



QUANTUM ACCELERATION IS ON THE HORIZON

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Author: Simon Baxter

Email: sbaxter@techmarketview.com



People-Centred AI
UNIVERSITY OF SURREY



INTRODUCTION

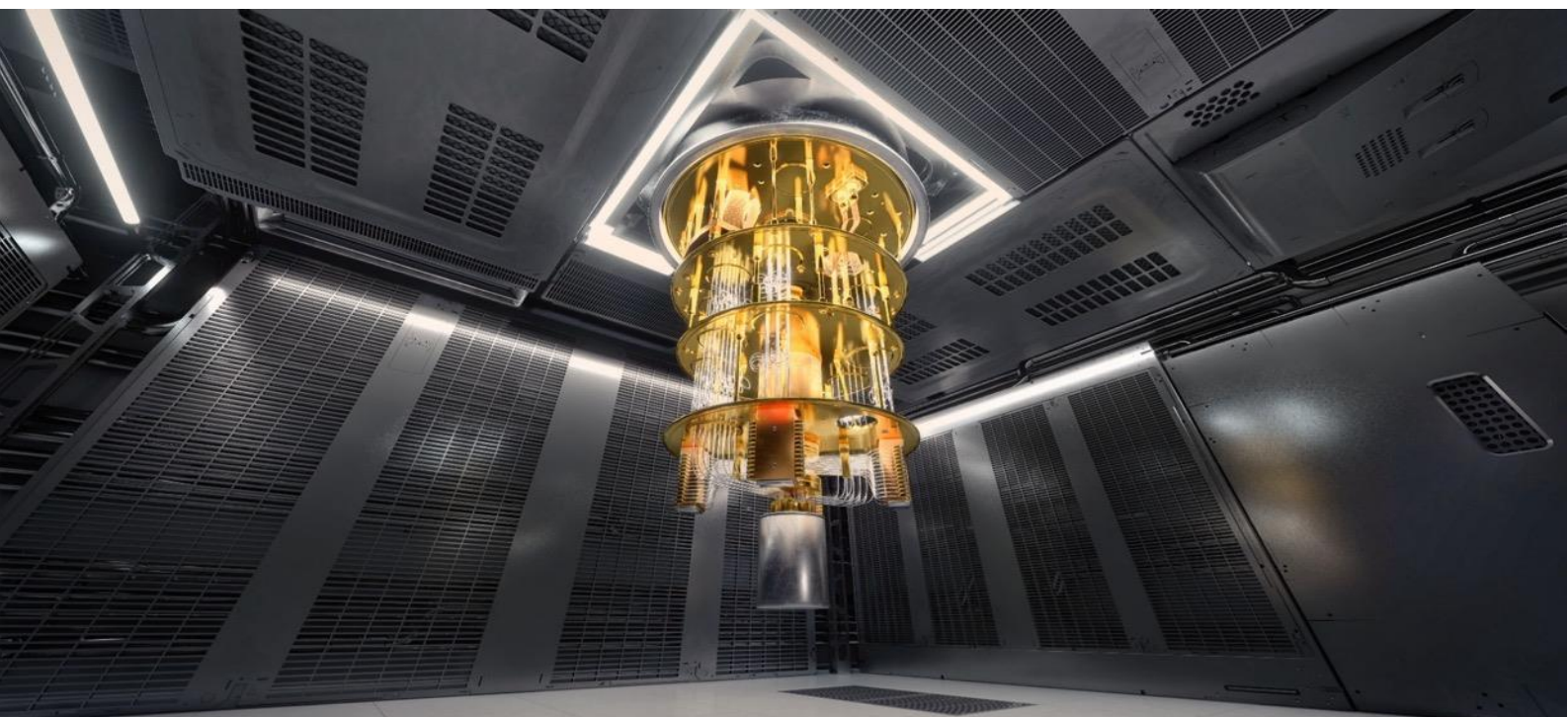
IT IS TIME TO PREPARE FOR QUANTUM TODAY

Quantum computing and Artificial Intelligence (AI) are going to be two of the most disruptive fields of technological innovation over the next decade. Both are developing at a different pace, with 2023 very much the year of AI. Yet many organisations are underestimating and unprepared for the potential gains quantum computing will bring. The development of more sophisticated quantum solutions will enable compute speeds to eclipse even the most powerful supercomputers, unlock faster data processing across use cases such as transportation optimisation, speed up discovery of new medicines and materials, and enhance the capabilities of AI machine learning algorithms.

Achieving large scale business gains from quantum is still a few years away, and it is clear that AI will offer far more tangible short-term gains. Yet looking back to the period before the current AI boom, we were in a similar position to that which quantum is in today. Around 2016-18, AI was already experiencing a period of rapid innovation, but with organisations sceptical to deploy at scale. There was also an apathy about investing substantial sums into AI infrastructure, skills and talent, that today we are finding in short supply. Quantum computing has significant technology and engineering hurdles still to overcome, but if organisations don't start preparing today, building knowledge and capability, many will find themselves in a similar position to today's AI challenges five to ten years down the line.

