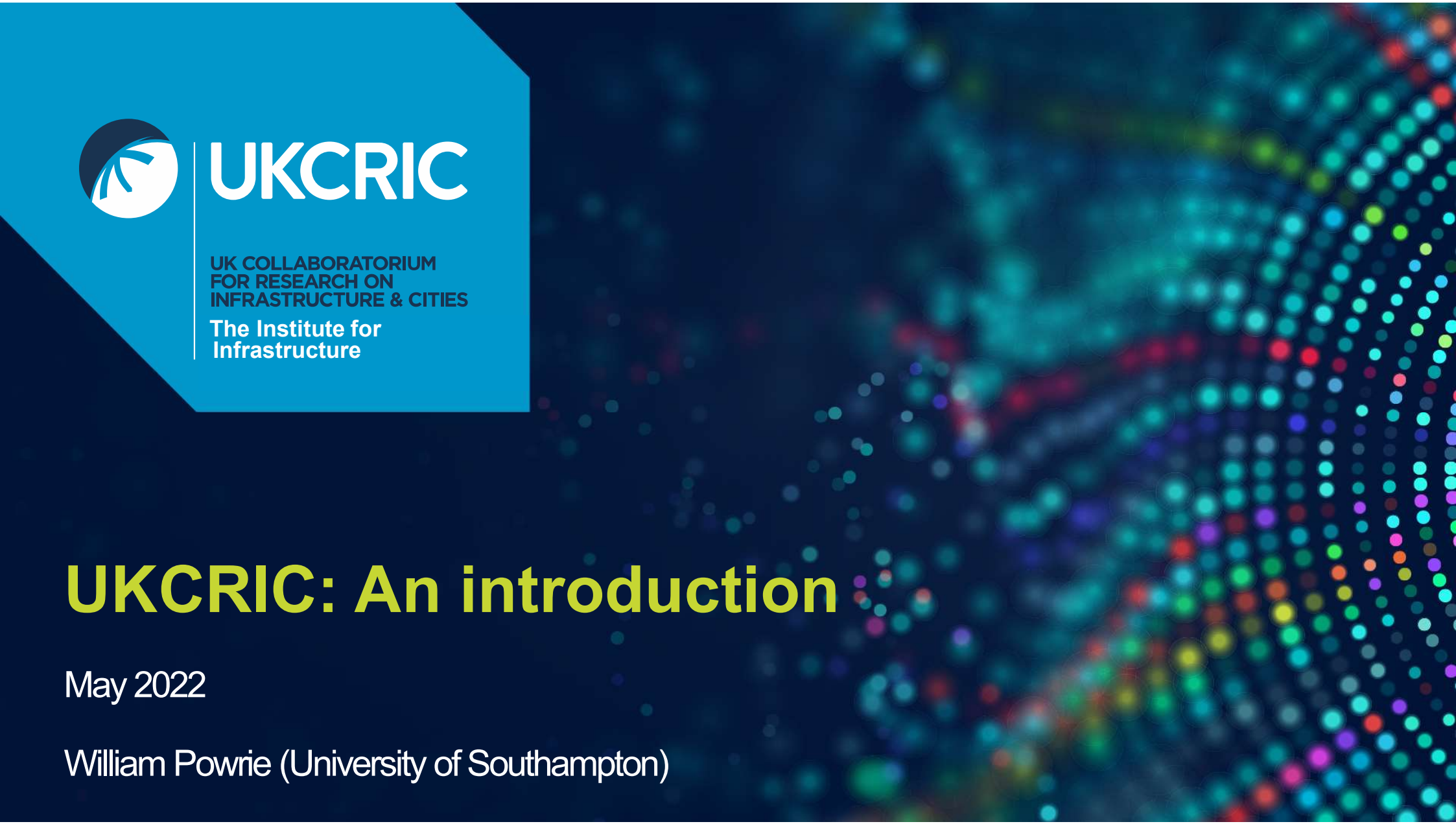


UKCRIC: An introduction

May 2022

William Powrie (University of Southampton)

