joint IP frameworks. This aligns closely with the UK's national quantum strategy, which prioritises international collaboration as a key enabler of commercial readiness and supply chain resilience. DSIT support could play a catalytic role in scaling such a platform, anchoring long-term UK–India cooperation in secure, open, and interoperable quantum infrastructure.
- Organising joint showcases and industry events (e.g., UK-India Quantum Summits) focused on demonstrating quantum applications' strategic and commercial benefits can attract enterprise engagement.
- Building on domestic progress, Indian ecosystem should accelerate investments in full-stack quantum computing capabilities by supporting hardware startups, local fabrication, and domestic cloud-based access to quantum processors. While NITI Aayog provides national-level strategic direction, real progress will also require deeper engagement from long-standing commercial actors (e.g., in semiconductors, telecom), greater diversification in the

Establishing a Forward- Looking Quantum Talent and Governance Ecosystem

- As quantum technologies evolve rapidly across applications and platforms, skills development and regulatory design can no longer remain siloed efforts. Following up on the next steps outlined in the UK Quantum Skills Taskforce Report would ensure that UK-India talent development is both industry-relevant and internationally interoperable.
- Streamlining mobility pathways and creating clear bilateral mechanisms for talent exchange would significantly improve the transfer of expertise and enable more effective collaboration on joint research and commercial projects. There was frank commentary on India's over-reliance on a narrow domestic advisory circuit and limited representation in global quantum forums. With the UK redefining its quantum skills priorities, greater clarity on bilateral priorities, especially from drivers such as India's DST and NITI Aayog, and a more open, globally engaged advisory ecosystem are essential for meaningful UK-India exchange.
- Collaboratively develop and implement standardised quantum education curricula and certification programs recognised across UK and Indian industries, based on successful models like those of QuNu Labs and University of Calgary (Australia) collaborations (Cbc, 2022).¹³
- Establishing a dedicated UK-India online quantum professional platform can facilitate consistent interaction and knowledge exchange among stakeholders, enhancing visibility and collaboration across ecosystems.
- The UK-India TSI framework needs to be expanded to incorporate detailed guidelines on quantum technology commercialisation, intellectual property management, and joint venture formations.
- Regular engagements involving NITI Aayog, UK quantum institutions, startups, and industry leaders could facilitate proactive identification and resolution of regulatory and logistical barriers, creating an environment conducive to sustainable bilateral cooperation.

Establishing a Forward- Looking Quantum Talent and Governance Ecosystem

- Regularly reviewing and dynamically adapting bilateral quantum policy frameworks, reflecting best practices from responsive strategies observed in other nations such as Japan, can ensure policies remain relevant and practical.¹⁴
- For instance, the UK's establishment of the Quantum Regulators' Forum (QRF) this year following recommendations from DSIT presents a timely opportunity for direct engagement with Indian regulatory counterparts, including NITI Aayog and National Quantum Mission leadership (Regulatory Horizons Council, 2024; DSIT, 2024).¹⁵¹⁶¹⁷ Such engagement could ensure policy interoperability, coordinate export controls, and align ethical and commercial frameworks for quantum technologies.

Boosting Industry Engagement and Quantum Adoption

- Encouraging tech companies to allocate a portion of their CSR funds to “tech-for-good” quantum initiatives can support skilling, education, and applied research in public interest areas like healthcare, climate, and secure communication.
- Establishing a bilateral VC or CSR-backed fund or challenge track would enable Indian and UK companies to co-invest in equitable innovation, targeting early-stage startups, university projects, and underserved regions aligned with national missions.
- Encouraging and supporting industry-linked PhD programs with direct industry involvement, similar to successful frameworks seen in biotechnology sectors, will align research with commercial outcomes.
- Actively cultivating quantum industry champions from both UK and Indian enterprises, leveraging successful quantum integration examples such as those seen at Mphasis Quantum Labs, can advocate and demonstrate quantum’s strategic benefits in corporate boardrooms.
- Supporting targeted bilateral industry partnerships specifically in quantum sensing and secure communications, by leveraging India’s emerging startups and the UK’s advanced research capabilities, will ensure rapid demonstration and adoption of quantum technologies – and also direct investor attention to the sector.

