**Establish a future communications systems early-stage federated hub**

Apply for funding to create a platform in a core research area in the future communications systems space.

Research areas include:

* network of networks
* wireless and wired systems and spectrum
* cloud and distributed computing.

You must be based at a UK research organisation eligible for EPSRC funding.

Each platform will:

* coordinate with the existing research community
* drive emergent ideas towards market
* address user-inspired challenges.

The full economic cost of your project can be up to £2.5 million. EPSRC will fund 80% of the full economic cost.

Funding can be requested for up to three years.

Standard EPSRC eligibility rules apply. Research grants are open to:

* UK higher education institutions
* research council institutes
* UK Research and Innovation-approved independent research organisations
* eligible public sector research establishments
* NHS bodies with research capacity.

[Check if you are eligible for research and innovation funding](https://www.ukri.org/apply-for-funding/before-you-apply/check-if-you-are-eligible-for-research-and-innovation-funding/who-can-apply-for-funding/#contents-list).

You can apply if you are a resident in the UK and meet at least one of the conditions below:

* are employed at the submitting research organisation at a level equivalent to lecturer or above
* hold a fixed-term contract that extends beyond the duration of the proposed project, and the host research organisation is prepared to give you all the support normal for a permanent employee
* hold an EPSRC, Royal Society or Royal Academy of Engineering fellowship aimed at later career stages
* hold fellowships under other schemes (please contact EPSRC to check eligibility, which is considered on a case-by-case basis).

Holders of postdoctoral level fellowships are not eligible to apply for an EPSRC grant.

Submissions to this funding opportunity will count towards the [EPSRC repeatedly unsuccessful applicants policy](https://www.ukri.org/councils/epsrc/guidance-for-applicants/unsuccessful-applicants-and-resubmissions/repeatedly-unsuccessful-applicants-policy/).

Communications systems research is a critical area that underpins the whole future digital society and forms part of a national ambition around world-class communications systems and technology. Sustained investment in future communications systems is a vital step in achieving this ambition.

By investing in these technologies, we can reignite the UK’s status as a science and technology superpower and deliver for the next generation.

For more background information on this programme, see ‘Additional info’.

EPSRC will fund three federated and connected platforms in the future communications systems space.

Applications should include expertise or understanding across the breadth of the scope, where appropriate, to better enable the interface with the wider community. However, any programme of research does not need to encompass the whole scope.

These initial exploratory platforms will enable applicants to work flexibly in order to network with, and leverage support from, the existing communications landscape. They will also provide support for research with focus on lower technology readiness level (TRL) discovery science which should gear towards translation to high TRL challenges. Over three years, EPSRC is asking applicants to:

* discover the pipeline of ideas and solutions to problems that we cannot yet solve
* develop those technologies and emergent ideas that are not yet ready for market
* exploit routes for deployment of technologies that are ready.

This will inform EPSRC to explore opportunities for further investment in future communications systems similar to the quantum technology hubs, if funding enables.

You must align to business and government needs in the areas and seek to connect with the existing funding landscape, where appropriate. This includes UK Research and Innovation investments such as:

* hubs
* centres for doctoral training
* innovation knowledge centres, institutes and facilities.

In addition, this also includes working closely with the recent Department for Media, Culture and Sport (DMCS) investment and the UK Telecoms Innovation Network (UKTIN), to ensure that work is complementary.

UKTIN is an information and ideas hub for industry and academics looking to access funding for research and development testing facilities and opportunities to collaborate on developing new mobile and broadband technology.

The three successful platforms must also endeavour to connect with the recent series of DCMS funding in this space (which includes UKTIN) as part of a broader UK programme. This will help to enable a coordinated approach and will support the community to reorient towards UK priority areas.

Applications will be invited covering one of the core research themes outlined below. Each consortium will be a multi-university or institution consortium, with an identified lead university, and should have expertise in the areas defined, but we recognise that the initial programme of research cannot cover all of this.

### Research areas

#### Network of networks

This includes early-stage validation of technology and proof of concept or application, across three broad areas:

* integration and optimisation across terrestrial (wired, small cells and cell-free) and satellite (non-terrestrial networks, high-altitude platform systems (HAPS) and unmanned aerial vehicles). This will include research around end-to-end connectivity (including wireless, wired, satellite and optical interconnections and coordinating interfaces), control layer and management protocols
* physical system architectures, network interoperability and integration. This could include research across new architectures for network-compute sensing, softwarisation, new interfaces for open radio access networks (RAN) and open networks
* associated new materials, devices and sensors that enable network to network architecture.

