Q&A Session

How do you see the funding envelope and division across different vehicles evolve in the longer term for Quantum Technologies? Will there be a Phase 3 of the National Quantum Technologies Programme?

We are working with partners across the national programme and with key stakeholders to understand the changing landscape and potential opportunities for quantum technologies within the NQTP framework. The strength of the national programme is in the coordination between government, academic and industrial partners. This is working well as demonstrated by the successes highlighted in the NQTP strategic intent published last year. The NQTP Strategic Intent sets out a 10-year vision of the programme and all partners are committed to realising this together.

Will the EPSRC Hubs have continued funding? / Is there a possibility to continue with the Hub structure in Phase 3?

This is linked to the previous question. We are looking at the evolution of the QT landscape and how we expect our portfolio to evolve to reflect that. We are looking at the landscape to understand the new areas of QT that will need critical mass support to deliver the next generation of quantum technologies. We will be engaging the community further as we look to gather evidence to support future investment plans.

Could you break down the National Quantum Computing Centre (NQCC) budget of £93m and how it is planned to be spent? How does this factor into the "New £210m centre to advance AI and quantum computing" announced on the UKRI website?

The £93m for the National Quantum Computing Centre includes costs for construction of the facility, capital equipment and technology projects, and resource. The cost of the facility is £45m including VAT.

The £210m announcement was for the Hartree National Centre for Digital Innovation, a collaboration between STFC and IBM. The work on quantum computing as part of this centre is an important although relatively small part of the whole programme. The NQCC Leadership Team are in regular contact with the Hartree Centre to understand where the interfaces are in the work being carried out.

How does the development of new materials and new components for Quantum Technologies fit into this landscape?

We currently are working with the materials community to investigate the opportunities and challenges within this area of materials for Quantum through a survey and it forms part of our engagement with the community to scout and explore emerging areas that have potential.

Could you elaborate on mechanisms for international collaborations and funding in Quantum Technologies (both EU and further afield)?

The UK through early investment into quantum technologies has been able to establish itself as a strong international competitor and often world leader in the different areas of quantum technologies. In addition to the investments already announced and made through Phase 1 and 2 of the national programme, all partners are committed to work collectively on activities to further boost the national programme as shown in the Strategic Intent. Although this may not be visible through a large one-off investment, but rather through sizeable multiple activities, we will endeavour to increase the advertisement of the national programme activities, its breadth and size of investment.

All partners of the programme have activities that involve international partners. The UK government is currently discussing different possible international activities that the UK can continue to be involved in or that we can newly establish, such as bilateral agreements. The association status for Horizon Europe remains unclear at present, but UKRI is a programme partner for QuantERA II and as such participation in QuantERA II activities will be unaffected by Brexit.

When working with international partners, we want to remind UK partners to check export regulations. Both the UK as well as other countries have legislation that includes quantum technologies, sometimes packaged within the term emerging technology, and that restrict the work with international partners. The Government's Foreign, Commonwealth & Development Office (FCDO) is working on briefing material to assist with this, which should become publicly available in the next months.

Does EPSRC have a list of partner countries in mind for the QT International Networking call (for example will it be limited to those countries already covered by Lead Agency agreements, or continuing EPSRC's focus on collaborations with Europe, China, India, Japan and the USA)?

There is no prescribed list of partner countries from which applicants may select network participants. Applicants will be expected to demonstrate the appropriateness of their chosen network partners and a plan for the protection of sensitive research, personal information or intellectual property. Full information on the assessment criteria will be given on this website when the opportunity is launched in August.

For guidance on Trusted Research, please refer to the Centre for the Protection of National Infrastructure: Trusted Research - Guidance for Research and Innovation Sector | CPNI

Can the EPSRC Network+ call be used for Quantum?

EPSRC currently has a Network+ call open with priority areas from EPSRC's Manufacturing the Future and Digital Economy themes. Information on deadlines etc. can be found here: https://www.ukri.org/opportunity/develop-digital-economy-research-communities-with-networkplus/ . There is no specific mention of Quantum Technologies within the areas, but projects with relevance to Quantum Technologies might fit under some priority areas. If in doubt, please contact the team to discuss.

Will QT for science also include medical research?

