**Develop a UK digital twinning research community with a NetworkPlus**

Apply for funding to establish a multidisciplinary research community in digital twinning, complementing the existing industry-led multisector digital twins community.

You must:

* have the leadership skills to coordinate a multidisciplinary research community in digital twinning
* lead the research community to create a picture of what the UK needs to develop a national capability in digital twinning
* lead the development and publication of thought leadership, including for ethics and human interaction, environmental sustainability, and security and resilience in digital twinning
* lead the running of opportunities for small projects

UK Research and Innovation (UKRI) will fund 1 NetworkPlus up to £3,000,000 (80% of the full economic cost) for 5 years.

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

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

[Check if your institution is eligible for funding](https://www.ukri.org/apply-for-funding/before-you-apply/check-if-you-are-eligible-for-research-and-innovation-funding/eligibility-as-an-individual/).

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

* 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 a UKRI, 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, but we encourage applications to reflect how they can be involved in the network’s activity.

UKRI would like to encourage applicants from a broad range of disciplines, some of whom may not normally engage with or be familiar with digital twinning.

We encourage submissions from consortia of research organisations to ensure the team has the ability to reach out across a breadth of disciplines and across the UK.

The challenges for this opportunity include but are not limited to engineering and physical sciences, and a diversity of thought and knowledge will be required to overcome them.

The principal investigator of the proposal should have a collaborative and inclusive mindset, alongside excellent leadership and management abilities.

Individuals based in non-UK countries that could make valuable contributions to the NetworkPlus can be involved in the grant as project partners, members of advisory boards or collaborators but they are not eligible to be investigators.

An institution may submit only 1 application as lead institution. A maximum of 5 investigators, including principal investigator and co-investigators is permitted for each application. Each investigator can only be included on 1 bid.

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/).

### Start date

The successful NetworkPlus will have a fixed start date of 1 August 2023.

There will likely be a grant condition on end date to align with the 5-year maximum duration of this grant.

EPSRC is leading this UKRI [building a secure and resilient world strategic theme](https://www.ukri.org/publications/ukri-strategy-2022-to-2027/ukri-strategy-2022-to-2027/) funding opportunity to create and operate a digital twinning NetworkPlus. The NetworkPlus will establish an inclusive, multidisciplinary research community to advance the UK’s position in developing a secure, ethical, and sustainable national capability in digital twinning.

The requirement for a national capability in digital twinning was identified in the UK government’s Integrated Review, ‘[Global Britain in a Competitive Age, the Integrated Review of Security, Defence, Development and Foreign Policy](https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy)’, published in 2021.

Digital twinning also features within the following publications:

* [National AI Strategy](https://www.gov.uk/government/publications/national-ai-strategy)
* [Data for the Public Good report](https://www.gov.uk/government/publications/data-for-the-public-good-government-response/government-response-to-data-for-the-public-good)
* [National Infrastructure Strategy](https://www.gov.uk/government/publications/national-infrastructure-strategy)
* [Large-scale computing report](https://www.gov.uk/government/publications/large-scale-computing-the-case-for-greater-uk-coordination)

This funding opportunity is a major part of UKRI’s contribution to the national capability in digital twinning.

Please see ‘additional information’ for more context.

### Scope

This NetworkPlus will bring together a diverse research community in digital twinning to:

* engage and network with stakeholders in academia, industry and government across UK and internationally
* assess and determine what the UK needs in terms of research, research infrastructure and skills to develop a national capability in digital twinning
* undertake thought leadership in areas of ethics and human interaction, environmental sustainability, and security and resilience of digital twinning through publication of white papers
* develop and run open opportunities for small digital twinning research projects

Digital twins have the potential to profoundly impact almost all areas of our lives. They are increasingly used in manufacturing, engineering design, and logistics, and offer the potential to accelerate progress in achieving net zero, to improve national security and national resilience, to improve understanding of human behaviour, as well as delivering wider economic and societal benefits.

Digital twins are virtual replicas and representations of assets, processes, systems, or institutions in the built, societal, or natural environments. They provide real- or right-time insight into how complex physical assets and citizens behave, helping organisations improve decision-making and optimise processes.

Digital twins fundamentally differ from computer models as they can provide significant amounts of real- or right-time data, allowing an appropriate level of interaction with the physical twin. At the same time, proposals, actions and events can be modelled with unprecedented accuracy effectively offering the ability to experiment in a non-live environment of the real world. Digital twinning refers to the wider approach in developing digital twins.

For the UK to reach its potential in this area and to be competitive, it will be necessary to harness the wealth of subject matter expertise across multiple disciplines and places and to deliver the research, research infrastructure, and highly skilled people that will be critical to the development of the next generation of digital twinning capability. Doing so will provide the UK with a competitive advantage in the design, manufacture, deployment and operation of new technologies through the use of digital twins. This will reduce the risks associated with innovation while simultaneously increasing the efficiency of existing and future systems.