#### Wireless and wired systems and spectrum

This includes three broad areas:

* radio frequency engineering, covering open RAN and diversification, massive multiple-input and multiple-output (MIMO) network to software as well as the antenna and receivers. This will include:
  + materials up to the device level
  + antenna technology
  + reconfigurable intelligent surfaces
  + cell-free access networks
  + mmWave, THz and optical wireless and extreme densification
* spectrum innovation and integration, towards spectrum abundance in terms of efficiency, management and policy. This will include research around intelligent spectrum management and spectrum agile technology, as well as optical wireless integration
* optical and photonics, as applied to communications networks. This will include research around hollow-core fibre and fibre optics, photonics, free space optics and quantum communications.

#### Cloud and distributed computing

This includes four broad areas:

* cloud, fog and edge computing, operations and optimisation. This will include research around the evolution of analogue computing, such as neuromorphic, as well as aspects of the future of internet infrastructure
* exploration of the software-hardware (such as materials, devices and sensors) interface
* data science and algorithms, control layers and management protocols
* artificial intelligence and machine learning for network design, routing and operation.

### Themes

Each platform should also cover some or all of the following cross-cutting themes, as appropriate:

* security, resilience and trust:
  + resilience of power systems (capacity planning)
  + resilience and reliability of non-terrestrial (inter-satellite, inter-flying platforms, satellite-to-ground, flying platforms-ground and underwater) communications
  + verifiability and trust of network intelligence, native security, physical layer and hardware security
* open networking: interoperability and integration of open network solutions and multi-vendor architectures
* accessibility and human-centric aspects of communications: coverage and quality of access and a consideration of ethics, societal, economic and political impact
* sustainability: end-to-end energy efficiency, energy harvesting, network redundancy and resilience of power systems (capacity planning).

We would expect funded platforms to have a plan for creation, filing and UK retention of intellectual property. In addition, applicants should consider how to transform generated intellectual property into impact on the UK research ecosystem.

You will also be required to consider UK skills needs as part of your proposal.

This could include training and upskilling as well as wider consideration of the ecosystem, through translation throughout supply chain, across TRLs and layers, and patent filing and retention of intellectual property.

As EPSRC is not providing studentship funding as part of this opportunity, applicants should consider how best to leverage each university’s doctoral training partnership allocation, and how to work with businesses to access ICASE studentships, where appropriate.

Each platform will:

* coordinate with the existing research community and the other funded platforms
* enable impact of existing outcomes of research
* drive the push of emergent ideas and technology towards market
* address user-inspired, high TRL challenges with lower TRL research.

Your application should cover:

* research team: who will be involved and what is their expertise?
* vision: what is the scope of the hub research and innovation programme?
* impact and commercialisation: how will you push emergent technology and ideas towards market?
* engagement: how will you engage with the wider landscape? This should not be a list of potential partners, but rather an engagement plan, and should address international collaboration and trusted research
* governance: how would the hub be governed, and how would it coordinate with other hubs?

### Partnerships

EPSRC is anticipating that applications to this opportunity will be multi-institutional. In order to facilitate the creation of new partnerships outside of your institution for this funding opportunity, we have set up a web portal for any individual wishing to be involved.

[Access the partnerships portal](https://futurecomms.meeting-mojo.com/page/homepage).

If you wish to engage in the application process as an academic, please select the appropriate option within the portal. You will then be able to outline your areas of expertise and the core research theme you are able to contribute to. This will enable other interested parties to contact you through the portal.

EPSRC will be covering how to use this portal at the webinar.

EPSRC is trialling a new method of industrial engagement through this scheme which will simplify the application process. At this stage, we do not require project partner letters of support and any potential non-academic partners do not need to be named in your application. However, we do still expect you to outline how you plan to engage with the academic and non-academic community more broadly within your engagement plan.

We will instead be asking potential partners to register interest through the portal above. The list of potential industrial partners will then be provided to the successful academic consortium upon award of the funding. This is to encourage non-standard partners such as small and medium enterprises, in addition to larger organisations who typically engage with EPSRC funding.

This does not restrict you from discussing potential collaborations with industrial partners and you will still be able to include partners who are not part of the list EPSRC provide upon award of the funding.

### Webinar

We are holding a webinar on 27 October 2022, 11am to 12:30pm for prospective applicants to this funding opportunity. If you would like to attend please register by 26 October 2022 at midday. A recording of the webinar will be made available afterwards for anyone who cannot attend. A direct link to this will be added to the partnerships portal.

[Register to attend the webinar](https://www.smartsurvey.co.uk/s/7O6RHR/).

For more information about the webinar, email: [bethany.turner@epsrc.ukri.org](mailto:bethany.turner@epsrc.ukri.org).

### Funding available

EPSRC will fund three hubs. The full economic cost of each hub can be up to £2.5 million. EPSRC will fund 80% of the full economic cost.