The area of Quantum Technologies for science users looks at collaborations across the QT community with communities traditionally based in the remit of other research councils. We are talking to colleagues in other research councils to identify areas where quantum technologies can drive science discoveries and as such activities would be able to include areas in medical sciences.

There is growing activity in the quantum/space area - to enable effective research and demonstrations is the EPSRC planning to fund, or work with other organisations to fund, research in this area? Perhaps a series of IoDs (in-orbit demonstration) with payload space for components?

Our community is already working well to connect the quantum and space areas through a number of different programmes, and we are monitoring whether this requires further funding as we do for all of our investments and programmes. Regarding the possibility of in-orbit demonstrations – this is an area that we will investigate further with colleagues in relevant councils.

Could you please clarify whether EPSRC/NQTP will sustain Quantum Technologies for Fundamental Physics (QTFP) in the long term?

As mentioned, the QTFP programme and collaboration between STFC and EPSRC has had a strong start and we are looking at possibilities to continue the partnership. As the projects have newly commenced, appropriate timing will need to be considered.

What is the panel's vision on sustaining the recently established collaboration with STFC community via the QTFP Programme? Given its significant transformational potential in how fundamental physics is done, should it continue to be part of NQTP or be "handed over" to STFC?

One aim of the NQTP is to remove barriers in how activities are delivered by the community as well as managed by programme partners behind the scenes. STFC are a partner in the NQTP and the QTFP programme falls under the NQTP umbrella. QTFP is funded via a UKRI Strategic Priorities Fund allocation to STFC, jointly working with EPSRC on the delivery and monitoring. Being part of the NQTP activities allows it to be coordinated with other activities and there is keen interest from other NQTP partners to see the progress the projects are making. Therefore, the QTFP activities will remain under the umbrella of the NQTP as a component of NQTP activities managed by STFC.

Will the QT Fellowship scheme be accessible to address STFC science challenges in fundamental physics with quantum technologies (such as those addressed by the QTFP Programme)?

Proposals must be at least 50% within EPSRC's remit. They can cover any aspect of quantum technology research.

Proposals could include:

- theoretical or experimental research
- training and development activities to enable you to expand or enhance your role and career

- collaboration with other research bodies, both in the UK and abroad, industry or other users

Is there (or might there be) a mechanism to direct support for PhD studentships into new/emerging strands of research?

EPSRC fund PhD studentships primarily through 3 different mechanisms: Doctoral Training Partnership, Centres for Doctoral Training and iCASE awards.

EPSRC-funded Centres bring together diverse areas of expertise to train engineers and scientists with the skills, knowledge and confidence to tackle today's evolving issues, and future challenges. There are two current Centres for Doctoral Training focused on Quantum Technologies.

The Doctoral Training Partnership awards are managed directly by universities. They are very flexible awards and can be allocated across all engineering and physical sciences disciplines depending on the university strategic priorities and needs.

Industrial CASE awards provide funding for doctoral studentships where businesses take the lead in arranging projects with an academic partner of their choice.

EPSRC is currently carrying out a review of doctoral support and there may be changes in the future to reflect recommendations from this review.

There are often comments about how many trained people we will need for industry as well as research. What is being planned for training?

We have been looking at Training and Skills broadly within our team and across the NQTP. We have identified support for fellowships to retain and attract talented early career researchers as a priority. The call for fellowships which is shortly due to go live is the first step in implementing our strategy looking at the importance of sustaining our pipeline of future leaders in QT. Further development of our skills strategy will help shape upcoming opportunities to support individuals in the QT career pipeline. Future QT Fellowship calls will be dependent on demand, strategic need and, of course, available budget.

If you are interested in applying for a Fellowship outside of the call that we will shortly be launching, then please have a look at the EPSRC Open Fellowships to see our requirements and if that would be suitable.

Going forward we aim to look at the training needs more broadly including what the needs are for an investment similar to that of the Training and Skills Hubs would be going forward.

Since there are only two more rounds of CDT Cohorts starting after this October, when might we know if the CDT programme will be renewed?

EPSRC's current CDTs run until 2028 with final cohorts starting in FY 2023/24. The CDT model is well regarded, and the quality of training has been judged to be high. It is generally agreed that the mix of doctoral training that EPSRC offers is positive (CDTs, DTP and iCASE). The plan would be for future rounds of CDTs to include quantum relevant priorities, but we are unable to confirm specific timings at this point due to the way our budgets are set.

