

Quantum Technologies Strategic Capital Investment Call

Call type: Invitation for proposals

Closing date: 02 June 2015

Information Day: 29 April 2015

Related themes: Engineering, Global uncertainties, ICT, Manufacturing the future, Mathematical sciences, Physical sciences, Quantum technologies, Research infrastructure

Summary

The National Quantum Technology Programme wishes to augment its existing network of capability through further capital investment.

Proposals are invited that will contribute to the expansion of the UK's quantum technology capability in one or more of the areas of strategic focus identified for this call.

The four areas of strategic focus are: 1) Building technical capability; 2) Manufacturing tools; 3) System / subsystem design and 4) Acceleration of innovation.

Up to £25M capital funding is available for this call. Funding is available for individual or consortia of institutions that demonstrate how their proposal will augment existing capabilities in the UK and that bring together a suitable support package that enhances this capital funding and enables delivery of new capabilities for the national network.

Proposals should clearly articulate the industrial contribution and leverage supporting this investment and how the investment would strengthen industrial engagement

An institution may only lead on one bid. Consortia applications are permitted, but these must be one application form per consortia bid not per institution.

Proposals will be sent to postal peer reviewers before consideration at a sift panel. Shortlisted proposals will then be invited to interview.

Background

The diverse range of quantum technologies that are currently under development will enable the creation, control and manipulation of sensitive and fragile quantum effects within single systems. This provides powerful and useful effects that are not possible with current electronics or materials based systems. The new components, devices and systems resulting from these technologies offer

enormous potential to build new products, services, processes and industries that will enhance the quality of life of citizens and generate employment and wealth.

In recognition of this opportunity, and the UK's vibrant and internationally competitive research base, the government announced a £270 million investment in its 2013 Autumn Statement to establish the UK National Quantum Technology Programme. This is a collaborative effort between the Department for Business, Innovation and Skills (BIS), EPSRC, Innovate UK and the National Physical Laboratory (NPL), in partnership with the Defence Science and Technology Laboratory (Dstl) and the Government Communications Headquarters (GCHQ).

The UK National Quantum Technology Programme has already had a significant impact on the UK's quantum technologies landscape through a range of investments. Notable developments include the establishment of a national network of Quantum Technology Hubs, EPSRC investment in Centres for Doctoral Training (CDTs), and initiatives by Innovate UK to enable businesses to explore commercial opportunities that quantum technologies may bring to the UK.

This call will contribute to the aims of the UK's National Quantum Technology strategy by providing capital funding to augment and expand the UK's quantum technology capability. It will take a strategically focussed approach to do this, identifying a number of areas of capability as starting points to strengthen capabilities in the UK.

Initial analysis of existing capabilities has fed into the scoping of this call. This work has involved the mapping of the UK's existing quantum technology capabilities (funded through the strategic partners of the National Quantum Technology Programme, including EPSRC's recently funded hub network) against the technologies outlined in the Dstl landscape document published in 2014 (<http://www.epsrc.ac.uk/newsevents/pubs/dstl-uk-quantum-technology-landscape-2014/>) and those of the Innovate UK led quantum technologies road mapping workshops and also by considering the range of platforms relevant to quantum technologies and the five technical themes (quantum computing; quantum secure communications; quantum metrology; quantum sensors and quantum simulators) which underpin the quantum technologies hub network.

We invite proposals from eligible institutions (<http://www.epsrc.ac.uk/funding/howtoapply/fundingguide/eligibility/organisations/>), or consortia of institutions, for capital investment that will enable the augmentation and expansion of quantum technology capabilities within one or more of the four areas of strategic focus identified in the scope of this call. Applicants need to demonstrate that a suitable support package is in place to maximise this capital investment and to enable delivery of the capability.

Consistent with the focus of the National Quantum Technologies Programme on accelerating translation to application, we expect to receive proposals offering wide access to the resulting facilities and equipment to the academic and industrial community and leveraging other national innovation assets of the UK (e.g. multidisciplinary research centres; innovation centres and campuses).

Those funded through this call would be expected to participate fully in the broader National Quantum Technology Programme and engage with other activities to optimise effectiveness of the national network.

Applicants should note that a separate call for Quantum Technologies Training and Skills Hubs funding is being conducted in parallel with this call. The two calls are being conducted through synchronised but separate assessment processes.

