



Call for Expressions of Interest from Research Partners

Digital Twinning for Transport Decarbonisation

Background

EPSRC consultation leaders, Prof. Phil Greening and Prof. David Flynn, have been selected to lead a proposal for a strategic 5 year investment in digitalisation for transport decarbonisation.

Vision: The decarbonisation of transport, with its shared infrastructure and complex interdependencies, throws into sharp focus the need to consider a whole-system view of physical and socio-economic systems in infrastructure and operations. The urgency of decarbonising, and the radical transformation of critical infrastructure this will require, dictates that real-world trials and demonstrators are complemented with increased use of virtual modelling and deployment of digital twins (DT). The DT transition within transport is, at present, largely constrained to niche, well-articulated and simplified challenges, such as sub-system modelling of components within transport systems. We therefore need to develop a new paradigm, extending boundaries of DTs into an interconnected whole system view, and incorporating DTs with other types of modelling. This modelling framework will, in turn, also expose integration challenges between transport modes and across sectors, which will assist in planning a smoother-running, resilient overall transport ecosystem.

This paradigm shift represents the only viable pathway to de-risking the investments needed to achieve the nationally important Net Zero target by 2050, and to be effective it must be widely accepted by all. This will require inputs from both passenger and freight transport sectors, and across all modes: road, rail, maritime and aviation.

The research priorities of this hub are to tackle the complex and adaptive system modelling of transport infrastructure and future services. Creating an emergent capability in Digital Twins and digitalisation for critical UK transport infrastructure and services.

The team has conducted extensive consultations across stakeholders within the Transport, Energy and Digital Technology domains, including operators and users of transportation services for freight and passengers <https://transit.ac.uk/our-network/>. Key themes to emerge from the consultation include:

- Risk and uncertainty (financial and technological)
- Siloed decision making, preventing integration across transport modalities, geographies, technologies, etc.
- Data and sensing systems, including standards, access, privacy, and security.
- Human behaviour including consumer acceptance, behaviour change and accessibility.
- Skills and innovation.
- Energy supply.

The ambition is to discover and develop a digitally enabled toolkit that can inform policy makers at all levels of government, business investors and social organisations, providing on-going oversight of transport networks and usage to drive rapid decarbonisation. The team is aware of the significance of existing UKRI investments in transport decarbonisation and digitalisation, and a function of this National Hub will be to deliver complementary research and assist in the national coordination of these strategic investments. As to support an accelerated and enhanced research impact in transport decarbonization.

The challenge is not simply to bring a selection of isolated digital twins to the transport sector, but rather to take a complex adaptive systems perspective to facilitate whole-system optimisation, through a federated system of digital twins. The research will select a limited number of use-cases to develop the architecture that could subsequently be applied to all transport modes and scales.

We are seeking academic partners, who can make a significant contribution to this strategic national investment. Significant transport domain knowledge with experience of interdisciplinary research using enabling digital technologies. The final consortium is not expected to exceed 7 institutions including Heriot-Watt and University of Glasgow.

Eligibility

- Partners must be based at an organisation eligible for UKRI funding, and eligible to be named as a co-investigator on an EPSRC bid.
- Demonstrate a track record of impact in the transport domain.
- Demonstrate a strong track record in leadership in delivering large-scale interdisciplinary research projects, typically over 3-5 years duration exceeding £2M
- Capacity to leverage support from industrial stakeholders and national research assets
- Demonstrate research impact particularly with respect to policy advice
- Evidenced extensive experience in the use of digital technologies for transport infrastructure and services.
- Evidenced experience of working on multi-modal transport solutions.
- A track record of supporting or leading existing EPSRC investments in Transport Decarbonisation is desirable.

Additional requirements

- Able to attend proposal development workshop in Edinburgh on 27/28 November 2023
- Able to provide an institutional costing by 6 December 2023
- Available for proposal development and drafting during December 2023 and early January 2024.

Key dates

- Deadline for return of EOI - Friday 17 November 2023
- Decision on EOIs made by leads - Tuesday 21 November 2023
- Deadline for full proposal submission – Tuesday 30 January 2024
- Project start date – estimated May 2024 (5 year duration)

Budget

- Maximum budget – for each University - likely to be between £500K and £1M 80% FEC
- Funding will be available at 80% Full Economic Cost.
- Project duration up to 5 years, but may be a shorter time commitment.
- Likely start date –May 2024

Further information

- Please address any questions to Info@transit.ac.uk
- EoI form to be submitted to Info@TransiT.ac.uk by 9 am Monday 20th November 2023