National Distributed Water Infrastructure Facility (NDWIF) at the University of Sheffield

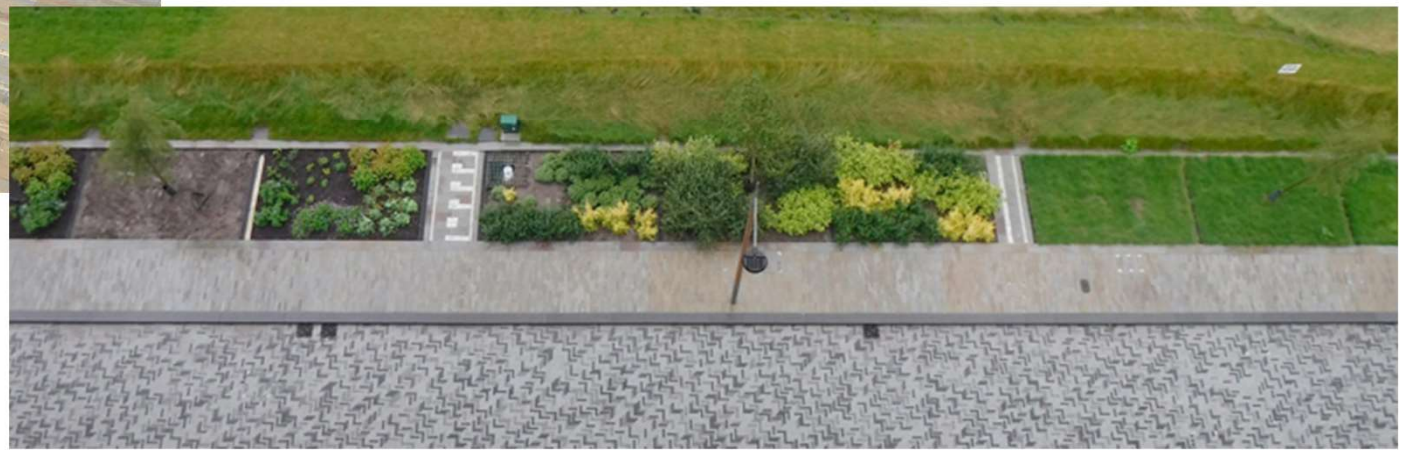
- 600m2 of specialist laboratory space
- 1350m3 waterproof test cell 45m long by 5m deep by 5m deep with in-situ instrumentation
- Straight test length of 38m
- In-pipe and surface flows of up to 200 l/s
- Pressure transient shocks of up to 10bar
- Actuators able to impose complex cyclic loads of up to 10kN/m2

National Research Facility for Water and Wastewater Treatment at Cranfield University

- Advanced Sensors Lab
- Sewer Loops rig
- Point-of-use Water Treatment Development lab
- Test and control drinking water treatment rig
- Sediment Erosion Flume
- Breakthrough Innovation Hub

National Green Infrastructure Facility (NGIF) at Newcastle University

- Can hold 600m3 of water and is capable of handling 50mm of rainfall in one hour
- Large-scale, heavily instrumented lysimeters that allow unique trials of experimental SuDS specifications
- A 130m ‘extreme event’ swale enabling research and demonstration of leaky barriers for urban water attenuation
- A 100m ensemble of variably planted bioretention cells to investigate the influence of planting regime and management on hydrological performance



