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The world needs global advisory body for quantum technology

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Global dividing lines are taking shape over quantum science, with questions over when and how to collaborate, and at what stage of development.

By David Matthews

Ian Walmsley, Provost of Imperial College London. Photo : DLD / Hubert Burda Media / Verwendung weltweit / Flickr

The world needs an international expert body to advise governments on the safe and ethical development of quantum technologies, mirroring efforts to create global oversight of artificial intelligence, experts told a Science|Business conference

Drawing on quantum mechanics, the field promises a whole new type of computing which could potentially solve problems that take conventional computers years to crack.

Although practical applications are still limited, there is hope that quantum computing could resolve currently impossible tasks in chemistry, finding new catalysts to suck carbon from the air, for example.

There is a security dimension to quantum too: the technology offers the potential to create all but un-hackable communication channels.

Creating a global ethical framework over the use of the technology is essential, said quantum expert Ian Walmsley, provost of Imperial College London. “That seems to me to be an area where we absolutely need some collaboration, with as wide a circle of friends as we can possibly have, so we get an agreed set of principles,” he told the conference.

One possible model is the Global Partnership on Artificial Intelligence (GPAI), promoted by French president Emmanuel Macron and Canadian prime minister Justin Trudeau and launched in 2020. It aims to link up experts and policymakers to discuss not just ethical issues in AI but also areas like data sharing and research collaboration.

“I think that that would be a good idea,” said Walmsley. “Certainly the leaders of the national programmes could self-organise to start to do that.”

Yuko Harayama, executive director of Japan’s RIKEN research network, who sits on one of the AI partnership’s working groups, agreed it would be a “good idea to have a GPAI version for quantum.”

Although the technology is still in an embryonic state, the geopolitical dividing lines over quantum are already being drawn, with questions over who states and national funders should work with, and at what level of technological readiness.

States and private firms are pouring money into quantum research, Walmsley noted, with the US and EU each putting in the region of €1 billion, and a more hidden but likely “quite substantial” Chinese effort too. Earlier this month, France and the Netherlands signed a quantum pact designed to build EU strategic autonomy in the technology.

Along with AI and biotech, Japan has also prioritised quantum, and is keen to build research links with the US, UK, Germany and EU, Harayama said.

“Each of our countries [in Europe] are too small to have the ambition to really play an international role alone, so clearly we have to cooperate,” said Antoine Petit, chief executive of France’s National Centre for Scientific Research. “But we don’t have to be naive.”

"We all know there are security issues, and economic issues," he said. "We have to cooperate between friendly nations, particularly in Europe." But for other states, "we have to be cautious," he warned.

The European Commission had proposed excluding the UK, Switzerland and Israel from quantum research in Horizon Europe. After months of fighting, in June (https://sciencebusiness.net/framework-programmes/news/white-smoke-eu-deal-over-quantum-space-research-lets-horizon-europe) member states agreed UK, Israeli and other non-EU researchers could join Horizon Europe's most sensitive projects, on condition they provided "necessary assurances" that their participation would not harm the EU's strategic interests.

Portuguese MEP Maria da Graça Carvalho said that at least in the "early stage" of development, it "for sure" made sense for the EU to collaborate with these neighbouring countries on quantum.

Petit agreed, saying, "If we don't include these countries, then they will work with other countries. They will not stay alone. In the end, we will be the losers."

Theoretical versus practical

Another key question is drawing the line between early stage, more theoretical research, where global collaboration is seen as less problematic, and applied work to create real world applications, at which point states might want to hide the results from rivals.

"Early stage collaboration, followed by late stage competition, is potentially a recipe that will lead to the best impact for this technology," said Walmsley. "I think you can probably push the collaboration to a significant TRL [technology readiness level], if you've got proper ways to manage that intellectual property," he said. "Certainly up to demonstration and in some cases a little past demonstration."

But Harayama said that "geopolitical factors" are now interfering with this traditional distinction between early and late stage research. "Even from the beginning, some countries are reluctant to make open collaboration, keeping some research institutes within," she said, though she did not specify which countries she was referring to.