Information Day

An information day for this call and the concurrent Quantum Technologies Training and Skills Hubs call will be held for prospective applicants on 29 April 2015 in Manchester. We encourage potential applicants to attend this meeting, or send a suitable representative from their institution. If you wish to attend then please register your interest by email to events@epsrc.ac.uk by **16 April 2015**.

Please note that EPSRC will limit the number of attendees per institution in the event of high demand for places.

Scope of Call

This call will expand the capabilities in the UK, complementing those offered through the hub network and other key investments made by stakeholders in the UK's National Quantum Technology programme by providing capital investment in four strategic areas.

Technological Scope

The research and capability enabled by this capital investment must focus on quantum technologies.

Quantum technologies are those that involve the creation, control and manipulation of sensitive and fragile quantum effects within single systems. Although many current and future technologies are described by quantum theory, the focus of this call is on expanding capabilities focussed on the direct exploitation of quantum phenomena such as superposition or entanglement to enable disruptive impacts in security, precision, sensitivity, accuracy or speed of sensing.

This call is open for proposals that augment existing UK capabilities in (one or more of) four areas of strategic focus:

1) Building technical capability

There are a number of technical platforms relevant to quantum technologies. To develop the UK's quantum technology capability across the platforms, capital funding will be available for bids that clearly demonstrate a strong case for broadening capability in a specific platform where the existing UK capability is limited or has narrow technical focussed.

2) Manufacturing tools

A range of tools will be required at various stages of the manufacturing process for quantum technologies. This call provides capital funding to develop the necessary capabilities throughout the stages of manufacturing. This development can include the creation of new manufacturing tools or the adaption / modification of those currently utilised for other technologies. Manufacturing tools could cover a number of stages including design for manufacture, validation across quantum technology platforms and industrial strength design.

3) System / subsystem design

System and subsystem design impacts on the success of a range of quantum technologies. In order to maximise the UK's potential in translating quantum technologies from the lab to application and device, these systems and subsystems need to be designed in collaboration with those working on the technologies into which the systems will be integrated

4) Acceleration of Innovation

This call provides funding for capital equipment and facilities that would facilitate the faster development, test, calibration and deployment of prototype devices and technology demonstrations.

Funding available

Up to £25M in capital funding is available to support 3- 6 grants over a three year period starting on 1 April 2016. The funding available has a fixed spend profile as follows: 16/17 - 50%; 17/18 - 33% and 18/19 - 17%. All proposals must meet this capital spend profile and a condition will be added to the grant that a fixed capital spend profile applies to the awarded funding.

Proposals are invited for equipment items that will enable expansion of the UK's quantum technology capability within the scope of the call.

Please note the following:

- An application may be fully or partially awarded, with the peer review panel providing a recommendation to EPSRC on potential partial awards. The justification of resources for each strategic area should list the items in the applicant's order of prioritisation for funding. However, unless strongly advised otherwise by the panel, proposals will be funded in their entirety or not at all.
- This call is for equipment items costing £10K each or over.
- Only capital funding is available from this call. Associated running costs and other resources such as technical staff costs and consumables, will need to be met by the institution or other source.
- An institution is only permitted to submit one application to this call.
- EPSRC will award costs at 100%. The quoted cost of an item should include VAT, delivery charges and have any academic or other discount subtracted. Particular care must be taken where currency conversions are required.
- Once submitted, the institution will not be able to rectify miscalculations. If the figure on the Je-S form does not match the total figure on the table of equipment, EPSRC will fund the lower of the two figures and any error will have to be covered by the institution.
- Equipment must be supporting capability clearly centred in the scope of this call, and within EPSRC's remit.

- Laboratory refurbishment costs are not normally permitted except for specialist infrastructure essential to the operation of the equipment requested.
- As with all EPSRC grants, the use of sub-contractors to deliver part of a proposal is allowable

Eligibility

For information on the eligibility of organisations and individuals to receive EPSRC funding, see the EPSRC Funding Guide:

<http://www.epsrc.ac.uk/funding/howtoapply/fundingguide/>

As this call is a targeted funding opportunity provided by EPSRC, higher education institutions, and some research council institutes and independent research organisations are eligible to apply. A list of eligible organisations to apply to EPSRC is provided at: <http://www.rcuk.ac.uk/funding/eligibilityforrcs/>

Eligible institutions are only permitted to lead a single proposal for this call.

How to apply

Submitting application

You should prepare and submit your proposal using the Research Councils' Joint electronic Submission (Je-S) System (<https://je-s.rcuk.ac.uk/>).