This budget is indicative and subject to final budgetary allocations.

Equipment over £10,000 in value (including VAT) is not available through this opportunity. Smaller items of equipment (individually under £10,000) should be in the ‘directly incurred – other costs’ heading in your Joint Electronic Submission (Je-S) system application.

[Read EPSRC’s approach to equipment funding](https://www.ukri.org/councils/epsrc/guidance-for-applicants/types-of-funding-we-offer/epsrc-approach-to-equipment-funding/).

### Duration

Projects can have a duration of up to 3 years.

### Responsible innovation

You are expected to work within the [EPSRC framework for responsible innovation](https://www.ukri.org/about-us/epsrc/our-policies-and-standards/framework-for-responsible-innovation/).

### International collaboration

Applicants planning to include international collaborators on their proposal should visit Trusted Research for [guidance on getting the most out of international collaboration while protecting intellectual property, sensitive research and personal information](https://www.cpni.gov.uk/trusted-research).

### Intention to submit

To help EPSRC plan for this opportunity, you are asked to submit an intention to submit by 1 November 2022 at 4:00pm UK time.

This should contain:

* principal investigator details including name, email address, title, job title, organisation and country
* ORCID ID
* core research theme being addressed
* cross-cutting theme being addressed
* name of any co-investigators and their host organisations
* short description of the research covered
* acknowledgement that your organisation’s research office is aware of your intention to submit an application to this funding opportunity
* details of the contact within the lead organisation’s research office.

[Complete an intention to submit](https://www.smartsurvey.co.uk/s/SBH2T2/).

Email confirmation for completion of this survey will only be sent once the survey has closed.

### Submitting your application

Each consortium should submit a single application through the Joint Electronic Submission (Je-S) system.

This must be done by the lead applicant on behalf of the entire consortium and should include funding requested for researchers at other institutions that are part of the application.

You can find advice on completing your application in the [Je-S handbook](https://je-s.rcuk.ac.uk/Handbook/index.htm).

We recommend you start your application early.

Your host organisation will also be able to provide advice and guidance.

Before starting an application, you will need to log in or create an account in Je-S.

When applying:

1. Select ‘documents’, then ‘new document’.
2. Select ‘call search’.
3. To find the opportunity, search for: Future Communications Systems Hubs.

This will populate:

* council: EPSRC
* document type: standard proposal
* scheme: standard
* call/type/mode: Future Communications Systems Hubs.

Once you have completed your application, make sure you ‘submit document’.

You can save completed details in Je-S at any time and return to continue your application later.

### Deadlines

EPSRC must receive your intention to submit by 1 November 2022 at 4:00pm UK time.

EPSRC must receive your Je-S application by 29 November 2022 at 4:00pm UK time.

You will not be able to apply after this time. Please leave enough time for your proposal to pass through your organisation’s Je-S submission route before this date.

You should ensure you are aware of and follow any internal institutional deadlines that may be in place.

### Attachments

Your application must include the following attachments:

* case for support (10 sides of A4, four on your team and their expertise and six on the scientific case, strategy and engagement plans)
* workplan (one side of A4)
* justification of resources (two sides of A4)
* host organisation letter of support (two sides of A4) detailing a top-level agreement between all universities involved in the application
* cover letter (optional attachment, no page limit and not seen by the panel).

You should attach your documents as PDFs to avoid errors. They should be completed in single-spaced Arial 11 font or similar-sized sans serif typeface.

[Advice on writing proposals for EPSRC funding](https://www.ukri.org/councils/epsrc/guidance-for-applicants/what-to-include-in-your-proposal/).

### Ethical information

EPSRC will not fund a project if it believes that there are ethical concerns that have been overlooked or not appropriately accounted for. All relevant parts of the ‘ethical information’ section must be completed.

[Guidance on completing ethical information on the Je-S form](https://je-s.rcuk.ac.uk/handbook/pages/GuidanceonCompletingaStandardG/EthicalInformation.htm).

### Assessment process

In the event of this funding opportunity being substantially oversubscribed, EPSRC reserves the right to modify the assessment process.

Applications will be assessed by an expert interview panel. The panel will conduct interviews with the lead applicant and two other applicants and will assess each application according to the below criteria.

Applicants invited to interview will be expected to give an outline of their vision for the platform and programme more broadly.

There will be no postal peer review stage for this funding opportunity.

### Assessment criteria

#### Standard criteria

##### Quality (primary)

The research excellence of the proposal, making reference to:

* the novelty, relationship to the context, timeliness and relevance to identified stakeholders
* the ambition, adventure, transformative aspects or potential outcomes
* the suitability of the proposed methodology and the appropriateness of the approach to achieving impact.

