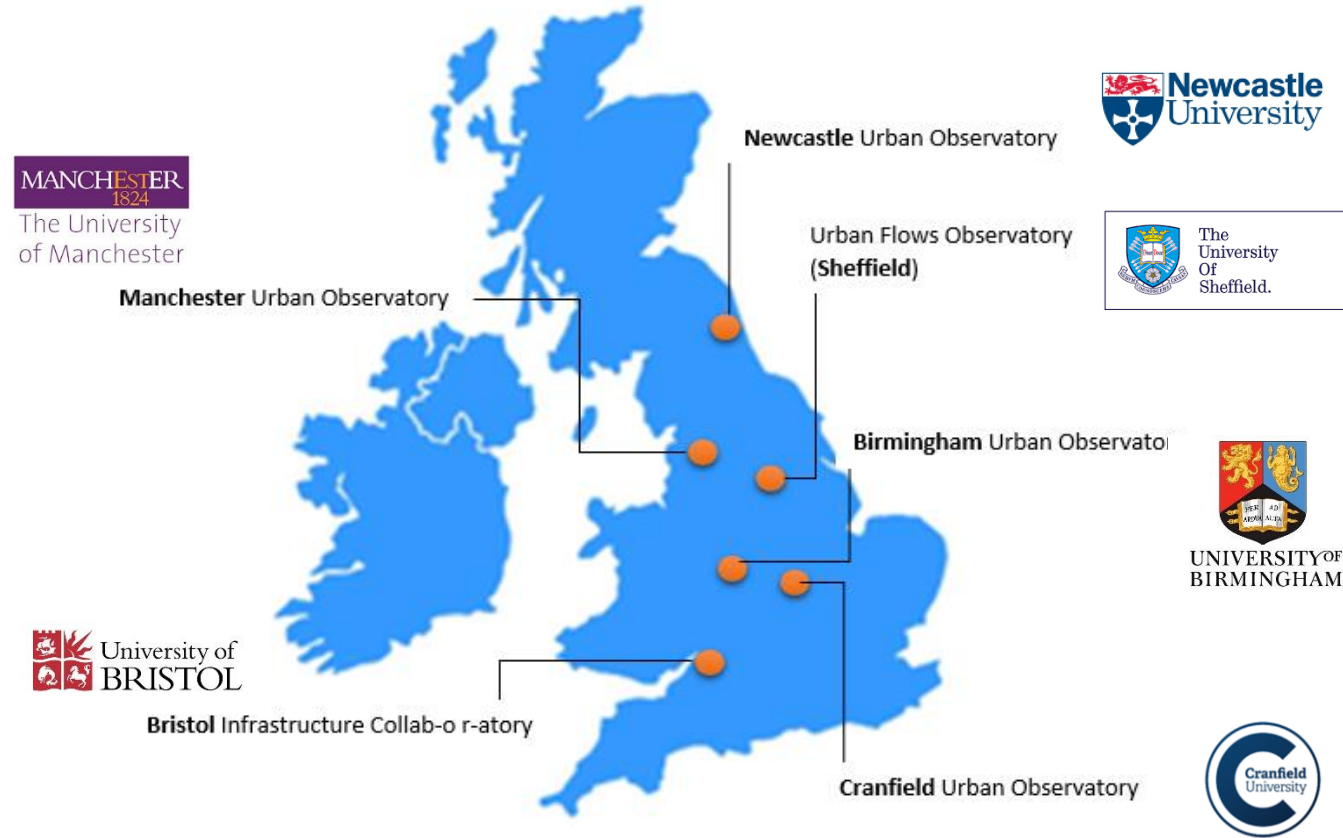


National Network of Urban Observatories



UK's largest open urban sensing network

- 10 billion + data points
- Only open weather radar data in the UK
- 4000+ deployed sensor streams
- Scalable 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.**

