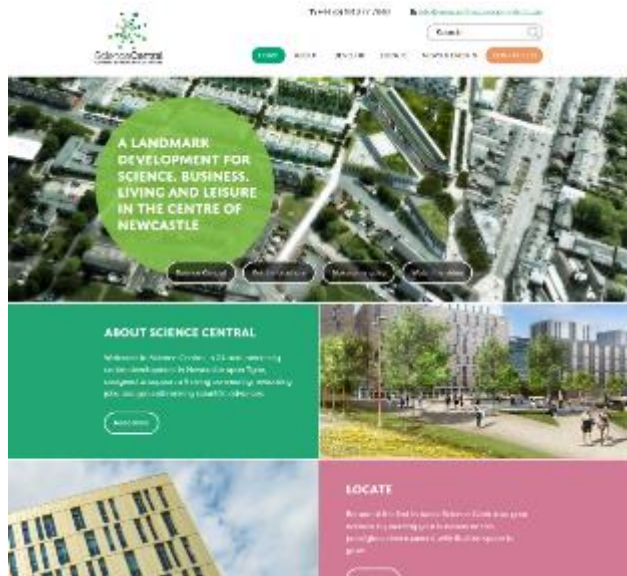




Digitally-Enabled Urban Sustainability
A Living Laboratory for Research,
Learning & Teaching and Innovation

31st January 2017

Science Central – a living lab



Digitally Enabled Urban Sustainability

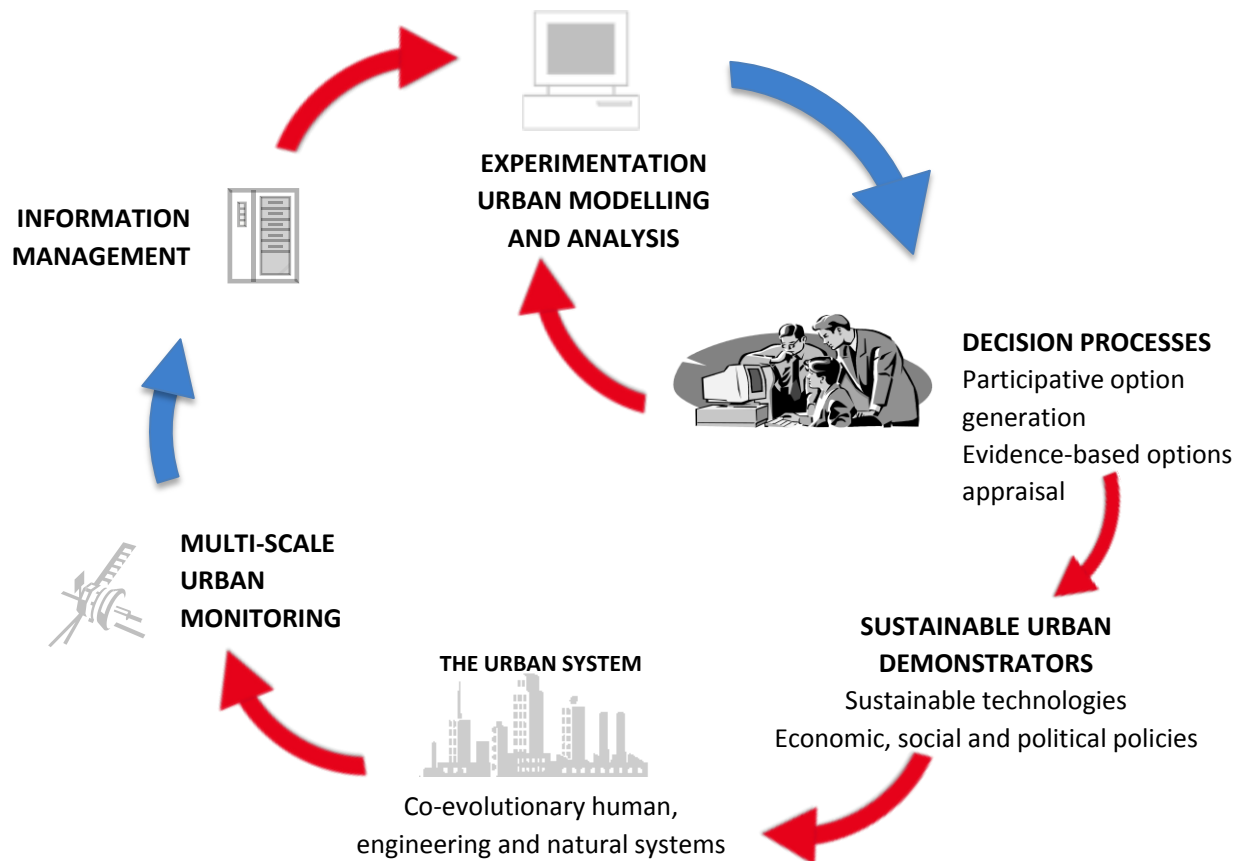
Stephanie Glendinning
Prof Civil Engineering
Newcastle University