When adding a new proposal, you should select:

- Council 'EPSRC'
- Document type 'Standard Proposal'
- Scheme 'Standard'
- On the Project Details page you should select the 'Quantum Technologies Capital call 2015'.

Note that clicking 'submit document' on your proposal form in Je-S initially submits the proposal to your host organisation's administration, not to EPSRC. Please allow sufficient time for your organisation's submission process between submitting your proposal to them and the call closing date. EPSRC must receive your application by 16:00 on 02 June 2015.

Guidance on writing application

For general advice on writing proposals see:

<http://www.epsrc.ac.uk/funding/howtoapply/preparing/writing/>

Please note that on submission to council all non-PDF documents are converted to PDF, the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document. For this reason we therefore recommend that all the documents are converted to PDF prior to attaching them to the proposal.

Proposals must comprise the following documents:

1. Je-S application form
2. Case for support (8 pages)
3. Justification of resources (2 pages per strategic focus area)
4. Pathways to Impact (2 pages)
5. Workplan (1 page)
6. Host organisation statement(s) of support
7. Project partner statements of support
8. Letters of support from key users of the equipment
9. Table of Equipment request
10. Summary of quotes

1. Je-S application form

- All sections of the form should be completed.
- The start date is 01 April 2016
- The duration of the grant should be no more than 36 months
- Please nominate 3 potential reviewers who are not conflicted with any of the investigators. At least one of these should be based outside the UK.
- The Principal Investigator (PI) should be the academic responsible for leading the team involved in day-to-day management of the equipment. Co-Investigators (Co-I) may be added, however Co-Is must meet the standard EPSRC eligibility for investigators and be directly involved in the management of the equipment.
- The title of the grant should be prefixed by "Quantum technology capital:"
- The value of all equipment requested should be added together and entered as one entry on the Je-S form under the equipment section.

The full economic cost should be the total cost of all equipment prior to the deduction of any contributions received from other sources but after deduction of a vendor's academic discount.

The amount requested from EPSRC must be the total figure after all adjustments for VAT, delivery charges, currency conversions and any academic or other discounts have been added or removed. Under this call, EPSRC will pay up to 100% of the FEC cost of equipment.

- Where a consortium is bidding, only one Je-S form is permitted for the whole consortium.

2. Case for support (maximum of 8 pages)

- Track record (up to two pages of the max 8 pages)

- Track record of the PI and Co-Is, i.e. the team who will manage the equipment (e.g. procurement, access, maintenance) and why they have the appropriate skills to take on this role. Where appropriate the track record of other individuals involved may also be included, e.g. a facility manager or collaborator.
- The remaining pages of the case for support must provide the following details for each of the areas of strategic focus that you are applying for:
 - Details of the capability that will be delivered and how this fits the scope and aims of the call.
 - How the equipment requested will enable this capability.
 - The package of support from the institution(s) and other sources being provided. How this ensures delivery of the capability. If appropriate, the institutional strategy to address the cost of upgrade and / or replacement of the equipment may also be referenced.
 - Suitability of the proposed team and host institution(s) for delivering the capability and hosting the equipment.
 - Management and sustainability – how access to the requested equipment will be managed to maximise usage and capability delivered. Who will be responsible for this? How the equipment will be supported, maintained and updated during and beyond the duration of funding. A clear view as to the longer term sustainability of the equipment should be provided. How will users be charged and what costs will the charges cover?
 - National Importance – must include the added value to the UK for expanding the UK’s capability in this direction and why now; how the capability proposed will fit in the UK and International landscape of research and innovation directed towards accelerating quantum technology to application; how it complements existing funding in the UK and specifically how it augments the existing investments made via the National Quantum Technology Programme.
 - User Engagement – plans for engaging with potential users of the equipment, and maximising user access and demand for the capability and/or equipment. Applicants should indicate who the likely users of the equipment will be and what proportion of instrument time will be set aside for users at the host institution, external academic and industrial users. Clearly articulate how the investment is supported by, and would strengthen, industrial engagement.

3. Justification of resources (Maximum 2 pages per strategic area)

A separate justification of resources must be attached for each area of strategic focus.

This must provide the following:

- A list of all of the items requested relevant to this area. This list must be in the PI’s order of prioritisation for funding.

- A descriptive overview of the items requested.
- Justification of why these particular items have been requested to deliver the expanded capability.
- Where an item requested will help capability in more than one of the areas of strategic focus, this item should be listed in both prioritisation lists and this link stated in both justification of resources.