The breadth of research needed will span much wider than the development of the technology and the sharing of data between and across platforms. Digital twins can also be used to better understand human behaviour in various contexts, such as the impact of high cognitive load, stress, and group dynamics on decision-making, and how individuals, crowds and populations respond to threats and crises.

This NetworkPlus is intended to provide an agile way for individuals interested in digital twins or related areas to engage with world-leading UK academic researchers, innovators and users. It is expected to generate impact for the digital twinning community through connecting our research and innovation space and working collaboratively with other UKRI and wider digital twinning investments and initiatives.

A key role of this NetworkPlus is to assess and determine what the UK requires in terms of research, research infrastructure and skills to develop a national capability in digital twinning.

EPSRC consulted a range of government, industry and academic stakeholders at roundtable sessions in April 2022 to identify what critical digital twinning research challenges need to be addressed to build a national capability.

Some of the digital twinning research challenges that were identified include:

* data acquisition, analysis, curation, storage, processing, standardisation and sharing, including the interoperability and integration of complex spatial data from multiple sources, and combining publicly available data with commercially sensitive data
* multifidelity and multiscale modelling, including working in high fidelity
* working in real- or right-time
* using artificial intelligence (AI) and different levels of automation
* semantic rules for federation of digital twins, developed for different reasons, and defining a clear systems architecture
* digital safety and security (including cybersecurity), understanding vulnerabilities and building resilience, including through diversity
* uncertainty, complexity, validation, verification, and assurance, including assurance in safety critical applications
* decision-making and understanding systems of systems, and how to most effectively use digital twins based on clarity of purpose
* visualisation and user interface, making digital twinning as an approach accessible for decision makers and those affected by the system or systems
* working with large volumes of data to understand and improve systems, system of systems, and their interaction over time using large data storage while concurrently using edge computing to enable rapid interactions within systems using real time sensors and updates to optimise operation in the moment
* environmental sustainability, understanding and optimising the power efficiency of digital twins as an approach through design and operation
* developing digital threads to develop, design, understand, and optimise the performance of systems, and parts of the systems, over time
* using high performance computing and related infrastructure
* offline simulations and emulations, testing and improving options with digital twins generating learning loops
* hardware and software for digital twins
* human behaviour and humans in the loop, including equality, diversity and inclusion (EDI), ethics and trustworthiness and personal data aspects, protecting privacy and security, while empowering users
* infrastructure requirements including how different climate change models and temperature variances impact over the lifetime of the infrastructure
* liability, legal, standards and regulations
* aspects of public policy development, including balancing competing public goals
* supporting legacy infrastructure assets as well as new systems, and their interactions
* skills development, including skills needed to work in multi and interdisciplinary settings
* cultural change while moving towards national and multimodal level solutions
* adoption of commercial aspects, including regulatory challenges

Please note that this list is not exhaustive.

### Aims of the NetworkPlus

The principal investigator of the proposal should have a collaborative mindset, and excellent leadership and management abilities. The leader of this network is expected to engage closely with academic, industry and government stakeholders. They should be an EDI role model for the community.

The NetworkPlus is expected to:

* establish and maintain a digital twinning research community by developing relationships and improved connections between UK and international academics, researchers, innovators, local and national bodies, regulators, and groups working on [low technology readiness levels (1 to 4)](https://www.ukri.org/publications/activities-associated-with-different-technology-readiness-levels/) digital twins research and related areas, increasing trust, impact of research and level of collaborations across the UK and internationally
* build multi and interdisciplinary capability, leverage existing partnerships and establish new ones
* assess and determine what the UK needs in terms of research, research infrastructure and skills to develop a national capability in digital twinning
* develop, publish and maintain a set of white papers in the first year of the NetworkPlus, drawing in expertise from relevant academic disciplines and providing thought leadership in the areas of:
  + security and resilience in digital twinning
  + ethics and human interaction in digital twinning
  + environmental sustainability. The future of digital twins must be founded on sustainable principles
* support the UK in delivering fundamental, non-sector-specific research needed in digital twinning. The scope of this research will be informed by the set of white papers on thought leadership as outlined
* identify research challenges, opportunities and priorities for the UK with users, academia, industry and government stakeholders that need to be addressed if the UK is to reach its potential for a long-term capability in digital twinning
* represent and promote the UK academic and research community in interactions with key stakeholders in the digital twinning space (see list in ‘additional information’ section on the digital twins landscape)
* develop communications, knowledge exchange, coordinated networking, and wider stakeholder engagement plans, in order to co-create activities, widely disseminate findings, improve alignment of research, policy and innovation across the UK, and increase coherence across the digital twinning landscape through better links between stakeholders
* report to and create a plan of engagement with EPSRC and work with other UKRI investments in this space to maximise benefits and ensure alignment between investments
* establish an appropriate management and governance model with effective monitoring and evaluation, develop a clear EDI plan, and support early career researchers
* develop and run open opportunities for small digital twinning research projects in areas such as supporting initial testing of new ideas, kick starting new collaborations, addressing digital twinning research challenges, and supporting early-stage research and development (R&D) through feasibility studies within a trusted framework
* develop and maintain an international strategy for the UK digital twinning academic and other research community, in support of the advancement of the national capability and benefit of the UK and its nations and regions

