

National Quantum Computing Centre

Frequently Asked Questions

Question	Answer
Will the NQCC support UK built quantum technologies or the technologies developed outside the UK?	Both, the key priority for the Centre is to decide what is the best route forward to address the challenge of scaling quantum computing and assessing what options are the most promising to pursue which could be from the UK and elsewhere. The Leadership team will take the lead and have responsibility for deciding the way forward.
Is the NQCC intended to conduct research in quantum computing?	Yes, it will conduct research and development in the context of the vision to address the question of scaling quantum computing. The Centre is intended to be complementary to the current landscape but with a focussed mission.
What are the main mechanisms for industry to engage with NQCC and what are the timescales?	Once the NQCC Interim Leadership Team are in place, they will have responsibility for engaging with stakeholders. They will be required to develop an engagement strategy that is appropriate to enable them to achieve their mission of tackling the challenge of scaling quantum computing. A key opportunity for engagement is through collaboration with industry-led consortia as part of the Commercialising Quantum Technologies Industrial Strategy Challenge Fund. Once the leadership team of the NQCC is in place, the NQCC can have a role in consortia for the ISCF, providing capability to support industry in collaborations.
Quantum Computing is like other technologies, ideally we would like the UK to be world-leading but this might not be possible. On the other hand export control is interfering in collaborating with other parts in the world. What are your thoughts?	We have had some discussions with other countries and there are existing links with other activities that are industry-led. Having a Centre that will be a national capability helps make sure the UK avoids the situation where we are presented with a black box solution. The Centre will help facilitate partnerships that are mutually beneficial and that provide better understanding of the technologies being shared and developed.
Regarding the procurement and hosting of demonstrators, will the building specifications allow the accommodation of different technology platforms?	The building design is in an early stage and until the leadership team is in place, building design cannot be determined fully. Looking at how much flexibility can be afforded is another aspect to ensure that the physical infrastructure of the centre enables the challenge of scaling to be addressed. Staffing, accommodation space and space for collaborators are other aspects to consider. There is a limited budget and some assumptions have to be made to deliver in a timely way. The building also needs to be adaptable as the technologies within the Centre might not be the same during the lifetime of the Centre. An additional aspect is how to link in with activities and other facilities on the Harwell Campus.
How will ISCF and the NQCC fit together with the communications	Quantum Computing has been identified as a unique area and as capital-heavy. The NQCC will address an existing capital

<p>sector goals being delivered by the current ISCF?</p>	<p>investment gap which is specific to quantum computing so direct competition is avoided with other ISCF areas. The NQCC will help to lower the barriers for start-ups but also for users. The leadership team will be tasked with avoiding unnecessary duplication and competition within the UK.</p>
<p>How do you write an ISCF proposal that doesn't get reviewers saying why isn't the NQCC doing that?</p>	<p>Projects need to be timely and achievable. It is likely that ISCF projects and NQCC development programmes will have different scales and timescales.</p>
<p>Companies building the first machines will need to make choices between performance and independent operation. Is there a push to having machines on site?</p>	<p>This is an area that the leadership team needs to consider and make decisions on.</p>
<p>How will the centre address responsible research and innovation and downstream implication issues?</p>	<p>This requires further thought, it has not been decided at this stage of establishing the NQCC but is a key element that will need to be addressed by the Centre.</p>
<p>Different aspects about the leadership keep being mentioned. Where can I find details on the different roles?</p>	<p>Details about the different posts can be found in the slide set. Job descriptions will be available on the NQCC webpage and will be circulated to attendees once the adverts are published</p>
<p>How do we know we are in a relevant market place when people's activities become less transparent?</p>	<p>There is no easy answer to this, picking through what people want you to hear and what is really going on is a challenge. Having a centre that can show benefits to companies, encourages them to be open. Avoiding a black box scenario will avoid people fighting over the technology and access, and will keep the level of bureaucracy minimised.</p>
<p>Have we learnt from mistakes in the past by looking at NDAs, IP etc. in protecting the knowledge?</p>	<p>The NQCC Programme Team have developed a framework for commercialisation for the Centre which includes a preferred option for an IP model that the Centre could implement which will ensure that the centre generates value whilst being an attractive partner and place for industry to engage with. A great deal has been learnt from previous and current projects. This has been put forward in a framework, removing some barriers, but respecting the need to protect intellectual property. This framework will mitigate risks.</p>
<p>Where is the training resource for this centre? There is a desperate need for trained people, not all at PhD level, but a need for rigorously trained people.</p>	<p>The question is how we create the ecosystem to grow the community in the UK? EPSRC has made a commitment to support £25m over 5 years of quantum technologies postgraduate training and skills activities to ensure that the skilled people are available, but EPSRC is not the only player in funding training, and it is beyond EPSRC's responsibilities to have all the building blocks. A review of QT training and skills is under way at the moment, asking where the real need is and what skills need to be developed.</p>

