Parliamentary and Scientific Committee

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Quantum Technologies

Described as a paradigm shift, quantum technology is the next big leap forward in humanity's technological prowess. This evening, we heard from four expert speakers on how this technology is likely to develop, and the government policies that are essential if the UK is to be a quantum science superpower. Prof. Ian Walmsley FRS, professor and Chair in Experimental Physics at Imperial College London, described the likely evolution of quantum technology over the coming years. Roger McKinlay, Director of the Quantum Technologies Challenge in the UK, spoke about what the UK has done so far to be leading on this technology, and what we need to do to keep this lead. Dr Ilana Wisby, CEO of Oxford Quantum Circuits (OQC), gave us insights into the pioneering work of OQC. Lastly, Dr Carmen Palacios-Berraquero, co-founder and CEO of Nu Quantum, spoke to us about what the government needs to allow companies like hers to continue their work. The Q&A session at the end centred around this central question of government help.

Quantum technology will be a game changer, and the key development from this area is quantum computing. Prof. Walmsley outlined the basic principles of this technology and how changing from a computer composed of classical bits to one composed of qubits results in a potentially far more powerful machine. Classical computers follow a roughly linear relationship between the numbers of bits available and the complexity of problems that can be solved. Whilst for a quantum computer, this relationship becomes roughly exponential, meaning far more complex problems can be solved with fewer bits.

OQC offer the first commercially available quantum computing platform with their QCaaS. Dr Wisby discussed how costumers can run algorithms using this platform and get an insight into quantum technology. The task for companies like OQC now, as Dr Wisby puts it, is to increase the number of qubits whilst keeping the error rate down. If achieved, companies will produce computers far superior to current supercomputers. It's expected that earlier quantum computers will emerge in 5 years, whilst fully fault tolerant machines will emerge in about 15 years, and so the next decade is crucial.

If the UK is to be a quantum superpower, the conditions for technological development need to be present. Mr McKinlay outlined how £1 billion has gone into the UKRI quantum technologies programme. The quantum strategy outlined by the government is up for renewal and is desperately needed for UK industry to keep its edge. In the US there has been around $2.1 billion of private investment in quantum. In the UK this figure is around $0.9 billion. The UK doesn't have a homegrown computer major like Google, and so other interventions will be needed if UK industry is to keep its edge. Dr Palacios-Berraquero also emphasised how we have been locked out of the EU quantum consortium, and both the US and China are investing more in quantum than the UK. Dr Palacios-Berraquero emphasised the need for a long-term UK quantum strategy to build confidence in investors, and how scaling-up funding is vital over the next decade to commercialise this technology.

The Q&A centred around the key question of what government can do to help this industry. All of our speakers agreed that a strong long-term quantum strategy that inspires is needed. Furthermore, efforts to increase interest and access for talent in the UK and abroad will be crucial in the coming decade as this industry tackles this great challenge.

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