Your proposal must be multidisciplinary. We expect proposals to include expertise from across the range of academic disciplines. It is essential to involve expertise in computer science, engineering, and mathematical sciences. However, it is expected that other relevant disciplines will contribute in order to provide the expertise required to co-create and implement novel and human-centred solutions which incorporate legal and ethical considerations.

UKRI would like to encourage applicants from a broad range of disciplines, some of whom may not normally work with digital twins or be associated with the topic. The successful applicants will be able to demonstrate how they will bring together the relevant people effectively.

The NetworkPlus activities should:

* be UK-wide to include England, Northern Ireland, Scotland and Wales
* draw on existing and develop where appropriate, regional strengths
* should involve a broad range of disciplines and non-academic stakeholders

It is essential that user engagement is considered in the wider network membership. The NetworkPlus should aspire to accelerate development across the whole of the UK by maximising benefit from existing regional strengths and drawing in new relevant research expertise from across the UK. Collaborative networks should therefore strengthen connectivity and drive new potentially transformative academic contributions.

In support of this ambition, you are encouraged to tailor your activities to the needs of the area and to be innovative in your approach. Co-creation with the relevant stakeholders and partners will be essential in making this NetworkPlus a success.

You need to articulate clearly your approach to engaging and operating across scales (regional to national), across multiple geographies, and across other UKRI digital twinning investments in a structured and coherent way that enables benefits to be felt at both a regional and national level. User engagement must be monitored and reported on an annual basis.

### Funding available

The full economic cost of your project can be up to £3.75 million. UKRI will fund 80% of the full economic cost.

Normal costs associated in running a [standard research grant](https://www.ukri.org/councils/epsrc/guidance-for-applicants/types-of-funding-we-offer/standard-research/) may be applied for.

Your NetworkPlus can undertake a variety of activities over the duration of the grant to achieve its aims, including:

* workshops
* events
* communications
* secondments
* horizon scanning

You are encouraged to tailor your activities to the needs of the area and to be innovative in your approach.

Additionally, as part of running the NetworkPlus you will be expected to use part of the grant funding to develop and run opportunities for small projects. These will take place over the duration of the grant.

You should decide the amount of grant funding allocated to small projects. This amount should strike a balance between a need to support the key activities of the network and the need to support new activities.

The expectation is that some of these small projects will lead to applications for further support from appropriate funding bodies. In addition to being of high quality, all funded activities should aim for high impact and involve stakeholders to have a good chance of bringing real benefit to the UK.

Small grants will be covered by ‘flexible funding’ (see additional conditions), and this should be clearly stated on applications under the ‘directly incurred costs’ heading.

Please see the guidance for applicants for full details on what [costs you can apply for](https://www.ukri.org/councils/epsrc/guidance-for-applicants/costs-you-can-apply-for/).

### Investigators’ salaries

Requested under the ‘directly allocated cost’ heading.

The principal investigator and up to 4 co-investigators can request funds to cover their salary costs for the time spent on setting up and leading the NetworkPlus. The salary costs of NetworkPlus participants should not be included in the proposal and we would not expect these individuals to be co-investigators.

Please note that individuals listed as principal investigators and co-investigators can only be included on 1 bid.

### Travel and subsistence

Requested under the ‘directly incurred cost’ heading.

Travel and subsistence enabling members of the NetworkPlus to meet to exchange ideas and expertise. This may include visits by or to experts overseas. This may also include travel and subsistence costs to support secondments.

Where possible, collaborators should meet their own travel costs.

### Administrative and programme management support

Requested under the ‘directly incurred cost’ heading.

A sufficient level of administrative and programme management support should be requested to ensure the coordination, management and smooth running of the NetworkPlus.

Reasonable costs for monitoring and dissemination of the network’s output can be included. UKRI will also require monitoring of user engagement across the UK so you should include sufficient resources to allow for this.

### Organisation of activities

Requested under the ‘directly incurred cost’ heading.

Funding can be requested for costs involved in running activities such as:

* networking events
* expert working groups
* encouraging and stimulating discourse through debates and discussion
* online discussion forums
* lectures
* seminars
* problem-solving workshops

You are encouraged to think creatively about the range of activities that could support the delivery of the NetworkPlus goals.