In this report we will explore the latest developments in the field of quantum computing, the growing supplier landscape, challenges surrounding scale and skills, practical examples of getting value from quantum solutions, and the potential impact of the convergence of quantum computing with AI, a prospect that may be closer than you think.

TechMarketView has also partnered with the **Surrey Institute for People-Centred Artificial Intelligence** to bring a unique perspective from academia, with **Dr Andrew Rogoyski** sharing his views on the skills we will need in the future and how to cultivate the right talent.



EXECUTIVE SUMMARY

- **Quantum computing is a rapidly emerging technology** that promises to revolutionise the way we process and store data, and in doing so accelerate problem solving and computational analysis to new heights, driving higher productivity and enabling greater insights from data.
- **Practical quantum applications at scale are still a few years off**, with the current state still very much largely comprised of R&D, with a select few organisations piloting quantum computers in industries such as Financial Services (e.g. risk scoring and investment modelling), Pharmaceuticals (e.g. drug discovery), Manufacturing (e.g. Battery design & aerodynamics) and Transportation (e.g. route optimisation)
- **Quantum technologies are recognised as one of the UK government's five critical technologies** as set out in the UK Science and Technology Framework. The National Quantum Strategy, published in March 2023, commits £2.5bn to developing quantum technologies in the UK over the next ten years
- **The UK in particular has been a hotbed for quantum computing development**, with Oxford and Cambridge both popular hubs. Notable UK HQ'ed suppliers include Oxford Quantum circuits, Oxford Ionics and Orca computing, whilst many of the larger managed services providers such as Fujitsu, Eviden and IBM have also invested significantly into developing quantum solutions.
- **The future convergence of AI and quantum** may be a way off, but it is likely to accelerate and benefit both fields. Already organisations are leveraging AI alongside quantum algorithms, with one such area that of quantum machine learning (QML), which is exploring if quantum computers can speed up the time it takes to train or evaluate a machine learning (ML) model.

A VIEW FROM ACADEMIA

- **2023 has been an extraordinary year in AI.** The sudden explosion of interest caused by generative AI has already disrupted markets, changed careers and put AI into the hands of every digital citizen on the planet. And we're still only in the foothills of the AI Himalayas.
- **There is potential for hugely disruptive technologies to transform economies, markets, society and lives**, and to do so with very little notice. In the case of quantum computing, we have a little more time – but not much. We're already seeing extraordinary demand for PhD-level physicists, mathematicians, and engineers – the skills that young quantum computing companies need.
- **At the University of Surrey, we try to create courses that anticipate demand in key areas.** We have a new Applied Quantum Computing MSc and a very popular AI MSc course. But few companies really engage with universities to help capture the talent at source and to influence the courses they need.
- **Companies need to think hard about the skills they'll need for the next decade**, anticipating key technological advances and the impact it will have on their business, perhaps co-designing and co-branding university courses to ensure a better match between future supply and demand.

HOW TO ACCESS THE FULL REPORT

If you are a subscriber to **TechSectorViews** you can access the **Quantum acceleration is on the horizon** report today. If you don't have a subscription and would like to gain access to the report, please contact Deb Seth dseth@techmarketview.com to explore your options.

Our author, Simon, would be delighted to present his views on quantum. If you are interested in engaging Simon in this capacity, let Deb know.

ABOUT THE AUTHOR



Simon Baxter

Principal Analyst

Mob: +44 (0)7707942915

sbaxter@techmarketview.com

Simon joined TechMarketView in March 2022 as a Principal Analyst as part of the TechSectorViews research stream. Simon is our lead analyst for Cybersecurity, Quantum and Artificial Intelligence.

He has over 12 years of experience in research and analysis across the Global and UK IT markets, working with strategy and business development functions to shape how emerging technologies can drive real-world digital transformation for organisations.

A VIEW FROM ACADEMIA AUTHOR



Dr Andrew Rogoyski

Director of Innovation

a.rogoyski@surrey.ac.uk



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Andrew started his career as a physicist working at KCL and the Rutherford Appleton Lab on laser-generated plasmas, ICF and x-ray lasers. Finding that he spent most of his time programming a Cray supercomputer, Andrew joined industry, working in AI, image processing and cybersecurity for Logica (later CGI), QinetiQ, Roke Manor and a variety of consultancies, including a stint in the Cabinet Office.

Andrew recently re-joined academia to help create the Surrey Institute for People-Centred AI, a group that leverages Surrey's 35+ year history in AI to bring AI research and teaching to all parts of the University, promoting its unique focus on developing AI that truly benefits human beings.

TechMarketView LLP

PO Box 2288
Pulborough
RH20 6BR

t: 0203 5764266

e: info@techmarketview.com

www.techmarketview.com

@TechMarketView

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