##### National importance (secondary major)

How the research:

* contributes to or helps maintain the health of other disciplines
* contributes to addressing key UK societal challenges
* contributes to future UK economic success and development of emerging industry or industries
* meets national needs by establishing or maintaining a unique world-leading activity
* complements other UK research funded in the area, including any relationship to the EPSRC portfolio
* plans for dissemination and knowledge exchange with potential beneficiaries of the research.

##### Applicant and partnerships (secondary)

The ability to deliver the proposed project, making reference to:

* appropriateness of the track record of the applicant or applicants
* balance of skills of the project team, including collaborators.

##### Resources and management (secondary)

The effectiveness of the proposed planning and management and whether the requested resources are appropriate and have been fully justified, making reference to any resources requested for activities to either increase impact, for public engagement or to support responsible innovation.

#### Opportunity specific criteria

##### Fit to opportunity (primary)

This makes reference to:

* alignment of the research programme to aims and objectives of this funding opportunity
* the request of appropriate resources to support community building, responsible innovation and public engagement.

### Feedback

Feedback will be given to applicants following the panel meeting. This will be agreed by the panel chair and members during their discussions.

### Background

Communications systems research is a critical area that underpins the whole future digital society. There is a vibrant research and innovation community in the UK supported by a large EPSRC portfolio of funding.

There are currently over 130 live EPSRC grants (close to £300 million total investment) that explore the science around enabling:

* network of networks
* radio frequency engineering and device technology
* optical and photonics in communications
* distributing computing architecture.

Most of this funding has been delivered through investigator and community-led schemes.

Given the national ambition around world-class communications systems and technology, we need to foster an environment that enables discovery, development and deployment of the necessary technologies. Sustained investment in future communications systems is a vital step in achieving this. By investing in these technologies, we can reignite the UK’s status as a science and technology superpower and deliver for the next generation.

We want to enhance and maintain this status to ensure that the UK continues to be at the forefront of future communications systems and technology. To do this, we need to foster a sustained environment that enables discovery, development and deployment of the components of advanced communications networks.

To deliver the national ambition around world-class future communications systems, we need to create an environment that enables discovery, development and deployment of the necessary technologies. In support of this, EPSRC wants to invest in a small number of platforms that can act as the foundations for further development.

#### Platforms

These platforms will bring the community together including engaging with business, Catapults and internationally, around three broad themes. These will inform future investments in theme-based and mission-focused hubs that will deliver the technologies required to meet the UK’s strategic needs in this area.

These initial exploratory platforms will draw together the existing portfolio of EPSRC investments (including working with other connected investments such as the quantum technology hubs and any forthcoming artificial intelligence hubs), enabling a coordinated approach and supporting the community to reorient towards UK priority areas.

EPSRC’s ambition is (together with partners) to build upon these investments over the coming years. Based on the outcomes of this initial phase of funding, our ambition is to seek investment for and then launch a subsequent opportunity for several hubs, designed to translate world leading science to ground-breaking technology.

In addition, these investments will lay the foundations of an internationally recognised brand associated with the UK’s programme to further science and technology in communications systems and will promote international collaboration.

#### The Department of Digital, Culture, Media and Sport (DCMS)

The DCMS has recently launched a series of funding opportunities that are relevant to these EPSRC investments. Applicants should endeavour to connect with these opportunities, as part of a wider programme.

The DCMS has directly invested into future telecoms research through a series of programmes. The government’s diversification strategy was backed up by £250 million at SR21 to invest in the open networks research and development fund, which will run until April 2025.

As part of this, DCMS launched the Future Open Networks Research Challenge in July 2022, a £25 million challenge which will enable universities to work with large radio access networks (RAN) vendors, and other telecoms organisations, to conduct research and development to drive the openness and interoperability of future network architectures.

Other DCMS programmes have also delivered investment into future telecoms, including the Future Radio Access Network Competition, which allocated £30 million into supporting the development of open RAN.

### Grant additional conditions

Grants are awarded under the standard [UK Research and Innovation grant terms and conditions](https://www.ukri.org/manage-your-award/meeting-ukri-terms-and-conditions-for-funding/). There will be additional grant conditions that must be met as part of this funding programme, which will be defined at a later date.

### Responsible innovation

EPSRC is fully committed to develop and promote responsible innovation. Research has the ability to not only produce understanding, knowledge and value, but also unintended:

* consequences
* questions
* ethical dilemmas
* social transformations.

We recognise that we have a duty of care to promote approaches to responsible innovation that will initiate ongoing reflection about the potential ethical and societal implications of the research that we sponsor and to encourage our research community to do likewise.