### Research

Requested under the ‘directly incurred cost’ heading.

Research activity to support the research strategy developed within the NetworkPlus. Funds can be requested for:

* postdoctoral research assistant staff
* consumables
* travel and subsistence
* any other costs eligible under ‘directly incurred’ headings

This is likely to include a budget that can be allocated to researchers at other universities for open opportunities for small digital twinning research projects in areas such as:

* supporting initial testing of new ideas
* kickstarting new collaborations
* addressing digital twinning research challenges
* supporting early-stage R&D through feasibility studies within a trusted framework

We expect this to be a nationwide effort. You will need to think carefully about how this budget will be commissioned. Processes for the allocation of funds must be fair and transparent.

Please note that the funds for these projects will be restricted to organisations that are eligible to apply for EPSRC funding but will not be bound by standard EPSRC investigator eligibility criterion. It is the principal investigator’s responsibility to ensure ongoing governance to ensure correct usage and accountability of the funds.

UKRI would expect some examples of the types of projects at the application stage, but the research challenges should evolve during the course of the network activities and should be co-created and collaborative in nature.

### Other eligible and ineligible costs

Funding can also be requested for:

* activities to support experimentation on data within a trusted framework
* activities to identify and disseminate key research challenges in the area, for example horizon-scanning studies
* activities to facilitate impact and advance policy, such as reports, websites and briefings
* secondment support, including scoping of potential opportunities, travel and subsistence and so on
* activities to support career development
* activities to connect users, industry and other stakeholders with the research base
* communication costs to support the production of reports, videos and other media showing the benefits, outcomes and impacts of the NetworkPlus
* equipment to support networking, events and communication

Please note project partners cannot receive funding directly from the grant. The only exception to this is where a project partner is providing services or equipment that will go through a formal procurement process audited by the host research organisation. The project partner cannot receive any other funds from the grant, such as travel and subsistence.

Equipment over £10,000 is not available through this opportunity. Smaller items of equipment (individually under £10,000) should be in the ‘directly incurred – other costs’ heading.

We will not be funding laboratory or research equipment for this opportunity. We will only support equipment to facilitate communication, networking and events. We welcome innovative and creative thought.

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

### Project partners

NetworkPlus applications are expected to involve project partners from the digital twin innovation community and other users to co-create the NetworkPlus vision and aims. If successful, the NetworkPlus can onboard additional project partners during its lifetime, and is expected to do so as the network grows.

### Responsible innovation

Responsible innovation creates spaces and processes to explore innovation and its consequences in an open, inclusive and timely way, going beyond consideration of ethics, public engagement, risk and regulation. Innovation is a collective responsibility, where funders, researchers, interested and affected parties, including the public, all have an important role to play.

UKRI is fully committed to develop and promote responsible innovation. Research has the ability to not only produce understanding, knowledge and value, but also to identify and highlight potential unintended consequences, issues, questions, ethical dilemmas and, at times, to influence and shape thinking positively.

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.

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

### International collaboration and trusted research

The network’s leadership should be based in the UK, but the network may engage more broadly, as appropriate, taking note of UKRI principles on [trusted research and innovation](https://www.ukri.org/about-us/policies-standards-and-data/good-research-resource-hub/trusted-research-and-innovation/). In addition, we expect you to follow [guidance and best practice in working to reduce vulnerabilities to UK national infrastructure](https://www.cpni.gov.uk/trusted-research).

You may seek advice from the [Research Collaboration Advice Team (RCAT)](https://www.gov.uk/government/groups/research-collaboration-advice-team-rcat#contact-rcat), a collaboration between the government and academia which provides research institutions with a first point of contact for official advice about national security risks linked to international research.

You should be aware of the [National Security and Investment Act 2021](https://www.gov.uk/government/collections/national-security-and-investment-act), and where this may relate to outputs from your NetworkPlus.

You must apply using the [Joint Electronic Submission (Je-S) system](https://je-s.rcuk.ac.uk/JeS2WebLoginSite/Login.aspx).

You can find advice on completing your application in the [Je-S handbook](https://je-s.rcuk.ac.uk/Handbook/index.htm#t=pages%2FJeSHelpdesk.htm).

We recommend you start your application early.

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

### Submitting your application

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: Develop digital twins research community with NetworkPlus.

This will populate:

* council: EPSRC
* document type: standard proposal
* scheme: standard
* call/type/mode: Develop digital twins research community with NetworkPlus

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.

### Deadline

UKRI must receive your application by 4:00pm UK time on 23 March 2023.

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

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. UKRI will not accept any other attachment types under this opportunity.

