UNIVERSITY OF SURREY

**ACUITY AND AGILITY IN INFRASTRUCTURE SYSTEMS DECISION-MAKING**

WORKSHOP PROGRAMME

20-21 July 2022

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The Institute of Advanced Studies (IAS) at the University of Surrey sponsors workshops and Fellowships at the 'cutting edge' of science, engineering, social science and the humanities. Through this scheme the Institute fosters interdisciplinary collaborations and encourages a flow of international scholars to visit, enjoy their stay at Surrey and leave behind excellent ideas and innovations.

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# INTRODUCTION

Tragic incidents such as the collapse of the Mexico City Metro overpass have demonstrated the impact of inadequate infrastructure maintenance, while intense weather events coupled with higher societal expectations bring new challenges to infrastructure management.  Taking a richer, more proactive approach to the use of data – including data related to climate change – will be the topic of this event organised by Surrey's experts in civil engineering, electrical and electronic engineering and computer science in collaboration with Beckford Consulting. The activities planned for this event will provide insights on the value of data in achieving real-time, predictive and adaptive maintenance and management practices while balancing the trade-off between demanding criteria for de-risked (in terms of human safety) and de-carbonised activities. This will also assist in identifying areas where new technologies can be further exploited for monitoring, maintenance and management of assets.

**Organising committee:**
Prof John Beckford, Beckford Consulting
Prof Marios Chryssanthopoulos, University of Surrey
Dr Raffaella Guida, University of Surrey.
Dr Donya Hajializadeh, University of Surrey
Dr Boulent Imam, University of Surrey
Dr Sotiris, University of Surrey
Dr Emma Hellawell, University of Surrey

**Administrative support:**
Vicki Blamey,IAS, University of Surrey

# PROGRAMME

## PART 1 – ASSET-LEVEL DATA-TO-DECISIONS
## WEDNESDAY 20TH JULY

(BST)

14.00 – 14.15   Opening Session – Introduction and Agenda

14.15 – 14.45   Keynote Provocation Lecture

*Asset-Level Decision Making*, David Castlo, Network Rail

14.45 – 15.45   'Data as Services' asset-level asset management route map co-creation session – Session 1

15.45 – 16.15   Break

16.15 – 17.00   'Data as Services' asset-level management route map co-creation session – Session 2

17.00 – 17.15   Closing session for the day: overview of asset-level data-services map; next steps

Structure:

- Setting the scene using IAM's 'Big Picture'
- Overview of the route map template

Discussion points:

For two modes of rail and road and in the context of three asset categories of 'structures', 'geotechnics', 'tracks/pavements':
- The whats and hows of 'data to operation and maintenance' including the description of performance indicators and failure/disruption proxies, maintenance indicators for different assets, measured response vs asset condition
- The data/information and processes leading to decision indicators - considering acuity and agility as key attributes and exploring other key characteristics of decision processes
- Priority gaps in data and corresponding analytics
- Alignment gaps in response to Net-Zero targets, socio-political trends and emerging technologie

Session output:

Decisions to Data map for three categories of assets.

## PART 2 – NETWORK-LEVEL DATA-TO-DECISIONS THURSDAY 21ST JULY

(BST)

| | |
|---|---|
| 14.00 – 14.15 | Opening Session – Overview of Previous Session and Agenda |
| 14.15 – 14.45 | Keynote Provocation Lecture |
| | *Network-Level Decision Making*, Prof John Beckford, Beckford Consulting |
| 14.45 – 15.45 | 'Data as Services' network-level asset management route map co-creation session – Session 1 |
| 15.45 – 16.15 | Break |
| 16.15 – 17.00 | 'Data as Services' asset-level management route map co-creation session – Session 2 |
| 17.00 – 17.15 | Closing session for the day: overview of network-level data-services map; next steps |

Structure:

- Reflection on route maps developed for both road and rail considering the asset-level life-cycle
- Identifying similarities and differences between two modes both from demand and capacity points of view
- Discussions to co-develop a network-level asset management capturing the workflow of data to services and considering the interdependencies between two modes

Discussion points:

- The whats and hows of network level data-service workflow for each mode, considering different decision/performance indicators
- Multi-modal interdependency-related data/information/indicators – Multi-modal Interdependency-based analytics
- Multi-modality as an enabler of people and freight journey (purpose of a journey, travel choices, information required for a journey, drivers of a journey and changing trends, substitutions)
- Common frame of reference on performance, value, interdependency and resilience

Session output:

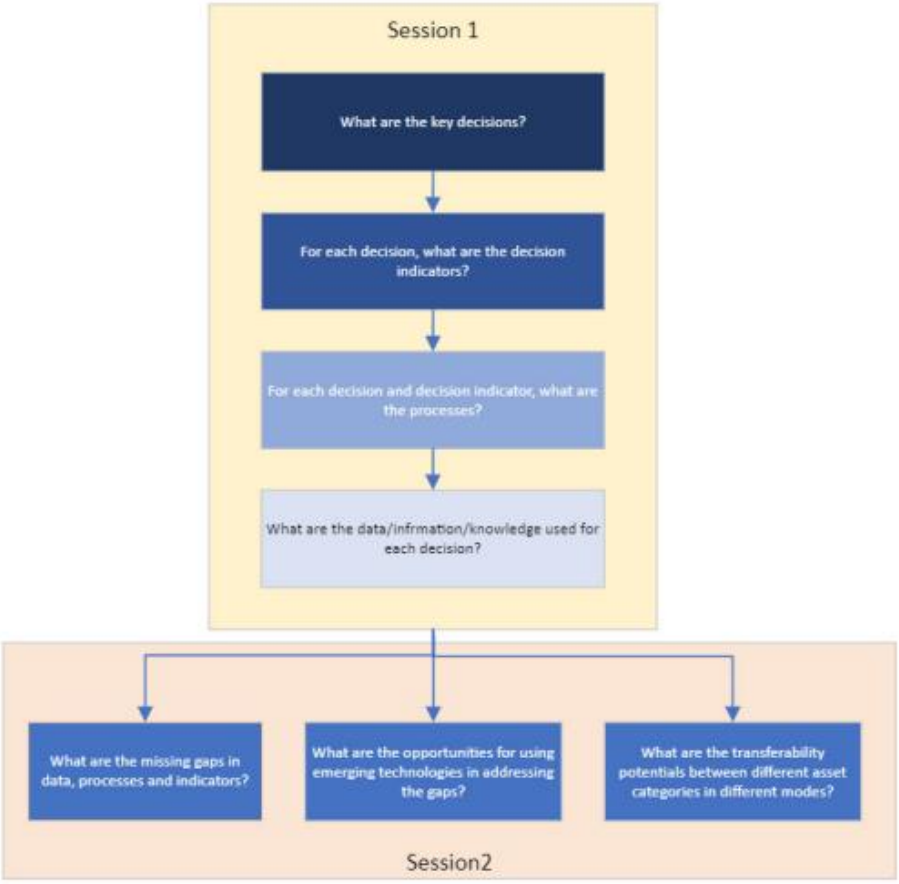Decisions to Data route map for two modes of transport.

**David Castlo CEng FICE MIAM, Network Rail**

: For the past ten years, David has held senior roles in Network Rail leading improvements in structures asset management and data systems. He is currently Network Technical Head; accountable for the standards, policies, competence, systems and R&D for the national tunnels portfolio. He also coordinates decarbonisation activity across Network Rail's engineering disciplines and is the company's primary contact with the Institution of Civil Engineers for graduate development.

**Professor John Beckford PhD MMS FCybS FRSA FIET, Beckford Consulting**

John is a partner in Beckford Consulting, Visiting Professor in the Department of Civil, Environmental and Geomatic Engineering at University College London and in the Centre for Information Management at Loughborough University. John is President of the Cybernetics Society and a Board Member of both the World Organisation for Systems and Cybernetics (WOSC) and of the European Union for Systemics (EUS). Through Beckford Consulting, John has been applying his knowledge of stakeholder engaged, information led adaptive organisation design, learning and transformation for over thirty years.

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