¹ The UK and Japan signed a MoU earlier this year on furthering collaborations in quantum science and technology.
 Reference: Department for Science, Innovation and Technology (2025) UK-Japan Memorandum of Cooperation on quantum science and technology.
<https://www.gov.uk/government/publications/uk-japan-memorandum-of-cooperation-on-quantum-science-and-technology>.
 Japan has taken a distinctive approach to quantum development by building a tightly integrated ecosystem through the Quantum Innovation Initiative Consortium—linking IBM, the University of Tokyo, and major corporates like Toyota and Sony—alongside dedicated hardware testing infrastructure, iterative QPU deployments, and a structured international programme to train 40,000 quantum professionals over the next decade.
 Reference: Swayne, M. (2025b) IBM, Japan Build a Quantum Computing Industry Through University, Corporate Ties.
<https://thequantuminsider.com/2025/03/12/ibm-japan-build-a-quantum-computing-industry-through-university-corporate-ties/>.

Next Steps: Establishing a UK-India Quantum Value Chain Map

- Undertaking a bilateral value chain mapping initiative—drawing inspiration from India’s QETCI-led “Quantum Value Chain Report 2023”—will help identify synergies, gaps, and innovation nodes across both countries’ quantum ecosystems (Quantum Ecosystems and Technology Council of India (QETCI), 2023).¹⁸

As identified during the roundtable, there remains a significant lack of visibility into the quantum innovation landscape, particularly concerning Indian startups and academic initiatives. Many UK stakeholders are unaware of “who is doing what” on the Indian side, limiting opportunities for collaboration.

- Value chain mapping should explicitly incorporate talent development needs across both ecosystems—highlighting where critical quantum skills are lacking, and identifying institutions (e.g. T-Hubs, regional skill missions, and industry partners) best placed to address them through bilateral skilling partnerships. As seen in the UCL–India partnerships announced in July 2025, establishing long-term academic collaborations can seed critical innovation nodes within the bilateral quantum value chain (UCL, 2025).¹⁹
- A comprehensive mapping exercise will not only clarify the distribution of talent, research, and infrastructure, but also serve as a dynamic directory to connect policymakers, investors, researchers, and businesses with potential partners across the value chain.
- The Regulatory Horizons Council of UK recommends an application-specific approach to regulating quantum technologies, also agreed mutually by the UK government, recognising that sensing, communications, and computing each pose distinct challenges and opportunities. This reinforces the importance of a UK-India quantum value chain mapping, which would help identify where each application domain sits in terms of maturity, stakeholders, and regulatory needs—ensuring tailored support that aligns with both countries’ strategic goals.



The UK-India quantum partnership offers a transformative opportunity to address complementary challenges: India's infrastructure development needs and the UK's talent acquisition requirements. With quantum markets projected to reach \$72 billion by 2035, bilateral collaboration through integrated value chains, streamlined regulations, and industry engagement can position both nations as global quantum leaders. Recent milestones like QpiAI's indigenous quantum computer demonstrate India's growing sovereign capabilities. Success depends on moving from fragmented initiatives to coordinated frameworks that leverage India's engineering capabilities alongside the UK's research excellence.

- **Dr Niladri Banerjee - Chair**, Associate Professor, Imperial College London
- **Reena Dayal Yadav**, Founder, Board Member and CEO, QETCI
- **Andrei Dragomir**, CEO, Aquark Technologies
- **Caro Ehrman**, Head of Commercial, Oxford Quantum Circuits
- **Priya Guha**, NED and Investor, Priya Guha Ltd
- **Dr Joe Spencer**, Key Account Manager, Global Quantum Intelligence
- **Ilyas Khan**, CEO, Quantinuum
- **Jonathan Legh-Smith**, Executive Director, UKQuantum
- **Richard Lewis**, Deputy Global Lead of Quantum, Department for Business and Trade
- **Richard Murray**, Co-founder and CEO, Orca Computing
- **Deepa Nagaraj**, SVP and Global Head of Communications, Mphasis
- **Sudiptaa Paul Choudhury**, Chief Marketing Officer, QNu Labs
- **Dr Sourav Ghosh**, Senior Lecturer, Loughborough University, and Director, Cromerix Ltd, Loughborough University Science and Enterprise Park
- **Rahul Tyagi**, CEO, SECQAI

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