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

Your application must include the following attachments:

* case for support: 8 pages (2 on your track record and 6 on the scientific case)
* workplan: 1 page
* justification of resources: 2 pages
* CVs: up to 2 A4 sides each only for named postdoctoral staff, researcher co-investigators (research assistants who have made a substantial contribution to the proposal and will be employed on the project for a significant amount of time) and visiting researchers
* [project partner letters of support](https://www.ukri.org/councils/epsrc/guidance-for-applicants/what-to-include-in-your-proposal/overview-of-information-needed-for-your-proposal/) from all project partners included in the Je-S form: no page limit
* host organisation letter of support from the principal investigator’s institution: 2 pages
* cover letter: optional attachment. No page limit and not seen by peer review

#### Case for support

Your case for support should include:

* track record of core NetworkPlus team (2 pages). This should include evidence of relevant experience and expertise the applicant team has in running networks or complex activities requiring comprehensive management
* clear, demonstrable links to a wide range of stakeholders, including national and international researchers, government (local, regional and national) and industry within the digital twinning and related communities. Please include examples of previous stakeholder engagement and knowledge sharing and its impact, and how you will build and develop a diverse NetworkPlus
* details of initial membership and contributions, including references to any:
  + collaboration with industry, policymakers and users
  + partnerships
* details on your activities to build and maintain a cross-sector, international, multidisciplinary research network in digital twinning that:
  + improves connections and collaborations between stakeholders
  + undertakes critical thought leadership in the areas of security and resilience, ethics and human interaction and environmental sustainability
  + supports small digital twinning projects
* how equality, diversity and inclusion and responsible research and innovation will be integrated at the core of the proposed activities
* how the proposed NetworkPlus will assess, determine and address real world research, infrastructure and skill challenges in the development of a national capability in digital twinning, this could be co-created with relevant partners
* scientific or technological basis for the NetworkPlus, including in the context of current and previous international research in the field
* strategy or approach to access and build on regional strengths of the UK over the lifetime of the NetworkPlus
* scientific, technological and management benefits and any additional benefits over the work of existing researchers or networks (targets and performance indicators should be given that allow the project to be evaluated at its end in the longer term, 5 years from start)
* details of plans for open opportunities for small digital twinning research projects, including commissioning and ongoing governance to ensure correct usage and reporting
* plans to disseminate the network’s outputs
* potential for industry and academia collaboration within the network and how this might lead to support for new research in the relevant and emerging fields
* plans for self-sufficiency beyond the end of the project

Your case for support should be a self-contained description of your proposed work, with relevant background and references. It should not depend on additional information such as the inclusion of external links.

Assessors are advised to base their assessment on the information contained within the application and are under no obligation to access any such links. This means that links should not be used to provide critical information.

#### Work plan

Your work programme should be illustrated with a simple diagrammatic work plan, such as a Gantt chart. This should clearly set out a timeline for activities and delivery milestones.

#### Justification of resources

Your justification of resources should state that the resources you are requesting are appropriate to undertake the activity described in your case for support. It should also explain why they are appropriate, taking into account the nature and complexity of your proposal.

It should not simply list the resources required, as this has already been done in the Je-S form.

Where you do not provide an explanation for an item that requires justification, it will not be funded.

#### CV

You must include a CV for:

* named research staff including postdoctoral staff and research technical professionals
* researcher co-investigators (research assistants who have made a substantial contribution to the proposal and will be employed on the project for a significant amount of time)
* visiting researchers

#### Host organisation letter of support

You must include a host organisation letter of support from a senior leader within your organisation.

Your host organisation letter of support should include:

* recognition of the fact that the host organisation will be responsible for administering the grant for the national network on behalf of all NetworkPlus partners and members
* details of specific support that will be given to the applicant team (including investigators, management team and administrators) in:
  + managing the NetworkPlus budget
  + commissioning the funds
  + ongoing governance to ensure correct usage and accountability

Please note, details about how your NetworkPlus will be managed should go in the case for support document.

The lead organisation must submit 1 proposal on behalf of all organisations involved in the NetworkPlus and attach all the relevant documentation for the project. If the NetworkPlus is funded, money will be awarded to the lead organisation who are responsible for distributing it between the collaborating organisations.

We will not be accepting submissions consisting of multiple proposals.

#### Proposal cover letter

The proposal cover letter is an optional attachment.

This letter will only be seen internally by UKRI. You can express any other information you feel is relevant to your application.

### 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).

EPSRC guidance can be found under ‘additional information’.

### Assessment process

Any proposals that do not fit the remit of the opportunity will be rejected prior to assessment. Please note that the proposal must focus on building a research community, not a research project.

Proposals that do not include plans to establish and run an independent steering board with membership and terms (as specified in the conditions) will be rejected.

This opportunity will use a 2-stage assessment process.

Applications will not be assessed by postal peer review.

In the event of this opportunity being substantially oversubscribed as to be unmanageable, EPSRC reserve the right to modify the assessment process

### Stage 1: expert panel

Applicants whose proposals pass remit will progress to expert panel in May 2023. Proposals will be assessed and prioritised using the fit to opportunity (primary) assessment criteria.