UKCRIC

- 15 UK universities
- National focus for Infrastructure & Cities research
- Distributed around the UK
- Multi- / trans-disciplinary and multi-application
- 3 strands: laboratories, urban observatories, DAFNI

www.ukcric.com hello@ukcric.com
@ukcric

UKCRIC

Partner universities

University of Birmingham
University of Bristol
University of Cambridge
University College London
Cranfield University
University of Edinburgh
Heriot Watt University
Imperial College London
University of Leeds
University of Loughborough
University of Manchester
Newcastle University
University of Oxford
University of Sheffield
University of Southampton

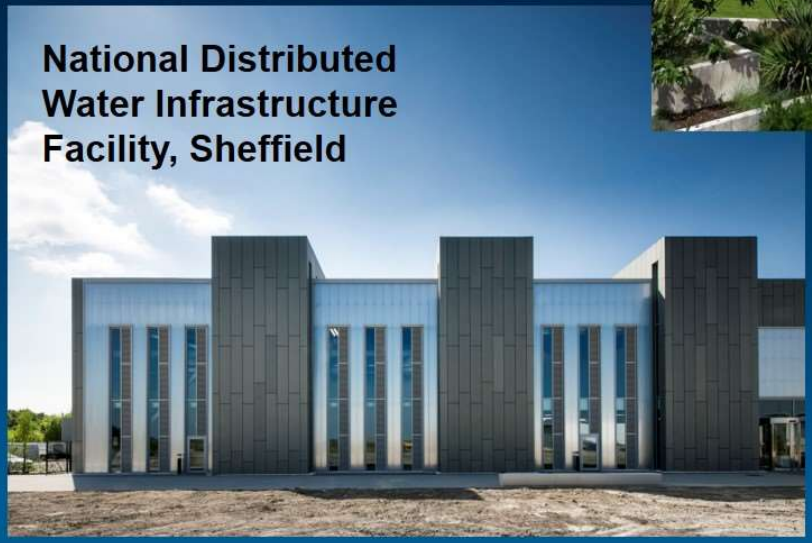
Affiliated facilities

V-Simulators labs at Bath and Exeter


National Water &
Wastewater
Treatment Test
Facility, Cranfield


National Infrastructure
Laboratory, Southampton


National Green
Infrastructure
Facility,
Newcastle


National Distributed
Water Infrastructure
Facility, Sheffield


National Research Facility for Infrastructure
Sensing, Cambridge

Urban observatories

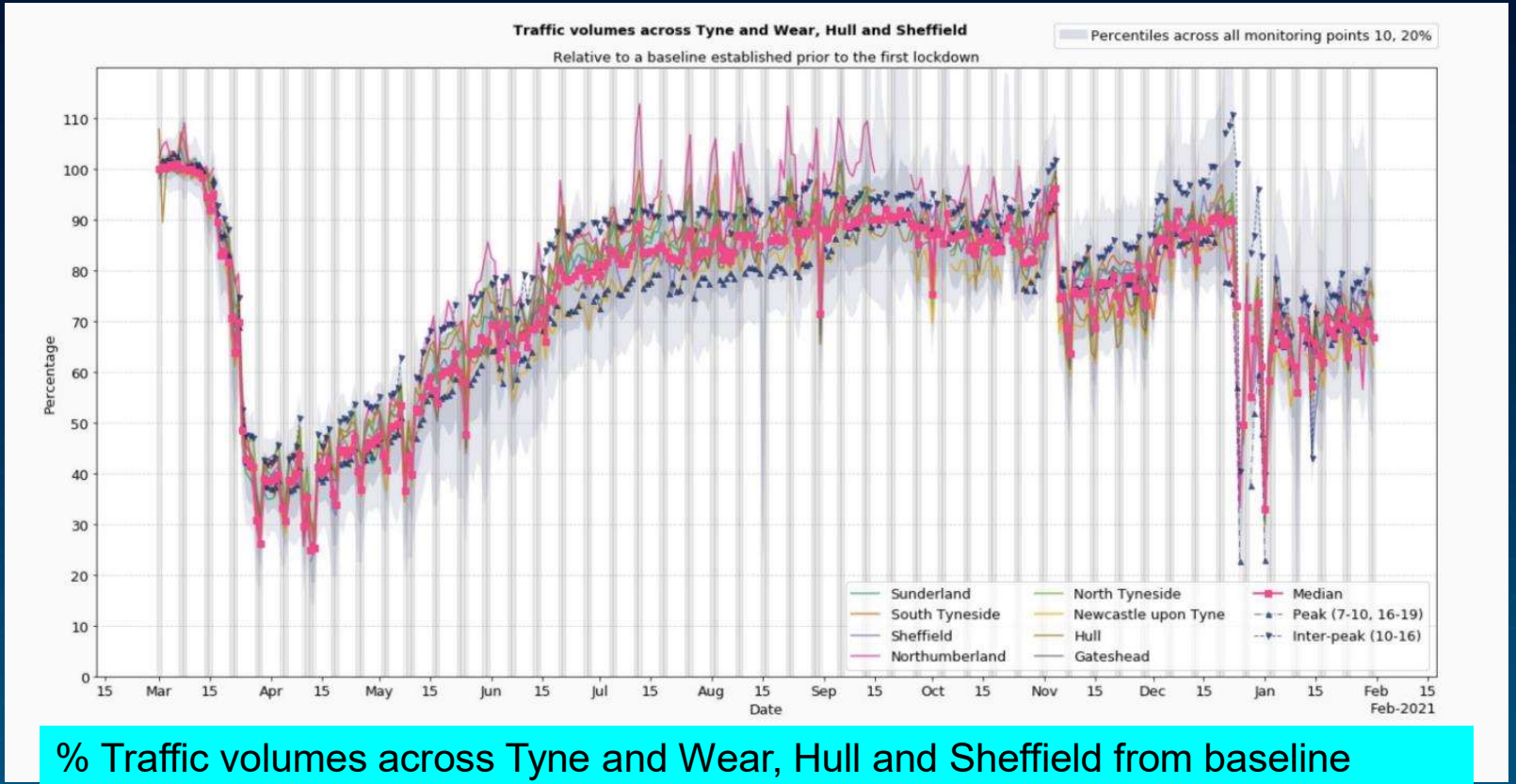
Newcastle, Birmingham, Sheffield, Bristol, Milton Keynes, Manchester

UKCRIC

Investigating

- Air quality
- Flood Management
- Public Health
- Transport
- Machine learning
- Smart Buildings
- Effects of Covid-19

Open source real time urban data



% Traffic volumes across Tyne and Wear, Hull and Sheffield from baseline March 2020 (pre 1st lockdown) to Feb 2021 (Phil James; Newcastle University)

Data Analytics Facility for National Infrastructure

- Part of the UKRIC community
- Computational platform to support data analysis and infrastructure research
- Large scale analysis, data access, software and visualisation

UK Collaboratorium for Research on Infrastructure and Cities

MISSION