4. Pathways to Impact

- Describe the kinds of impact envisaged, how the requested equipment will be managed to engage users and beneficiaries and increase the likelihood of impacts.
- Further guidance on preparing your Pathways to Impact document can be found here:
<http://www.epsrc.ac.uk/innovation/fundingforimpact/pathwaystoimpact/>

5. Workplan

This should include:

- Details of the timescales for the procurement process.
- Timescales for delivery, installation and getting the equipment fully operational
- Expected lifetime of the equipment
- Usage by different groups

6. Host organisation statement(s)

A Host organisation statement from the PVC research or equivalent is required for each institution involved in the proposal. This must provide details of

- How the requested items and the capability being proposed aligns with the University's own priorities and strategies for equipment.
- The institutional strategy for linking with the national quantum technology investments
- The support package provided by the institution to complement the equipment funding. How will the equipment be supported (technical expertise and running costs), maintained and updated during and beyond the duration of this funding. Any direct institutional contributions to these purchases should be clearly stated.

7. Project partner statements of support

Statements should only be included from user organisations who are contributing financially to the proposal, whether it is a direct or in kind contribution.

Project partners cannot benefit financially from the proposal and therefore suppliers cannot be project partners.

If suppliers are offering a contribution to the equipment cost or support package, then letters of support can be attached as additional documents. Please note

that an academic discount does not count as a contribution. Letters of support are not permitted from anyone that is not making an in kind or direct contribution to the proposal.

Each statement of support must detail the contribution (financial or in-kind) and their involvement in the development of the proposal. Statements should describe how the contribution will enhance the proposal and the benefits that will result from their involvement.

8. Letters of support from key users of the equipment

These should only be included when they show significant support for the proposal and a clear intention to use the equipment. Applicants are encouraged to think carefully about the letters they submit from key users and to be selective. In preference to providing letters from everyone, applicants are strongly advised to seek letters from a cross-section of key users. These may represent different universities (within or outside any regional alliance) or may indicate relevance to key collaborators in different industrial sectors.

More than one letter may be submitted from the host institution where a broad range of research will be enabled. However applicants are strongly encouraged to ensure each letter represents a very different interest, e.g. centre, group or department.

Otherwise only one letter is permitted per organisation, so where multiple groups/departments are key users the letter should reflect the range of interest.

9. Table of equipment request (to be added as additional document attachment type)

A table is required detailing all items of equipment that make up the equipment figure requested on the Je-S form.

Please note:

- An entry must be made in a table for each item of equipment requested
- Each entry must provide the information that would normally be entered into Je-S for an item.
- For each item it should be stated which financial year the payment is expected to occur. This is when the money is actually paid to the supplier not receipt of goods or invoice.
- All items in the table must be numbered for ease of reference
- Only items over £10K can be requested
- The total of the items requested should be included at the bottom of the table. This figure must match the entry on the Je-S form. Once submitted, the institution will not be able to rectify miscalculations. If the figure on the Je-S form does not match the total figure on the table of equipment, EPSRC will fund the lower of the two figures and any error will have to be covered by the institution.

10. Summary of quotes (to be added as additional document attachment type)

It is a requirement of EPSRC that 3 quotes are provided for all items of equipment costing £25K or more.

For those items costing between £25k and the OJEU limit quotes can be verbal. For all items over the OJEU limit, three written quotes are required.

For this call, applicants must provide a summary of quotes document through Je-S. The summary of quotes is sufficient to satisfy the quote requirement for all items below the OJEU limit.

The summary of quotes must list each item in the same order as the table of equipment and must provide details of the company name and the 3 quotes obtained.

If there is a sole supplier, this must be clearly stated for the item.

Written quotes for items over the OJEU limit should be provided as a single PDF via email directly to the quantum technologies theme quantumtechnologies@epsrc.ac.uk. These should be put together in the same order as the summary of quotes / table of equipment requested.

The written quotes form part of the call requirements and must therefore be with EPSRC by the call deadline of 16:00 on 02 June 2015.

Peer review will not be sent copies of the written quotes. They will receive the summary of quotes and table of equipment requested.

Please note that Je-S validation will require three equipment quotes and a business case to be added to the application. Please do not attach quotes or a business case to the application. Please attach 3 blank documents as equipment quote attachments and one blank for the business case attachment. This will enable you to pass the validation stage.

Please do not include any other attachments as they will not be accepted.

Attachments submitted under the type "other attachment" will not go in the panel papers so please do not use this attachment type. It is important that the correct attachment types are used to ensure reviewers and panel members see all the paperwork required.

