Centre for Systems Engineering and Innovation

Bringing systems engineering to civil infrastructure
Our vision is to bring systems engineering and innovation to civil infrastructure.

Systems engineering is “an interdisciplinary approach and means to enable the realization of successful systems” (INCOSE 2017)

Projects are interventions into infrastructure systems. Project delivery is being transformed through the use of digital information and new manufacturing approaches. Interdependencies across infrastructure sectors, such as transport, water, energy and buildings, are important to a smart and sustainable built environment. To realise the potential to improve overall performance across new and existing infrastructure, it is important to take a systems approach to understanding projects as interventions.

The research of the Centre for Systems Engineering and Innovation takes a systems approach to addressing sector challenges with thematic focus on:

**Digital**

1. **PRODUCTION SYSTEMS**
   - Modularity, design and optimization of delivery (led by Panagiotis Angeloudis and Marco Aurisicchio)

2. **INFRASTRUCTURE INTERDEPENDENCIES**
   - Interdependencies within and across infrastructures (led by Ana Mijic, Ivan Stolianov and David Birch)

3. **LIFECYCLE**
   - Value across the life-cycle: projects to operations (led by Arnab Majumdar and Jennifer Whyte)

**Manufacturing**

- Delivering better, more certain outcomes using digital technologies
- Improving productivity, quality and safety by increasing the use of manufacturing
- Optimising through-life performance though the development of smart assets

**Performance**

- First, we scientifically examine existing design practices to develop new knowledge about the challenges and opportunities for systems engineering and innovation in built infrastructure, as well as the trajectories of change to an advanced manufacturing industry.
- Second, we bring that learning back into the laboratory to develop novel tools and approaches from a systems perspective, using a range of modelling, simulation and data analysis techniques.
- Third, as part of an ‘open innovation’ ecosystem working across traditional boundaries, we rapidly address issues, and solve the fundamental engineering problems that arise in major infrastructure projects and delivery supply-chains.

Researchers in the Centre benefit from our location in a world-leading Department of Civil and Environmental Engineering and Faculty of Engineering. The Centre has an active research community, with links to related research across Imperial College London, in departments and centres, such as: the Dyson School of Design Engineering; the Data Science Institute; the Centre for Process Systems Engineering and Imperial College Business School. We also have strong links with the National Institute for Data Science, the Alan Turing Institute, and the UK Collaboratorium for Research on Infrastructure and Cities (UKCRIC).
Contact us

The Centre for Systems Engineering and Innovation
Imperial College London
South Kensington Campus,
London SW7 2AZ, UK

+44 (0)20 7594 5031
csei@imperial.ac.uk
@CSEI_imperial

www.imperial.ac.uk/csei