Feedback will not be provided to applicants at this stage unless they are invited to interview.

Applicants successful at stage 1 will have the opportunity to reply to the expert panels’ comments during the interview panel.

### Stage 2: expert interview panel

Successful applicants from the stage 1 panel will be invited to an interview by an independent panel of experts in June 2023.

Full details of the interview process will be sent to candidates before the interviews. The interview will assess the applicants against the assessment criteria.

The principal investigator should attend along with up to 2 other members of the team (this could include project partners).

As this assessment will be undertaken by an UKRI-nominated expert interview panel, there is no opportunity for applicants to nominate reviewers.

The proposals and interview will be assessed by the expert panel to generate a rank ordered list, taking into consideration the assessment criteria. EPSRC will make a final decision based on the recommendation of the panel.

All applicants interviewed will be given feedback from the panel on their proposal.

A funding decision is expected by early July 2023.

The successful NetworkPlus will have a fixed start date of 1 August 2023

In the event of this opportunity being substantially oversubscribed as to be unmanageable, UKRI reserves the right to modify the assessment process.

### Assessment criteria

#### Stage one: expert panel

##### Fit to opportunity (primary)

Making reference to:

* an effective, well-articulated strategic plan for how the NetworkPlus will achieve high quality, inclusive stakeholder engagement across a breadth of places, sectors and research interests to build a diverse and connected network, along with undertaking key activities in thought leadership and supporting small digital twinning research projects
* potential to stimulate the development of emerging research areas and build research collaborations
* potential to identify ambitious ‘real world’ research, infrastructure and skill challenges in digital twinning between users and academia, in associated problem domains, including an appreciation of the challenges and sensitivities of working in this area
* how the proposed NetworkPlus will build multidisciplinary capability relating to resilient digital twins and systems across the broadest possible range of disciplines
* potential for the network to advance the UK’s development of a national capability in digital twinning, as well as the UK’s economy and society
* extent to which the NetworkPlus complements other UK funded research activities and existing networks in the area, including any relationship to the EPSRC portfolio
* extent the application can be demonstrated to show regional relevance and benefits but in the context of a national landscape
* sustainability of the activity after the lifetime of the grant

#### Stage 2: interview panel

Stage 2 is an expert interview panel and will provide the applicants with the opportunity to respond to any questions or queries raised by the sift panel and will assess the applicants against the following criteria.

##### Quality (primary)

The research excellence, making reference to:

* the ambition, adventure, transformative aspects or potential outcomes
* the suitability of the proposed membership and activities. Applicants are encouraged to tailor their activities to the need of the area and be innovative in their approach. Activities should reflect the expected aims from the NetworkPlus
* appropriate engagement and dissemination plans to accelerate impact and form an agenda for future research in the area
* appropriate plan for how equality, diversity, and inclusion and responsible research will be embedded at the core of the proposed work

##### Applicant and partnerships (secondary major)

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

* track record of the principal investigator in engaging and collaborating with relevant academics, businesses, regulators and government agencies, as well as their relevant research, leadership and management of complex activities
* appropriateness of the track record of the applicants
* balance of skills of the project team, including collaborators.
* evidence of thought leadership, responding to strategic and policy drivers
* sufficient administrative support for managing the NetworkPlus
* appropriate range of expertise of core NetworkPlus members
* evidence of user engagement, co-creation and support (financial cash or in-kind) and ability to engage with users
* evidence of host institution support, specifically focusing on support given to the applicant team in managing the NetworkPlus budget and ongoing governance to ensure correct usage and accountability

##### 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:

* the project plan and management arrangements, which should be proportionate to the scale and complexity of the activity proposed, including appropriate governance for the commissioning of funds to ensure correct usage and accountability
* the effectiveness of the proposed management structure and plans
* appropriate resources have been requested to support community building, responsible innovation and public engagement
* plans for achieving self-sufficiency beyond the grant support

### Feedback

If invited to interview, feedback will be provided.

Feedback will be provided after the expert panel and the interview panel.

The final rank ordered list will be available on the [EPSRC grants on the web system](https://gow.epsrc.ukri.org/) when applicants are informed.

### Integrated review and national capability in digital twins

Department for Business, Energy and Industrial Strategy (BEIS) is the lead policy department for the development of the national capability in digital twinning. EPSRC, working with colleagues across UKRI and with BEIS, have considered how the academic research community can play its part in the development of the national capability in digital twinning.

The digital twinning landscape includes investments across government and industry.