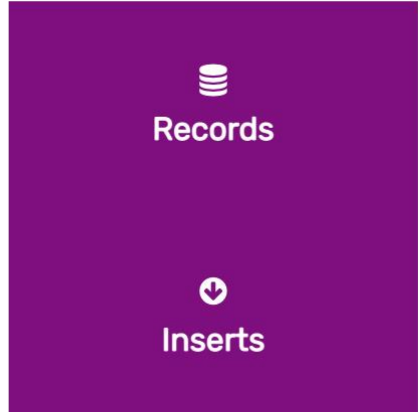
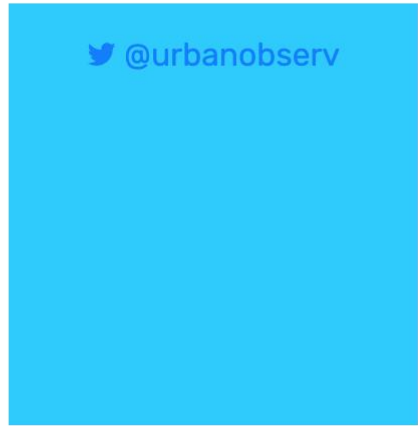
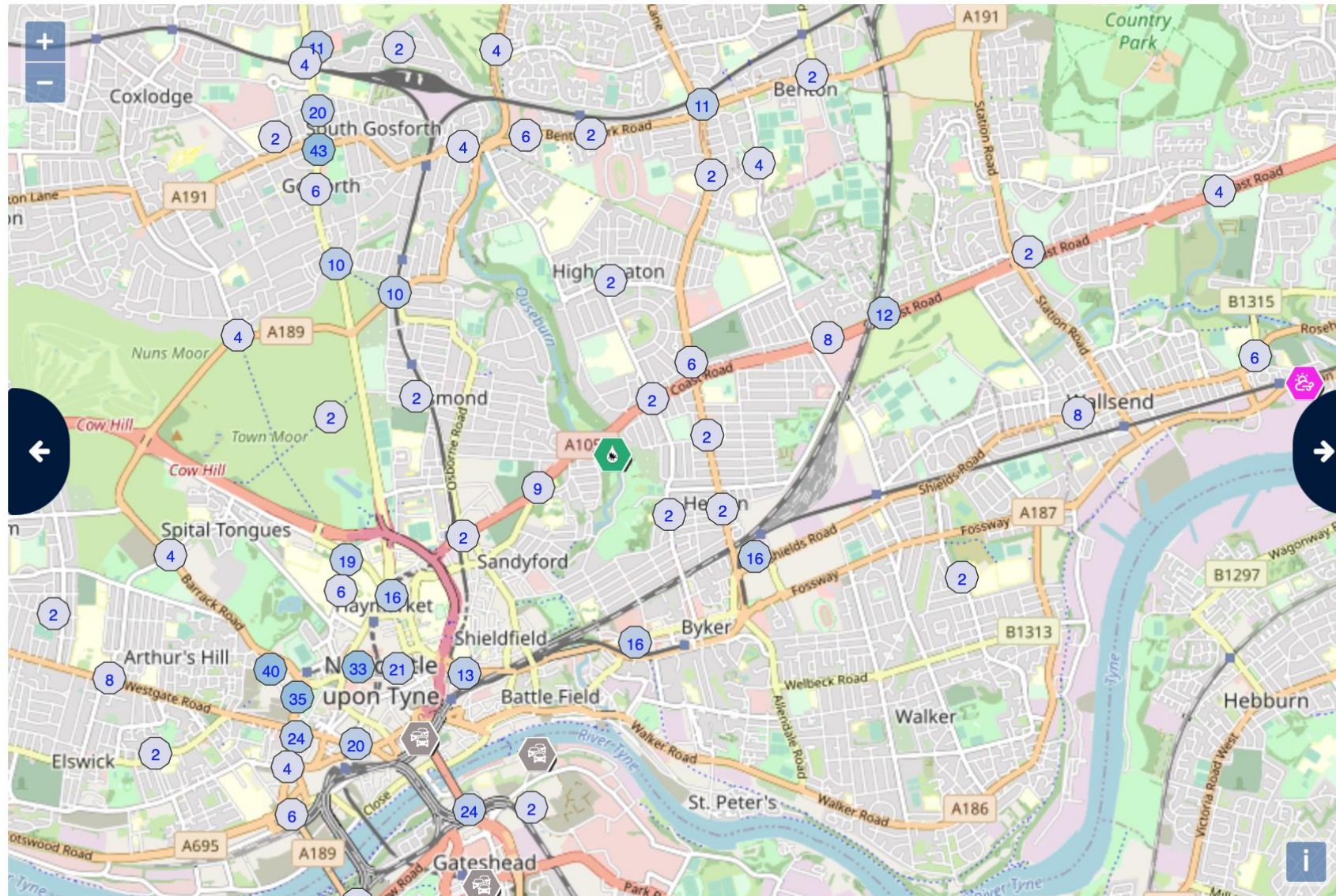
Sensor