	<p>We need to think about this wider than Quantum technologies. The previous government commitment of 2.4% means an increase in R&D spending will come with an increased spend on training.</p> <p>Training needs to link up relevant partners, catalysing on the range of opportunities, for example, CDTs are available through EPSRC funding and Hubs have training funding. There are also ways to link with different partners.</p> <p>It is worth noting the other training that goes on beyond PhD training. Industry can use the CDT's training modules to upskill their employees in a bespoke way for a cost.</p>
What is the budget split between capital expenditure, operations and the building the Centre?	<p>The split is roughly 1/3, 1/3, 1/3.</p> <p>This does not factor in other income through ISCF collaborations or core funding of the centre for long-term stability that are envisaged.</p>
First systems will be hybrid technology. How will we involve companies in this step and then transition to pure QC technology?	<p>Capabilities of STFC facilities in proximity can provide stability in the transition. The leadership team will need to engage with companies to find out challenges and opportunities in being involved at this stage.</p>
£30m for building, can that figure be reduced to make it look less iconic?	<p>Design will be focused on functionality rather than landscape beauty. It will be fit for purpose whilst attracting people to work there.</p> <p>It is recognised that it needs to be more than a functional box, the building needs to be internationally recognised when you want to attract international talent to engage or work there.</p>
Sustainability model of the centre – In the long term is the idea that the NQCC will provide services?	<p>In the long-term one might imagine this to become a centre providing expert services and advice, similar to supercomputers at the moment. This would be in the very long-term though, but the operational cost will be from UKRI after the first 5 years and it will have a core budget. Specific projects providing specific expertise will have different funding sources and the leadership team will have a role in identifying an appropriate operating model and income streams as part of the Centre design.</p>
Do you imagine spending the 1/3 of programme money all totally within the centre or commission projects or provide competitions for funding elsewhere?	<p>This is dependent on what is needed to support the centre's development programme and what the best way to achieve this is. Partnerships allow potential for the centre to have activity elsewhere and to fund that. It will not be a grant-awarding body, so it will not take applications for projects.</p> <p>The centre has to develop a development programme and a plan of how to get there – that will determine how and where it will spend the money. "What expertise does it need and where will it come from?" will be key questions here.</p>
Doesn't a roadmap already exist for Quantum Computing?	<p>European, US and NQIT roadmaps exist, but they are generalised.</p> <p>The opportunity for the NQCC is to develop a very specific roadmap and means that we have to look at what the UK should do.</p> <p>The NQCC led roadmap needs to be adaptive, with criteria to guide and community agreed metrics that will have to change over time.</p>

<p>How is the NQIT Hub different from the NQCC?</p>	<p>NQCC delivers on scale-up challenges. Engineering challenges will be addressed at the centre due to capacity and focussed engineering. Scale up is required and this is beyond the capability of the academic environment where lab-sized demonstrators are possible.</p>
<p>The Interim leadership team will design the process to decide which platform should be taken forward. Is there a particular emphasis on singular platform?</p>	<p>No, the centre will be open to considering the evidence different platforms can make to achieve the centre's mission. There could be multiple platforms or hybrid approaches.</p>
<p>We are all climbing a mountain that we have not climbed before: We are still trying to understand the resources required for reasonable applications, hence we need to keep an open mind, and picking benchmarks early on will provide challenges further along. We should not underestimate routes that are shallower at first and then go steeply up rather than race up the steep climbs sooner.</p>	<p>The leadership team will need to consider the different routes forward, keeping an open mind along the way.</p>
<p>What STFC resources will be available at Harwell?</p>	<p>The NQCC is being established through a partnership between EPSRC and STFC. Both Executive Chairs are sponsors for this project and this partnership is shown in the commitment across UKRI including the initial commitment to house staff on site until the building is built. Access to these facilities is why it makes sense to work with STFC and be part of the UKRI portfolio. Currently working with STFC to identify what facilities are available on STFC campuses and how the NQCC can get access.</p>
<p>What facilities will be available at the NQCC? And when are these expected to become available?</p>	<p>The Centre will have access to a number of facilities both in the NQCC building; on the Harwell campus and through partnerships.</p> <p>The exact facilities available will be determined by the development programme and partnership decisions made by the Leadership team.</p> <p>The leadership team will have to develop these plans once in post.</p> <p>Those available through partnership or already at the Harwell Campus may be available ahead of the physical building being completed.</p>
<p>What do you mean by interim – is it caretaking or a prototype permanent leadership team?</p>	<p>The interim leadership team could become the permanent leadership team but they would have to apply through the permanent leadership team recruitment exercise. It also depends if they have the skills that are required for the permanent leadership team posts.</p>
<p>Do you plan to appoint the Director first and then help to appoint the Deputy roles, giving them some control over the appointments?</p>	<p>Due to time constraints, all 3 posts for interim leadership team will be recruited in parallel.</p>

<p>There is a need for strong engineering skills, the main difference between the Hub and the Centre will mostly be in industry rather than academia. How will the centre extract the engineering skills from industry?</p>	<p>Leadership team is tasked to navigate through this in making the Centre an attractive place to work, and attracting the right skills e.g. through recruitment or drawing on skills in companies without direct employment.</p>
<p>The timelines are very tight. Generators/electric suppliers take lead up time of 18 months, hence the ILT would need to make these decision to allow for a timely launch of the centre building.</p>	<p>The STFC campus has sufficient capacity, Infrastructure is in place for other facilities enabling this to be in place in a timely way for the NQCC. STFC estates team are already considering the needs for the NQCC.</p>
<p>What is the planned duration of TAG? When will its term end and how will the NQCC receive advice?</p>	<p>Governance structure will be designed to fit the centre's structure and this work is still in progress. When we have governance and advisory structures, we have to work out what the centre needs and the TAG might be a solution or end when another solution is in place.</p>
<p>Harwell is focussed on being a campus where people will want to go and work. What is accommodation and transport like?</p>	<p>The STFC Harwell campus is a site which offers a large range of facilities and amenities for staff working there, and is well connected to surrounding areas.</p>