UKCRIC's integrated research capability underpins the renewal, sustainment and improvement of infrastructure and cities in the UK and elsewhere.

By engaging government, industry, academia and end users, UKCRIC is de-risking, helping to prioritise, and providing evidence, analysis and innovation for future national infrastructure and urban investments in a safer, more resilient and more sustainable future.

UKCRIC Scientific Missions

UKCRIC is driven by research in four Scientific Missions, each working to develop and deliver breakthrough research for the benefit of society.

The Scientific Missions are designed to facilitate the delivery of interconnected, integrated and transdisciplinary research programmes and projects.

Cross cutting themes within each Mission, alongside links with UKCRIC's facilities and industry, are central to achieving UKCRIC's vision.

UKCRIC Missions

Infrastructure and urban systems for one planet living

- Accelerating SUSTAINABILITY through advances in responsible consumption, resource efficiency and sustainable growth and helping the UK meet its carbon targets.

Research Routemaps

- Low-carbon materials
- Lean infrastructure

UKCRIC Missions

Transformational infrastructure and urban systems for a changing world

- Pioneering methods in infrastructure and urban systems design to meet the challenges of RESILIENCE AND ADAPTATION to changes in climate, patterns of use, societal expectations and emergent technologies.

Research Routemaps

- Digital twin and smart infrastructure
- Resilience – soil and water

UKCRIC Missions

Ownership, governance and business models for infrastructure and urban systems

- Developing innovative models for coping with greater system interdependencies, changing patterns of use and new, disruptive technologies while at the same time delivering social justice and AFFORDABILITY.