Clusters

- Cluster 2-9
- Cluster 10-24
- Cluster 25-49
- Cluster 50+

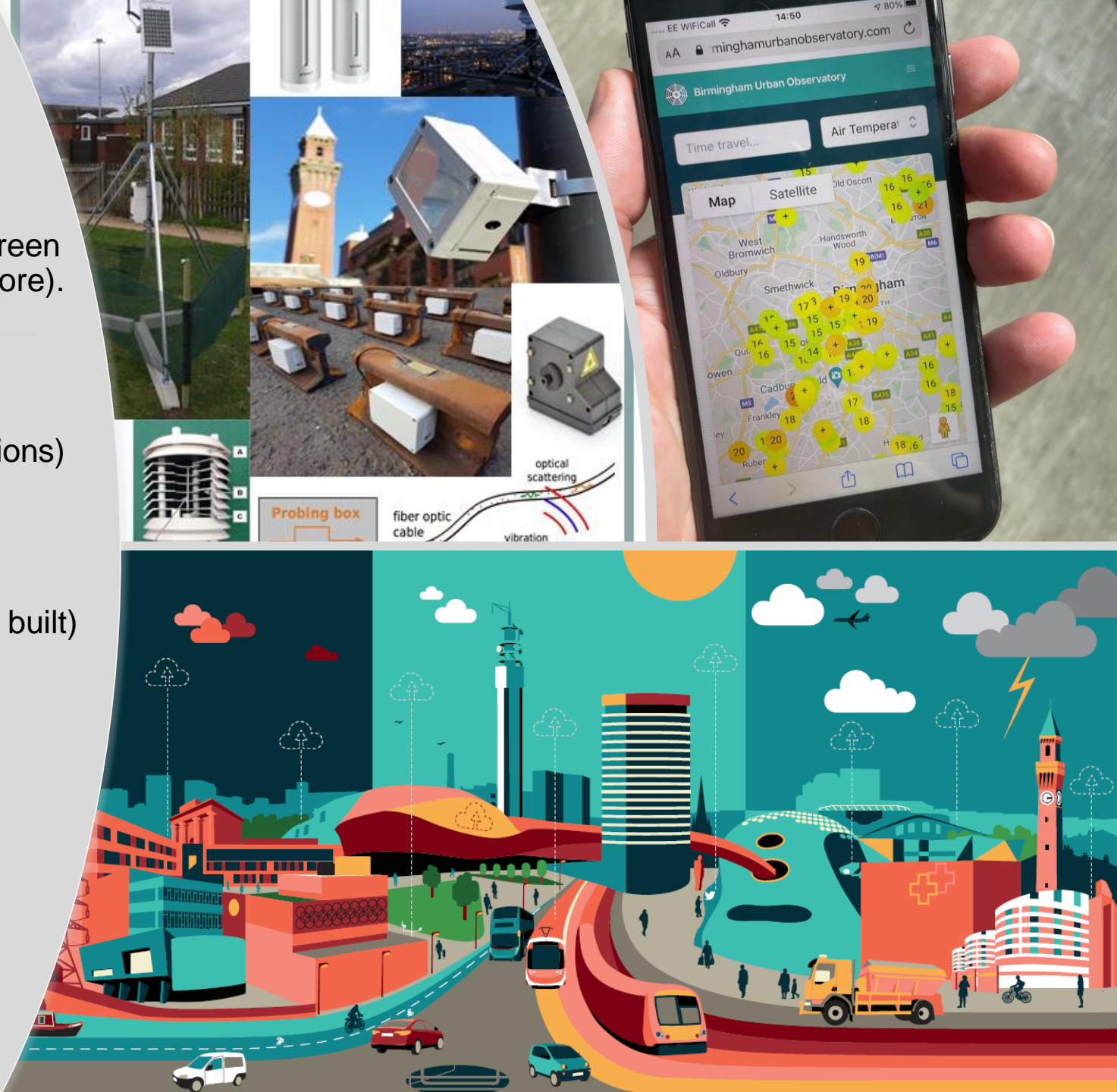
Sensors

- Noise
- Weather
- Traffic
- Air
- Quality
- Vehicles
- Water
- Quality
- Electrical
- People
- Sewage
- Soil