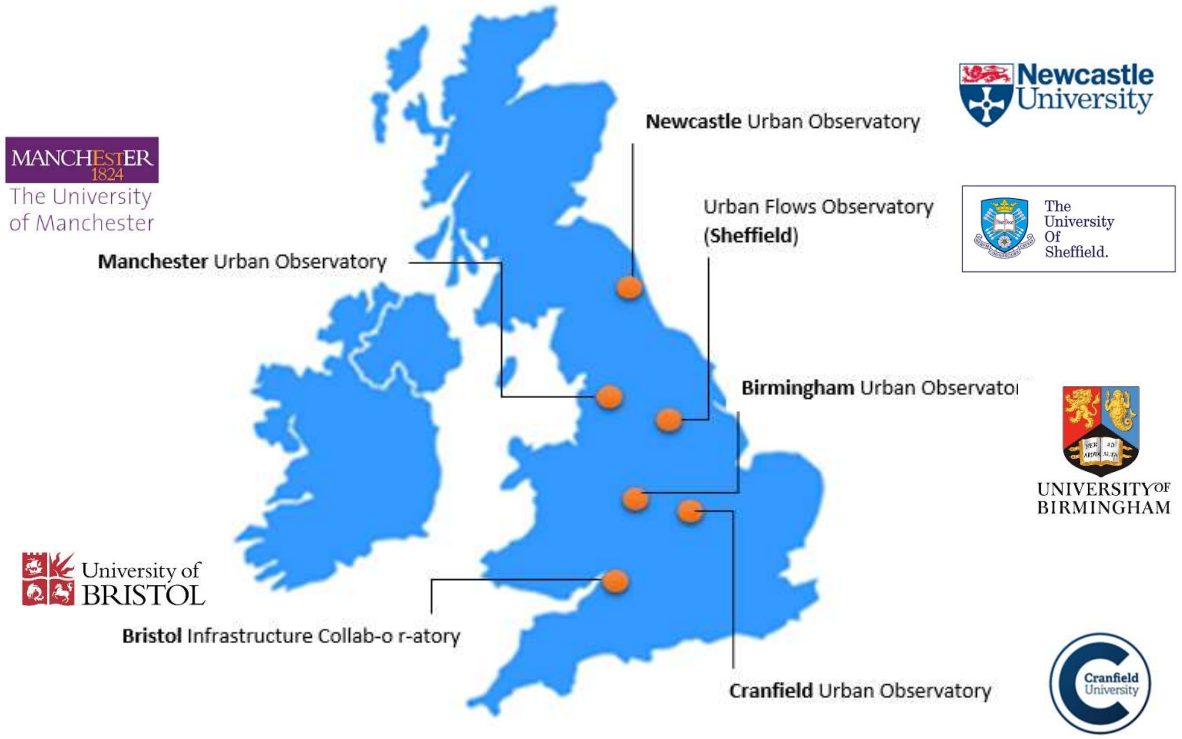
UKCRIC

National Buried Infrastructure Facility at University of Birmingham

- 25m x 10m x 5m deep pit with moveable floor sections, including a 10m x 5m moveable floor section to simulate subsurface ground displacements
- Material storage and test assembly areas
- Pipeline and small-structure testing rigs
- Material characterisation facilities
- Visualisation suite and knowledge transfer rooms

UKCRIC

National Network of Urban Observatories



EPSRC Engineering and Physical Sciences Research Council

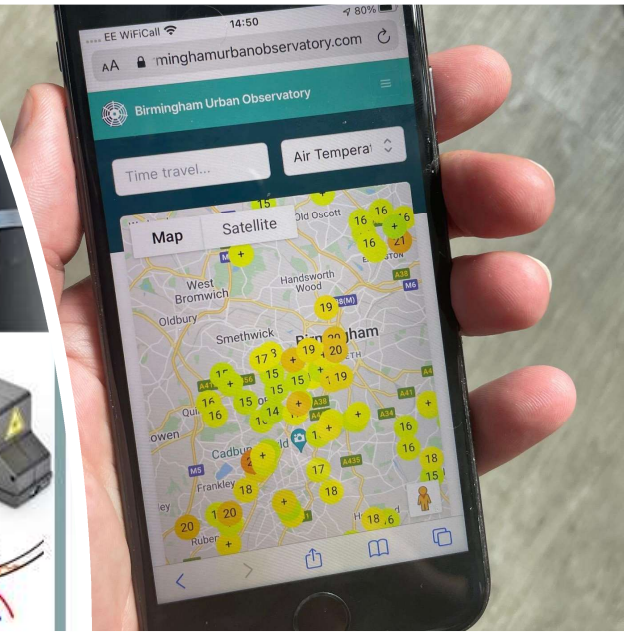
Department for Business, Energy & Industrial Strategy

presented by Professor Lee Chapman, Birmingham University

Birmingham Urban Observatory

- B’ham observatory monitors everyday impacts on green and grey infrastructure in urban areas (and much more).
- Supersite and distributed sensor network approach:
  - High resolution meteorological sensing:
    - Distributed weather sensors
    - Opportunistic sensing (citizen weather stations)
    - Meteorological supersite
  - Grey infrastructure sensors:
    - Road Surface Temperature (UoB built)
    - Rail temperature + leaves on the line (UoB built)
  - Environmental sensors
    - Soundscapes
    - Air quality (some UoB built)
  - DAS capability linked with NBIF
- Non-proprietary data visualisation platform:

  https://birminghamurbanobservatory.com/



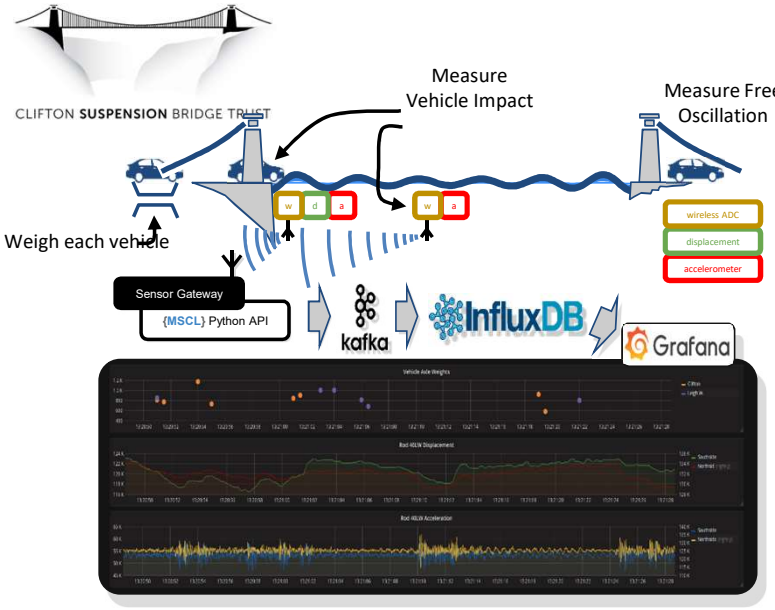
The Infrastructure Collaboratory: Bristol's Urban Observatory

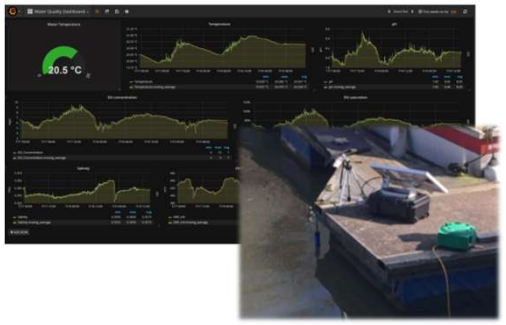
Our sensing platforms facilitate integrated infrastructure interventions with our partners, e.g.,

- Infrastructure asset monitoring and digital twin development: structural health monitoring, asset performance management **(Clifton Suspension Bridge)**
- Energy Systems: monitoring energy performance, microgeneration and peer-to-peer trading, consumer behaviour **(University Campus)**
- Mobility and people-space interaction: intelligent transport systems, electric and micro mobility, multi-modal mobility, people's perception of space, …
- Water quality: condition and quality monitoring, prediction and early warning **(Bristol Floating Harbour)**
- Citizen sensing and mobile making: STEM outreach, upskilling, citizen-driven urban innovation and ultimately co-creation **(Local Citizens)**

University of BRISTOL

ENGINEERED





Air Quality Platform

KWMC
KNOWLE WEST MEDIA CENTRE

BRISTOL CITY COUNCIL

Our projects include:

TWINERGY

REPLICATE
Exploring new technology for smarter streets and homes

Some of our PhD researchers have been sponsored in part by:

BT wsp

WATER INFORMATICS SCIENCE & ENGINEERING
EPSRC CENTRE FOR DOCTORAL TRAINING

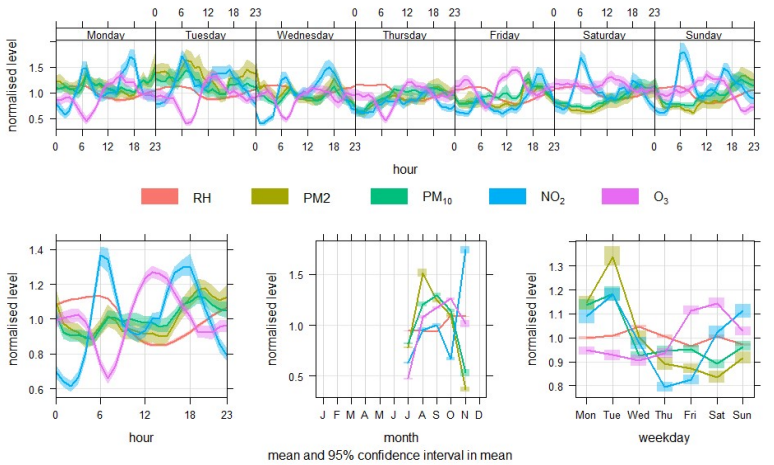
Cranfield Urban Observatory

- Self-contained and fully controlled rural location at the heart of the Ox-Cam Arc.
- Integration with other activities and infrastructure (e.g. UKCRIC Water Hub/WWTW, Global Research Airport, Digital Aviation Research and Technology Centre (DARTeC), FAAM, MUAEVI sensored vehicle test road).
- Sensor/IT testbeds with safe working access.
- Campus wide IoT Wi-Fi network and 4G IoT networking.
- Datahub including real-time visualization.
- Sensor capability includes:
  - Multiple weather stations including at solar farm and WWTW
  - Air quality network including reference site, campus/airport deployment and sensors deployed across Ox-Cam Arc.
  - Indoor air quality network including ultrafine/nano particulates.
  - Water quality network including water level, quality and inline flow meters.
  - Waste Water Treatment Works (WWTW) with sensing including multiple flow cytometers for monitoring pathogens, bacteria (unique research capability), and 100 sensors across pilot hall to monitor WWTW performance.
  - Water use and behavior change - ~450 shower sensors across halls of residence and water meters and novel water use sensors across residential and technical site.
  - Soil and buried infrastructure – multiple soil sensors and distributed bragg sensor system and High Fidelity Acoustic Sensor (HDAS) for buried infrastructure monitoring.
  - Wildlife monitoring – multiple acoustic recorders and photo/video cameras.
  - Rapid deployment sensor suit (e.g. air quality, video).
  - Low cost ubiquitous sensing capability.
  - Links to existing data (e.g. solar farm, energy use) and sensors (e.g. bioaerosols, noise monitoring station).
  - Planned linking to existing novel sensor/data platforms/facilities including MUAVI road (LiDAR & radar) and digital remote control tower, DARTeC passenger experience lab and B737.

https://www.livinglab.ac.uk

Manchester Urban Observatory

- Evidence on environmental quality and health to inform decision-making in cities.
- Work with local authorities, private companies and NGOs to understand the impacts of schemes on traffic, mobility, health and air quality.
- Bespoke monitoring solutions, data discovery service, data driven analysis /forecasting /nowcasting.
- Expose existing data for wider use through our non-proprietary data visualisation platform Manchester-I
- Host data on the Greater Manchester area covering traffic, active travel, air quality, bioaerosols, met conditions, noise and river levels.
- Saved local authorities more than £60k in avoided sensor costs by discovering existing data.
- Provided evidence for national guidelines for air purifiers in schools.
- Delivering >£250k of monitoring work with partners across UK.
- First real time pollen monitoring service in Europe.



Department for Business, Energy & Industrial Strategy

EPSRC Engineering and Physical Sciences Research Council

urban observatory

Newcastle University

UK's largest open urban sensing network

- 10 billion + data points
- Only open weather radar data in the UK
- 4000+ deployed sensor streams
- Scaleable data platform, APIs and downloads
- 65+ Variables (ANPR, bus GPS feeds, People movement, air quality, weather, water quality……)
- 500+ CCTV feeds
- 200,000 images processed daily
- 10,000 observations every minute
- Largest air quality monitoring network in the UK

National Urban Observatory Facility Newcastle

http://newcastle.urbanobservatory.ac.uk

From Newcastle.
For the world.

The University Of Sheffield.

We aspire to help cities to thrive within the carrying capacity of the planet by developing a globally leading understanding of the flows of energy and resources.

URBAN FLOWS OBSERVATORY

Our objectives:

- Quantify how our consumption of energy/resources impacts on the environment – GHG emissions & air quality & to identify levers for change
- Understand the Urban Metabolism required to deliver a Circular Economy,
- Provide an evidence base that facilitates local & national decision making