Once the proposal is submitted, no additional documentation can be added to your proposal. Peer review will only consider documents submitted with the application through Je-S prior to the deadline.

Assessment

Assessment process

There are two stages in the assessment of proposals:

1. Full Proposal Assessment

Full proposals will be sent to independent national and international peer reviewers provided that they fall within the scope of this call. Proposals falling outside the scope of the call will be rejected by EPSRC prior to peer review.

Proposals that receive sufficiently favourable comments from reviewers will be put forward to a prioritisation panel. Principle Investigators (PIs) will have the opportunity to respond to the reviewer's comments at this stage.

The prioritisation panel, consisting of independent assessors, will consider and rank the proposals against the full assessment criteria. Given the strategic nature of this initiative, strategic vision and contribution to national landscape will be considered as a major criterion. The panel will then make a recommendation to EPSRC on whether the proposal should be invited to the interview stage.

2. Interview Stage

For proposals that are successful during the first stage, the PI and up to two other people identified on their proposal, will be invited to attend an interview. It is up to the applicants which members of the core team attend the interview with the PI. Applicants will not be asked to make formal presentations during the interview.

The interview panel will be provided with any specific feedback provided to the applicant by the prioritisation panel, and will expect to observe appropriate responses at interview by the applicants to the feedback received. The interview panel will rank the proposal against the full assessment criteria

Assessment criteria

The assessment criteria described below (in no particular order) will be applied at all stages of the peer review process:

1. Vision and augmentation to the UK national landscape

- Clear demonstration of:
 - The capability that will be delivered and how this capability contributes to the scope and the aims of the call.
 - What this proposal enables that isn't currently available in the UK quantum technology landscape.
 - How the funding fits with and links to existing investments in quantum technologies in the UK. Considering investments of all strategic partners of the national quantum technology programme.

2. Quality of applicant team and research and innovation environment

- Appropriateness and strength of:
 - The strategy for maximising usage
 - The package of support from the institution(s) and other sources – How well this ensures delivery of the capability
- Evidence of:
 - A clear institutional strategy for linking with the national quantum technology investments
 - Suitability of the proposed team and host institution(s) for delivering the capability and hosting the equipment.

3. Management and sustainability

- The appropriateness and strength of plans to:
 - Manage access to the equipment and to maximise usage.
 - Provide access to a broad quantum technology community
 - Support, maintain and update the equipment during and beyond the duration of the funding.

4. National importance

- Evidence of:
 - How the capability will fit in the UK and International landscape
 - How it complements existing funding in the UK
- The strength of the demonstration of added value:
 - To the UK for expanding this capability
 - To the UK for making this investment now

5. User engagement

- The strength and appropriateness of plans for:
 - Engaging with potential users
 - Maximising access and demand
 - Utilising this capability to strengthen industrial engagement and support.

6. Pathways to Impact

Appropriateness and strength of plans to maximise potential social and economic impact.

Guidance

Guidance for reviewers

Peer reviewers will be directed to this call document when contacted to review the proposals. In addition, specific guidance will also be available to them based on the information in this call.

Prioritisation and interview panel members will also be given specific guidance based on the information in this call.

Information about the EPSRC peer review process and guidance for reviewers can be found at: <http://www.epsrc.ac.uk/funding/peerrev/Pages/peer.aspx>

Additional grant conditions

In addition to the standard terms and conditions for grants, there will be specific grant conditions for successful proposals regarding the following:

1. Fixed start date of 01 April 2016
2. Fixed spend profiles
3. Mandatory reporting to EPSRC
4. Expectations on engagement with the overarching national quantum technologies programme
5. Publicity and branding in relation to the national quantum technology programme and EPSRC

Key dates

Activity	Date
Call opens	17 March 2015
Information day for prospective applicants	29 April 2015
Call closes	16:00 on 02 June 2015
Prioritisation panel	Late October 2015
Interviews	Late November 2015
Announcement of awards	January 2016
Award starts	01 April 2016

Contacts

- **Amanda Howes**, Portfolio Manager, Quantum Technologies
Tel: 01793 444447; email: amanda.howes@epsrc.ac.uk

Your Research Administration should be able to offer advice about costing your proposal and the Je-S system.

If there are any queries related to Je-S, please contact the Je-S Helpdesk: JeSHelp@rcuk.ac.uk or 01793 444164.

Change log

Name	Date	Version	Change
Amanda Howes	27/02/15	1	N/A