SPEAKER SPOTLIGHT:

Quantum Computing – How Far Is The Future?

Quantum computing can spur the development of new breakthroughs in science. The exponential increase of computing power it would provide would bring about a dramatic change to the landscape of drug R&D. We interviewed Evert Geurtsen from the Quantum Computing Simulation Hub & University of Oxford on the UK quantum computing initiative he is involved in and what his views are on this exciting area.

EVERT GEURTSEN

Co-Director (User Engagement), Quantum Computing and Simulation Hub and University of Oxford

Evert is an engineer with a background in the international automotive industry and new product development with senior leadership roles at well-known brands including General Motors and Group Lotus. He has also founded his own ventures and raised investment pioneering the introduction of affordable electric cars. More recently he led the IP commercialisation and new venture creation for the physical sciences at Oxford University Innovation (OUI) where he and his team helped founders to start and raise investment for more than 50 new ventures and he created the Oxford's Startup Incubator. Since 2017 he was the co-director in the Networked Quantum Information Technologies (NQIT) Hub for User Engagement, the immediate predecessor of the Quantum Computing & Simulation Hub.

The quantum computing field is rapidly evolving. What makes this area so interesting to study?

Quantum computers and simulators attract a lot of attention because we believe that they will let us solve problems that current computers cannot solve or only very poorly. Those include optimisation problems, complex modelling (and control) and also the simulation and therefore understanding of chemistry and material design and development.

Could you please tell us how you got involved in this field? What does your work currently focus on?

The UK has a National Quantum Technologies Programme with an objective to build a world-leading quantum technology sector and user-base in the UK to maximise the economic benefits from our excellence in our science in this field. I have a background in innovation and most recently in connecting academic research with industry which has led me to my current role responsible for user engagement with quantum computing and simulation.

You are actively involved in the QCS Hub. What is the purpose of the hub and what's their mission?

The objectives of the QCS Hub are to create a joined up national approach to quantum technology research, innovation and exploitation that harnesses the UK's scientific strengths and ensures that a centre of scientific, technological, manufacturing and economic gravity remains anchored in the UK; and, operating as a national network and with high levels of engagement from industry, tackle the key challenges that need to be overcome to realise the promise of quantum technologies.

What challenges do you think the quantum computing field faces currently? What do we need to do better & achieve in order to overcome these?

The challenges in quantum computing and simulation include the scaling up from the current technology demonstrators to systems that can do useful things that classical computers cannot. To achieve this we will need still much more technology development of the hardware and software, and more time on early demonstrators to develop the applications. Those challenges in turn will need skills, imagination, broad participation and quite a lot of patience!

What do you think the future holds for the field?

We can be confident that the technology will deliver new and highly disruptive results but it is as yet less clear when that will be possible. As in previous major innovative technology fields there will be highly successful, new players and also some disruptions to existing business models.

What are some of the key opportunities of quantum computing?

To quote the 2018 report from the House of Commons Science and Technology Committee on Quantum technologies, key opportunities include:

1. Simulating chemical behaviour to enhance drug or materials discovery.
2. Optimising logistical arrangements, such as task allocation in the NHS or the management of supply chains;
3. Increasing the speed and capacity of data analysis, enabling improvements in artificial intelligence.

[...] many of these potential applications are "speculative", but that "history suggests that disruptive technology indeed creates new products and services that are socially desirable". Professor Winfried Hensinger, of the University of Sussex, similarly told us that "it is very unlikely that we fully understand all the opportunities quantum computers pose" but drew comparisons to the unknown applications of conventional computers when they were first built.