The successful NetworkPlus investigators should be aware of the digital twins landscape, such as:

* other EPSRC and UKRI digital twinning investments
* the National Digital Twin Programme led by BEIS
* Catapults
* Digital Twin Hub: a multisector industry and Catapult network partnership housed at the Connected Places Catapult
* The Alan Turing Institute: artificial intelligence and data science, including for digital twinning, such as the Turing Research and Innovation Cluster in Digital Twins
* The Apollo Protocol
* Centre for the Protection of National Infrastructure (CPNI) and the National Cyber Security Centre (NCSC)

### Upcoming EPSRC’s digital twinning investments

EPSRC is making a series of digital twinning investments linked to, and in some cases funded by, UKRI’s building a secure and resilient world theme.

The first of these investments is the [‘Leader for research in digital twinning for decarbonising transport’](https://www.ukri.org/opportunity/leader-for-research-in-digital-twinning-for-decarbonising-transport/), which is the first stage of a 2-stage process designed to launch a new EPSRC digital twinning research hub. The hub will tackle digital twinning research challenges to support and accelerate the UK transport systems’ transition to zero emissions, improve integration across the systems of transport and support economic growth.

Concurrently to the digital twinning for decarbonising transport research hub investment, EPSRC, supported by additional funding from UKRI’s building a secure and resilience world theme, is launching this NetworkPlus investment that will bring together the research community across disciplines in support of the development of the national capability in digital twinning.

In addition, EPSRC will make future investments in core research in digital twinning that can be taken forward for application in multiple settings and sectors.

A further UKRI and EPSRC digital twinning applied research investment will be focused on using digital twinning as an approach to support and improve the operation and resilience of the UK energy grid.

The strategy for EPSRC’s digital twinning investments is managed within EPSRC’s digital security and resilience theme, working in support of UKRI’s building a secure and resilient World theme and EPSRC’s AI, digitalisation and data priority.

### Building a secure and resilient world strategic theme

The [UKRI strategy for 2022 to 2027: transforming tomorrow together](https://www.ukri.org/publications/ukri-strategy-2022-to-2027/), outlines 5 strategic themes that look to harness the full power of the UK’s research and innovation system to address major national and global challenges.

‘Building a secure and resilient world’ is one of the themes under the auspices of which UKRI will catalyse, convene and conduct research and innovation, through taking a systemic approach that is human-centred, aimed at strengthening societal and economic resilience. The theme aims to enhance national security across virtual and physical environments, by improving awareness of risks and threats, preparedness, informed decision making and response, and allowing change to be understood as a force for good.

‘Building a secure and resilient world’ directly tackles core methodologies for supporting a better and more robust approach to managing crisis from business to government to communities. A core focus of the theme is on supporting systems thinking and decision making to reduce risk and strengthen our security and resilience, and showing how this should support, and be implemented by, communities at every level, from local to international.

We have identified 5 interrelated sub-themes, through which UKRI will deliver a range of activities tailored to enable resilience to different risks in different systems that:

* is built on the strengths of our current economy and society
* helps reduce vulnerability
* prepares for robust and rapid responses and enhances recovery
* encourages approaches which bring positive transformation

The 5 sub-themes are:

* global order in a time of change: enable UK to take one of the leading positions in shaping an international order that is secure, resilient and just
* technologies for resilience, security and defence: advance capacity of state defence and security, society and economy to reduce vulnerabilities, to respond to and recover from shocks through innovation and technological advancement
* resilient and secure supply chains: increase the resilience of supply chains (food, critical materials, manufacturing, complex systems) to a wide variety to potentially interacting shocks
* behavioural and cultural resilience: reduce the impact of shocks on individuals and communities through adaptation and embracing change, deployment of resources for personal resilience that is fair and just
* strengthening resilience in natural and built environment: mitigate impact of natural and anthropogenic hazards and risks on wider societal processes and operations in rural and urban contexts being responsive to particular requirements of place

This opportunity speaks directly to the ‘technologies for resilience security and defence’ sub-theme exploring and critically assessing the role of technologies in making systems more robust against external threats.

### EPSRC’s digital security and resilience theme

EPSRC’s digital security and resilience theme has been formed to put a spotlight on digital technologies relevant to the security, defence and resilience of the UK. The supported research will aim to create a more secure and resilient digital society that is robust and prepared to withstand shocks and challenges in an increasingly interconnected digital world.

We are doing this by:

* bringing relevant EPSRC investments under the new theme (around £120 million), while making connections across EPSRC and UKRI, and with key stakeholders
* developing EPSRC’s strategy and plans for digital security and resilience, and for specific topic areas falling under that remit, such as cyber security and digital twinning, while connecting across UKRI
* building communities, networks and capacity to develop national capability in specific digital security and resilience topic areas

Broadly, the digital security and resilience theme’s investments fall in 2 areas:

* mitigating risk: research to promote and improve the security and resilience of digital technologies
* creating opportunities: research into digital technologies that would be developed to promote and improve the security, defence and resilience of the UK, and the security and resilience of its organisations, systems, infrastructure and society

The successful applicant may be expected to provide additional reporting to EPSRC related to the UKRI building a secure and resilient world theme.