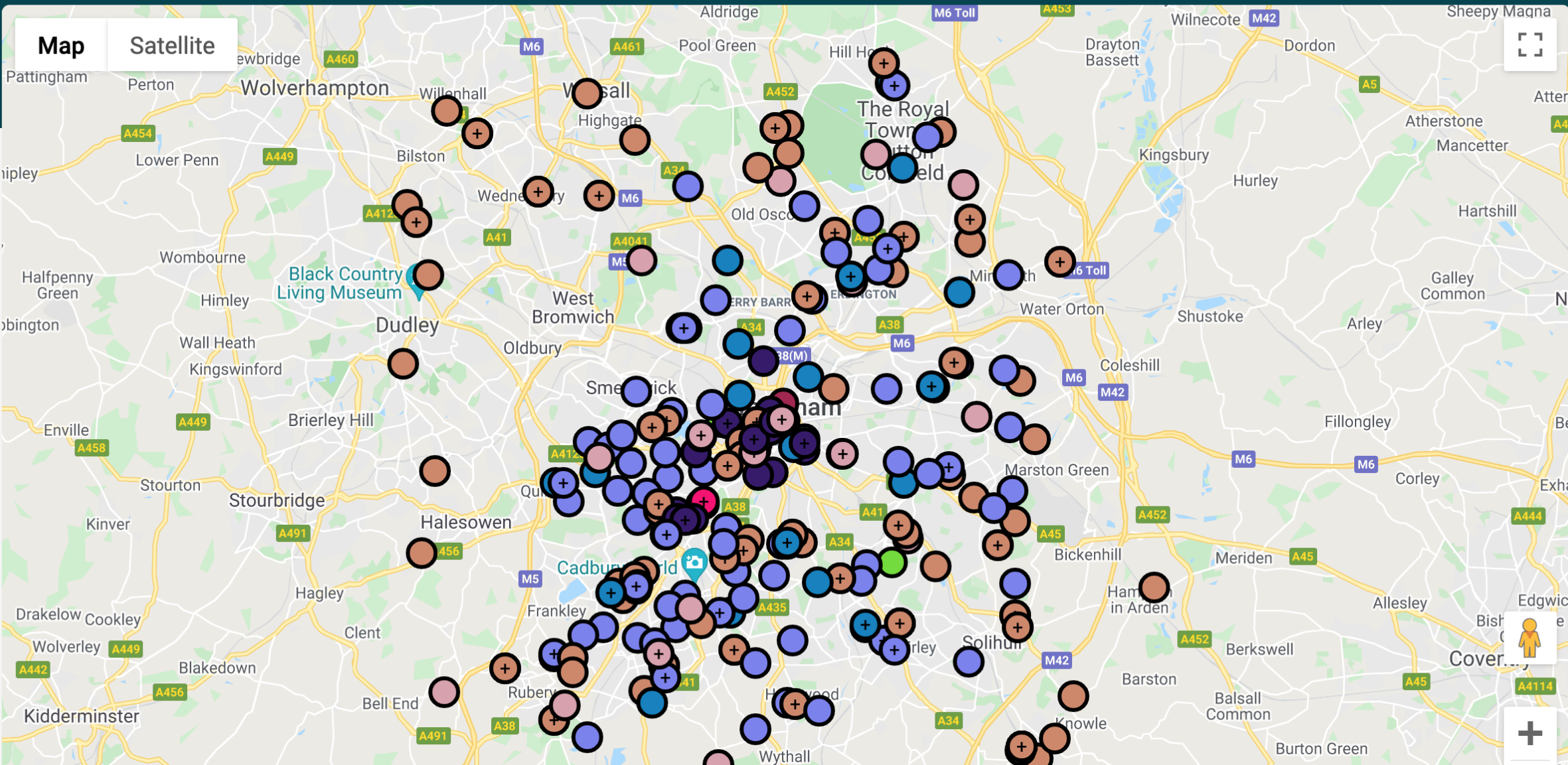
Birmingham Urban Observatory

- 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/>





Sensor Platforms

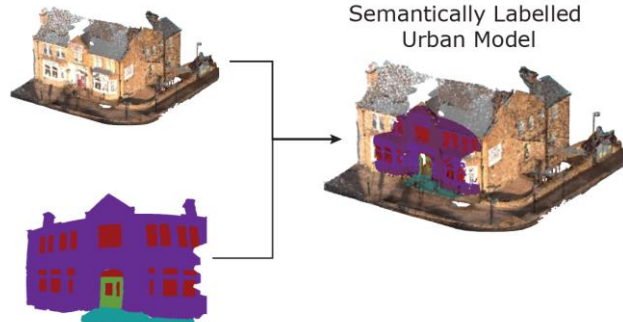


We aspire to help cities to **thrive within the carrying capacity of the planet** by developing a globally leading understanding of the flows of **energy** and **resources**.