You mention we are in 'QuantERA 2.0', but I did not think we are in the 2021 call?

That is correct, we are not a funding partner in the 2021 call, but associated with the overall programme and we aim to be in a participating funder in future QuantERA II calls.

How do you see Research Technology Organisations helping your programme?

We are keen to facilitate collaborations across the whole of the Research and Innovation sector including RTOs/PSREs. For the UK to continue to succeed in Quantum Technologies it requires all stakeholders to be involved to drive developments forward. RTOs can be part of grant applications to EPSRC, collaborate with existing investments in our portfolio and engage with EPSRC though workshops and events to provide input in strategy development.

Can you comment on the shift from Research to Product Development and the roles of EPSRC and Innovate UK in Quantum Technologies?

EPSRC and Innovate UK will continue to work together to provide as many opportunities as possible in line with the overall objectives of the NQTP to drive commercialisation and uptake of quantum technologies. We've already seen successes from those working in the QT Hubs going on to secure funding through ISCF competitions. We would hope to continue to see this type of interaction between EPSRC investments leading on to funding for higher Technology Readiness Level work from Innovate UK.

Additional specific delivery mechanisms to try and take this forward have not yet been identified.

You have described future funding opportunities within the EPSRC remit. Do you anticipate a complementary future programme for Innovate UK?

We cannot comment on the plans of Innovate UK colleagues specifically, but we are working together as programme partners to provide complimentary funding opportunities. Aside from the Quantum-specific Industrial Strategy Challenge Fund (ISCF) competitions, Innovate UK also have general competitions where Quantum projects have been successful in the past.

Is there an active element of the programme to ensure that innovative device technology is turned into high TRL components suitable for systems integration?

EPSRC's remit does not stretch above the lower Technology Readiness Levels (TRL), however, the mentioned high TRL work fits within the remit of Innovate UK's work as well as the Quantum-specific Industrial Strategy Challenge Fund competitions.

What are the best routes for industry partners, including start-up/spin-out companies, to get involved with the QT programme? E.g. continue our standard engagement modes through the

types of work outlined in Katharine's funding mechanisms slide? Or will there be other industry focused engagement?

There are a number of ways for industry partners to get involved with the QT programme. This could be through engagement with key investments such as attendance at Quantum Technology Hubs events and webinars, joint working with academic partners in quantum technology grant applications, or working with the Centres for Doctoral Training in offering student projects. Note this is not an exhaustive list. If you have specific questions on industry engagement, then please get in touch with the team.

Whilst quantum computing has now entered rapid commercialisation, the majority of questions remain fundamental. How will that research be funded? EPSRC does cover it in Standard Mode grants, but are there specific quantum calls?

We welcome applications across EPSRC remit through Standard Mode at any time. This includes adventurous research in quantum computing.

https://www.ukri.org/opportunity/epsrc-standard-research-grant/

In addition to Standard Mode, the EPSRC Quantum Technologies theme has highlighted Quantum Computing as one of its priorities and will be looking to fund a breadth of high-quality ambitious research in quantum computing which will complement the NQCC programme.

In terms of specific opportunities from the quantum technologies theme, we have a planned call (£10m) for proposals to be launched in August that will focus on challenges at the quantum computing and ICT interface.

Will the outputs of the QC/ICT event from June 28 be shared publicly?

The outputs from the event will not be shared publicly as they are being used directly to inform the preparation of the call documentation. The call will be launched at the end of August with full details of areas of research at the quantum computing and ICT interface to be supported.

Is there going to be a QT panel for responsive mode proposals (rather than sending them to ICT or Physics panels, which are only partly relevant)?

We have not seen sufficient demand over the last years to justify the running of QT standard mode panels, however, we want to establish such a specific panel mechanism over the coming years. For this to be viable, we require higher submissions through standard mode to be able to make a case and encourage anyone with a research project idea to submit it to EPSRC when it is timely rather than to wait for specific calls to be launched. If you have questions as to which panel (physical sciences, engineering, ICT) would be most suitable, please contact the team to discuss this ahead of a submission as we are able to assist.