### Background to EPSRC NetworkPlus grants

A NetworkPlus is a strategic investment which brings together new research communities and identifies, prioritises and develops future research challenges.

EPSRC has had considerable success from previous NetworkPlus investments which focus on academic research challenges. These NetworkPlus investments have developed a rich body of outputs, including:

* new collaborations
* grant proposals
* new research methods
* horizon scanning reports
* new policy
* feasibility studies

Lessons learned from previous NetworkPlus activities include:

* a clear, well-defined topic for the network is needed to focus plans and activities the portfolio of grants needs to be regularly reviewed
* sufficient administrative and host university support for the network is vital, in order to support activities such as small projects and dissemination activities
* the amount of funding for small projects may be variable, and should depend on the research topic or discipline
* different scales of study may require different assessment processes to reflect the value that is being requested
* expectation and arrangements for full economic costing of network activities need to be clear across all parties
* advertising of events needs to be included in the budget
* long-term plans for the legacy and sustainability of the network need to be considered early on
* coordinate and complement existing research in the area, rather than compete or replicate work

### Additional grant conditions (AGCs)

Grants are awarded under the standard [UKRI grant terms and conditions](https://www.ukri.org/manage-your-award/meeting-ukri-terms-and-conditions-for-funding/). The following additional grant conditions will also apply. Please ensure that this is resourced for accordingly in the application.

#### Community network expectations

This grant is awarded on the understanding that, in addition to the core research programme, the project will undertake a wider networking role with the research and user community outside its membership. This may involve coordination of activities such as meetings, workshops or seminars on behalf of us. A dedicated website must be set up within 6 months of the start of the grant and regularly maintained to provide a resource for engagement with the wider community.

This grant is expected to further develop the network including its academic and user (for example, policy, business, non governmental organisation) membership throughout the period of funding in order to maximise its impact on a wide range of disciplines. As part of the grant, networks must identify ambitious ‘real-world’ challenges, which require a multidisciplinary approach and will form an agenda for future research in the area.

#### User engagement strategy

You must develop and execute a strategy for engaging with potential users of the research funded in the project. This strategy should be reviewed and updated regularly as part of the formal management and reporting process agreed for this grant.

#### Equality, diversity and inclusion (EDI)

In addition to RGC 3.4, you are expected to prepare a full EDI plan for the duration of this grant to demonstrate best practice in EDI throughout the lifetime of this funding award. This must be recorded through the grant reporting process.

#### EPSRC project officer appointment

We will nominate a member of our staff (the project officer) who will be your primary point of contact. The project officer will ensure that the project is being run in accordance with the terms and conditions and in line with financial due diligence. The project officer should have access to all documentation of governance and reporting bodies, in so far as it relates to the administration and application of the grant. As funding administrators, all UKRI staff have agreed to maintain the confidentiality required by all parties involved in our funded research.

#### Advisory board appointment

This grant must establish and run an independent advisory board, or equivalent body, to oversee the running of the project and provide advice on the strategic direction and activities of the project. The terms of reference and membership of this group (at least 50% independent membership and an independent chair) should be agreed with us.

The project officer will also be expected to attend and participate in advisory board and other appropriate meetings for the duration of the grant.

#### Flexible funds

Notwithstanding standard grant condition RGC 4.4 the sum awarded under the heading of ‘Flexible funds’ can include both directly incurred and directly allocated expenditure. These funds must be reported on the final expenditure statement (FES) as awarded on the offer letter and a breakdown of the expenditure must be submitted along with the FES. If a breakdown of this expenditure is not received the FES will be returned. Standard grant conditions apply to all other funds awarded on this grant.

#### Publicity and branding

In addition to RGC 12.4 Publication and Acknowledgement of Support, you must make reference to UKRI funding and include the UKRI logo and relevant branding on all online or printed materials (including press releases, posters, exhibition materials and other publications) related to activities funded by this grant.

#### Progress reports

In addition to the requirements set out in RGC 7.4.3, you are responsible for providing annual progress reports against non-financial performance metrics. A detailed list of performance metrics and instructions for reporting will be agreed with the grant holder upon commencement of the grant.

#### Start date

Notwithstanding RGC 5.2 Starting Procedures, this grant has a fixed start date of 1 August 2023. No slippage of this date will be permitted. Expenditure may be incurred prior to the start of the grant and be subsequently charged to the grant, provided that it does not precede the date of the offer letter.

#### UKRI building a secure and resilient world theme

This is a strategic investment led by us on behalf of UKRI in support of UKRI’s building a secure and resilient world theme. Additional reporting requirements and conditions may be applied to this investment, and to other investments under the theme.