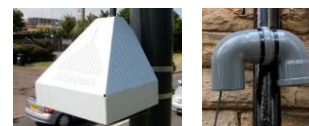
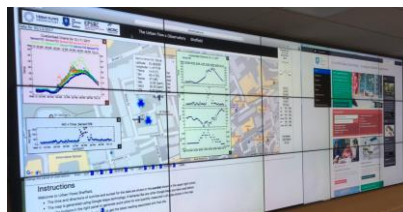
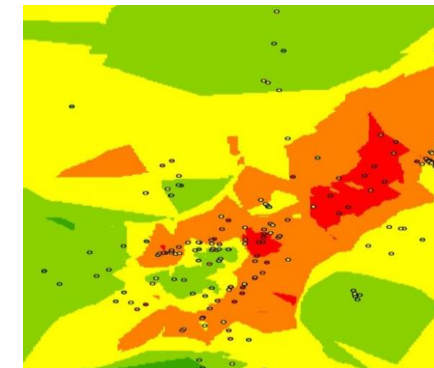
Our objectives:

- 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

Geometry & Mass Reconstruction



Component & Material Detection



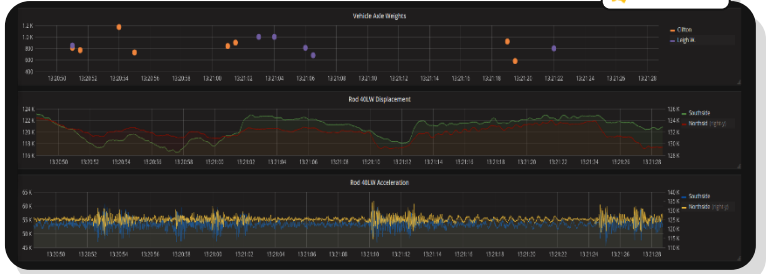
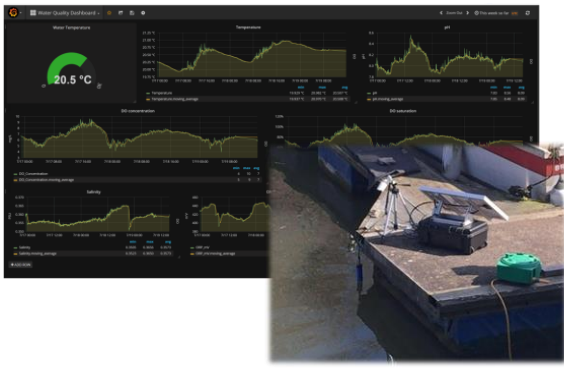
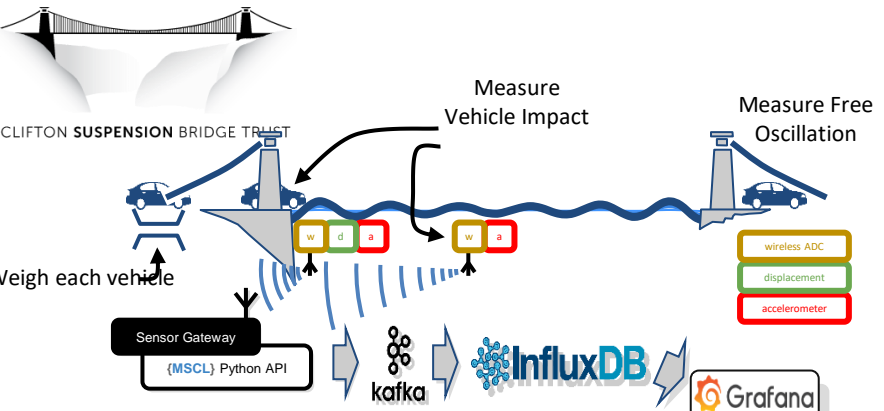
The Infrastructure Collaboratory: Bristol's Urban Observatory

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**)



ENGINE SHED



Our projects include:



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



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 sensed 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>



National Network of Urban Observatories

Thanks for listening!

Please join us in our break out room at 12, if you would like any further information or have any questions.

Available in the breakout room:

Professor Lee Chapman, Birmingham University

Professor Philip James, Newcastle University

Professor James Evans, Manchester University

Dr Jennine Jonczyk, National network of Urban Observatories project manager