Research Routemaps

- Balancing Risks and Responsibilities
- Responsiveness to innovation and change

UKCRIC Missions

Infrastructure and urban systems as drivers of EQUITY, INCLUSION AND SOCIAL JUSTICE

- Providing the underpinning, transdisciplinary research platforms for forging healthy, happy and productive lives for all through urban design, planning, policy and infrastructure.

Research Routemaps

- Accessible affordable urban mobility
- Socially just utility service provision

Stakeholder engagement

- Net Zero Coalition Working group / Mott MacDonald
- Resilience Shift / ARUP; NIC resilience consultation; London Resilience Forum
- ICE, IET, RAEng, NIC, IPA, I3P, TTAG, CIRIA, BEIS, DfT
- Digital Framework Task Group, Digital Twin Working Group, CDBB, STFC
- Greater Metropolitan Region Strategy, Newcastle, NSW, Australia
- Singapore: NTU, Govt., National Research Foundation, A*STAR
- Local Authority Workshops: Key Cities, Southampton; Core Cities, Manchester
- PAS 186 Smart Cities Consultation
- National Preparedness Commission
- HS2 Innovation Framework Agreement

……..among others…….

International community

- **UKCRIC International Advisory board**
- **Conferences with strong UKCRIC presence**
  - Urban Transitions Conference, Barcelona, 2018
  - ISNGI, Buenos Aires, 2019
  - International No Dig, Florence, Sept 2019
  - International Transdisciplinary Conference, Gothenburg, 2019
  - 4th International Conference on Transportation Geotechnics, Chicago 2021
  - International Transdisciplinary Conference 2021
  - *ISNGI, Rotterdam, September 2022*

CDTs and early career researchers

CDTs

- WiRe: Water Infrastructure and Resilience (Cranfield, Sheffield, Newcastle)
- Water Wiser (Leeds, Loughborough, Cranfield)
- Sustainable Infrastructure for Cities (Southampton, Birmingham, Loughborough, Sheffield)

C-DICE Centre for Postdoc Development in Infrastructure, Cities and Energy

- Training – linked to UKCRIC and ERA facilities
- Development – funded placements and secondments
- Sandpit Programme –the net zero carbon challenge
- Impact – delivering knowledge exchange events

Examples of successful collaborative bids supported by UKCRIC

- UKRI Interdisciplinary Circular Economy Centre for Mineral Based Construction Materials (UCL, Imperial, Leeds, Loughborough, Sheffield)
- Transforming Construction Network Plus (UCL, Imperial)
- C-DICE Centre for Postdoc Development in Infrastructure, Cities and Energy (Universities of Loughborough, Birmingham, and Cranfield together with ERA)
- iPACT Network Plus: infrastructure for Port and Coastal Towns and Cities (Southampton, UEA, QUB, Strathclyde, Lancaster, Brighton)

Using DAFNI to assess the risk of climate change

- DAFNI technology is being used to assess the risk of the effects of climate change, including occurrences such as flooding, the health risk from extreme heat, and the impacts on agriculture and biodiversity.
- Researchers are working with DAFNI to provide a framework for combining models together, and a place where users go to access and run workflows. And just as importantly, creating an open access legacy where models can be accessed for the long term.

Assessing the effectiveness of air purification in schools

- Childhood exposure to particulate matter (PM), NOx, O3 and black carbon can impair lung development, cause respiratory inflammation and there is evidence to suggest that attainment can also be compromised.
- One potential cost-effective mitigation strategy is the use of High Efficiency Particulate Air (HEPA) filters.
- The Manchester Urban Observatory team tested low-cost, portable purification units in schools, with the aim of improving air quality in classrooms.
- Results included a 32% reduction in PM 2.5 in a single classroom using purification in comparison to another which was not.

Affordable railway electrification (with Network Rail)

- Rail electrification is critical to transport decarbonisation
- Costs increased sharply in early 2010s
- National programme paused
- UKCRIC analyses & tests led to major efficiencies and cost reductions
- New findings embedded in standards, ensuring roll-out
- National programme re-started

Get in touch…..

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