**Built environment**

Quantitative engineering research into the design and operation of buildings and the construction processes involved.

This area encompasses quantitative engineering research into the design and operation of buildings and the construction processes involved, including topics around building performance, for example:

* heating
* lighting
* ventilation
* indoor air quality
* building acoustics
* thermal comfort
* resource efficiency and energy use
* design for productivity
* health and wellbeing.

This research area also includes processes such as procurement, project management, innovation management and use of information and communication technologies.

Research within this area remains of significant national importance and continues to be excellent. It will be characterised by investments that focus on long term transformative challenges within a whole systems context and consider the use of ICT in construction, building performance and public health in the built environment.

We will explore the needs of researchers who are early in their career and take action where necessary. In addition we will continue to work with other research councils and innovation partners, such as Innovate UK and government, to support multidisciplinary research.

We aim to have a portfolio of research addressing the issues below.

### Make use of ICT in construction

Making full use of Internet of Things technology and strengthening computer science in building design and management, ensuring alignment to government initiatives around digital construction. This will also require novel sensors, instrumentation and autonomous systems, and will be achieved through collaboration with IT-based research areas.

### Building performance

Ensuring buildings are fit for purpose and resilient to change in use. This will include current areas such as ventilation, heating and lighting systems.

### Wellbeing and inclusivity in public health

Continuing the focus on design for wellbeing and inclusivity, particularly aligned to improving health delivery with an ageing population. Also addressing the role of built environment design as a preventive measure to minimise spread of disease.

We will work with the community to understand and address, where possible, any leadership or related skills challenges, particularly in relation to early career researchers. Similar needs in the [Infrastructure and urban systems](https://www.ukri.org/our-work/browse-our-areas-of-investment-and-support/infrastructure-and-urban-systems/), [Structural engineering](https://www.ukri.org/our-work/browse-our-areas-of-investment-and-support/structural-engineering/) and [Ground engineering](https://www.ukri.org/our-work/browse-our-areas-of-investment-and-support/ground-engineering/) research areas will also be addressed.

The community should address these research challenges in the context of the whole system. In conjunction with the Infrastructure and urban systems, Structural engineering and Ground engineering research areas, this will contribute to establishing whole system connectivity in the smart cities agenda and increase acceleration of transformative impacts.

The community should position itself to maximise the impact of planned investment in the [UK Collaboratorium for Research in Infrastructure and Cities](https://www.ukcric.com/) and capitalise on the UK leadership created through such an investment, ensuring the harnessing of multidisciplinary opportunities.

This research area is also of potential relevance to the Foreign Commonwealth and Development Office’s [Official Development Assistance](https://www.gov.uk/government/collections/official-development-assistance-oda--2) funding streams.

We aim to give the UK a competitive edge in the construction section through smart technologies.

The UK is leading the way in implementation of digital platforms for building management, as demonstrated by government commitment to building information management . There is evidence for an increased international focus of the research, particularly in collaboration with the rapidly urbanising countries in Asia.

Research in the built environment is highly multidisciplinary and collaborative, cutting across the civil engineering research areas of Infrastructure and urban systems, Ground engineering and Structural engineering. Capacity is distributed across the country in built environment, civil engineering and architecture departments.

There has been a gradual increase in overall student numbers associated with this research area that are supported through doctoral training partnerships. A large overlap exists with student training in associated civil engineering research areas: Infrastructure and urban systems, Ground engineering and Structural engineering.

This research area has a low number of early career researchers funded by EPSRC, in terms of first grants and early career fellows, with overall funded ECRs falling. This trend is reflected in other areas related to civil engineering.

More broadly, there is a predicted skill shortage in the construction sector, particularly at apprentice and undergraduate level. The challenge will be to retain skilled individuals in academia who can train the next generation. There is a risk of loss of capacity due to an ageing demographic.

During the Research Excellence Framework (REF) 2014 process, Panel C assessed this research area and recognised that there has been a notable increase in the volume of interdisciplinary research addressed at global challenges such as sustainability, carbon reduction and resilience to climate change. The panel’s report highlighted the difficulty of translating the research outputs into changes of policy and also highlighted the increase in interdisciplinary work, particularly at the social and economic interface.

The UK Collaboratorium for Research in Infrastructure and Cities (UKCRIC) has major facilities and city observatories across the country, with core areas aligned to the challenges of the Built environment research area.