**EPSRC digital twins**

The Digital Twins theme worked with colleagues across UKRI and the Department for Business, Energy and Industrial Strategy (BEIS) to coordinate the UKRI strategy in support of the development of the UK national capability in digital twinning and cyber-physical infrastructure.

### Update notice

Within EPSRC, we operate challenge themes to address and deliver impact against the most pressing challenges of the moment. We continually review these challenges and the strategic outcomes we seek. The creation of the new DS&R theme reflects our themes and external landscape, priorities and policy drivers.

Cyber security and digital twinning will be included within the remit of the new DS&R theme.

The research supported will 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 will do this by:

* bringing relevant EPSRC investments under the new theme, whilst making connections across EPSRC and UK Research and Innovation (UKRI)
* developing EPSRC’s strategy for digital security and resilience, and for specific topic areas falling under that remit, such as cyber security and digital twinning
* building communities, networks, and capacity to deliver national capability in specific digital security and resilience topic areas.

Broadly, the DS&R theme’s investments will support two areas:

* research to promote and improve the security and resilience of digital technologies
* 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 DS&R theme will continue to work with colleagues across UKRI and the Department for Business, Energy and Industrial Strategy (BEIS) to coordinate the UKRI strategy in support of the development of the UK national capability in digital twinning and cyber-physical infrastructure.

More information on the new DS&R theme will be available soon.

If you have any queries, please contact [digital.security.resilience@epsrc.ukri.org](mailto:digital.security.resilience@epsrc.ukri.org)

### Background

Digital twins are virtual replicas and representations of real-world assets, processes, systems or institutions in the built, societal or natural environment. They provide real-time or right-time insight into how complex physical assets, systems and citizens behave, helping organisations improve decision-making and performance. This includes testing potential options off-line, to avoid unintended consequences.

This theme is relevant to engineering and physical sciences researchers at all career stages, but will also be of interest to business partners and interdisciplinary researchers in other council remits.

EPSRC is interested in supporting the engineering and physical sciences research and innovation required to develop and deploy digital twins across multiple economic sectors. This will be performed by working across our remit through specific activities alongside existing theme and programme structures to support research both in the fundamental development and interoperation of digital twins, as well as their application to specific key topic areas.

This includes supporting underpinning research in artificial intelligence, information and communication technologies (ICT), mathematics, validation and verification, complexity, visualisation, decision making and so on. These topics are also linked to wider research across the social sciences to deliver socio-technical change.

Realising the potential of digital twins throughout the UK economy will require interdisciplinary research across the full breadth of UKRI’s remit, as well as the involvement of industry, government, and the wider general public. EPSRC is therefore working closely with colleagues from other research councils, as well as relevant government departments, to develop cross-UKRI activities, funding opportunities and strategies.

Our intention is to connect the academic community across relevant disciplines and make sure research delivers impact, working closely with our strategic business partners, subject matter experts, trade bodies, public sector research establishments and governmental organisations to support the development of a national capability.

Digital twins is one of the transformative technologies under the UK Research and Innovation (UKRI) Transformative Technologies theme. It also sits within the Engineering and Physical Sciences Research Council’s (EPSRC) Artificial intelligence (AI), Data and Digitisation priority.

A requirement for a national capability in digital twinning was identified in the [Integrated Review](https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy), and the subject also appears in the following publications:

* [National AI Strategy](https://www.gov.uk/government/publications/national-ai-strategy)
* [Data for 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).

Digital twins offer the potential to accelerate progress in achieving net zero, to improve national security and national resilience, as well as delivering wider economic and societal benefits.

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 it is estimated that they could provide $1.3 trillion in economic value by 2030 across five key use cases alone. Furthermore, agriculture, education, healthcare, infrastructure and energy networks among many more can all benefit from this technology and the possibility of testing hypothetical outcomes and solutions.

This is envisioned to be a key part of a wider cyber-physical infrastructure (CPI) to help position the UK as a science superpower by making it the ideal place to set up an innovative business. This CPI will comprise connected elements of both physical and digital infrastructure. Common, shared digital elements could significantly reduce the rework that industry reports in developing use cases and common, open standards and frameworks. This enables federations of individual systems to increase the value of each use case by enabling a system of systems.

To reach its potential, the UK will need to develop the next generation of digital twinning capability, including the people who will drive this forward and anchor it in the UK. 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 and, in doing so, reduce the risk of innovation while simultaneously increasing efficiency of existing and future systems.

[View evidence sources used to inform our research strategies](https://www.ukri.org/publications/epsrc-research-area-evidence-sources/).

You can apply for funding to support an EPSRC research proposal in the area of digital twins at any time under any open EPSRC scheme including standard mode, programme grants and fellowships.

Standard (sometimes known as ‘responsive’) funding opportunities are open to a wide range of research and approaches within EPSRC’s remit.

In line with council remit we will support interdisciplinary proposals, but the majority of the research must be within engineering and the physical sciences