CASE STUDY 3

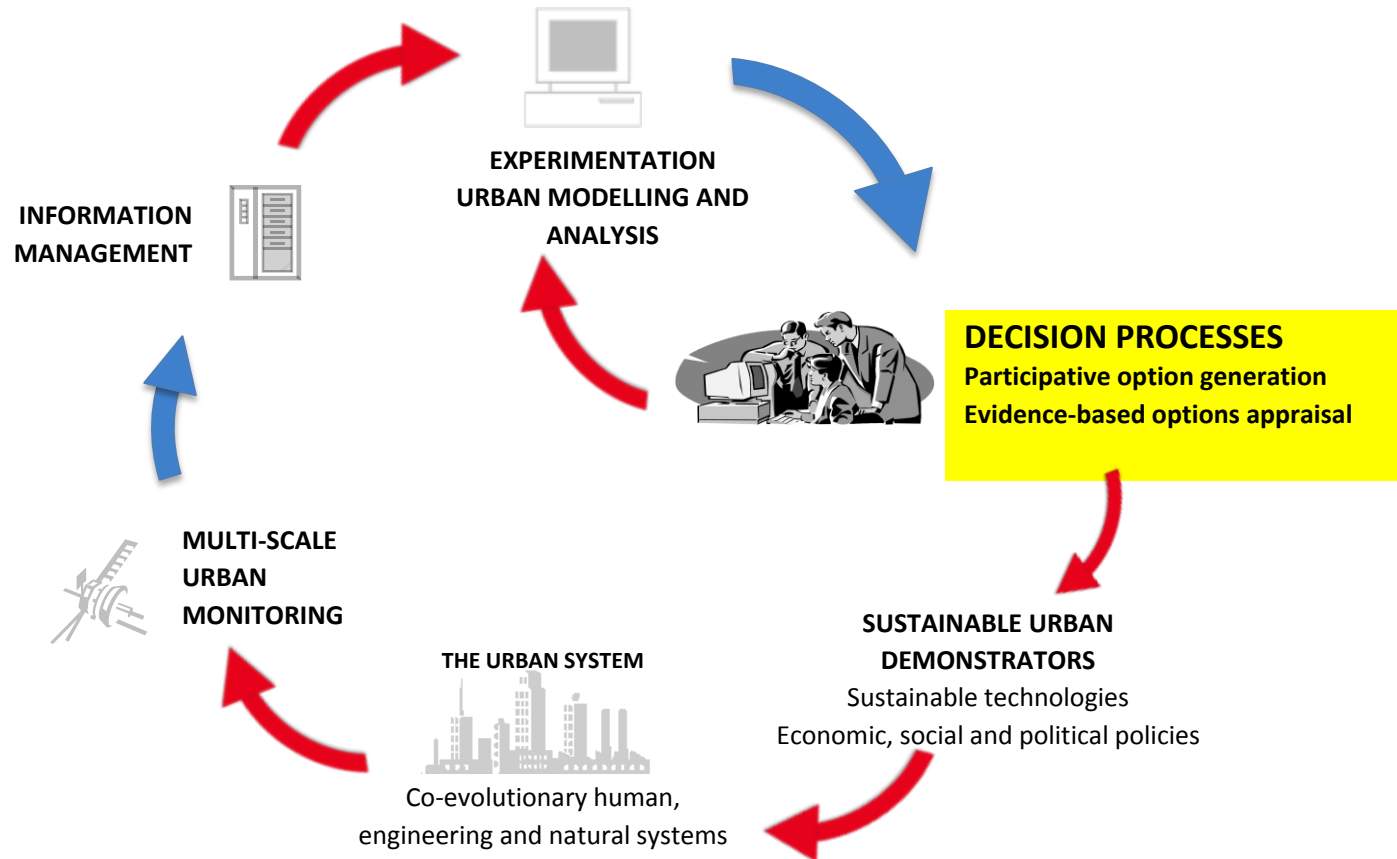
NEWCASTLE UNIVERSITY
AT SCIENCE CENTRAL

A 'living laboratory' for
sustainability in the city centre



- How do we turn concept into reality?

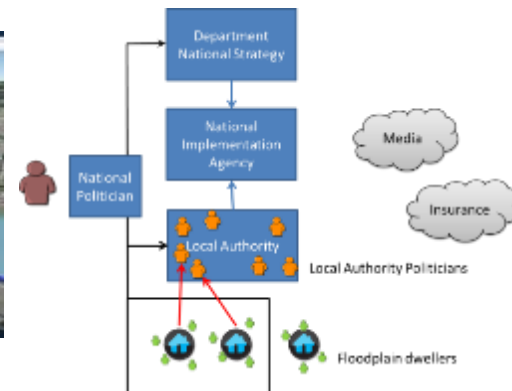
Living Laboratory: Integrating research methodology



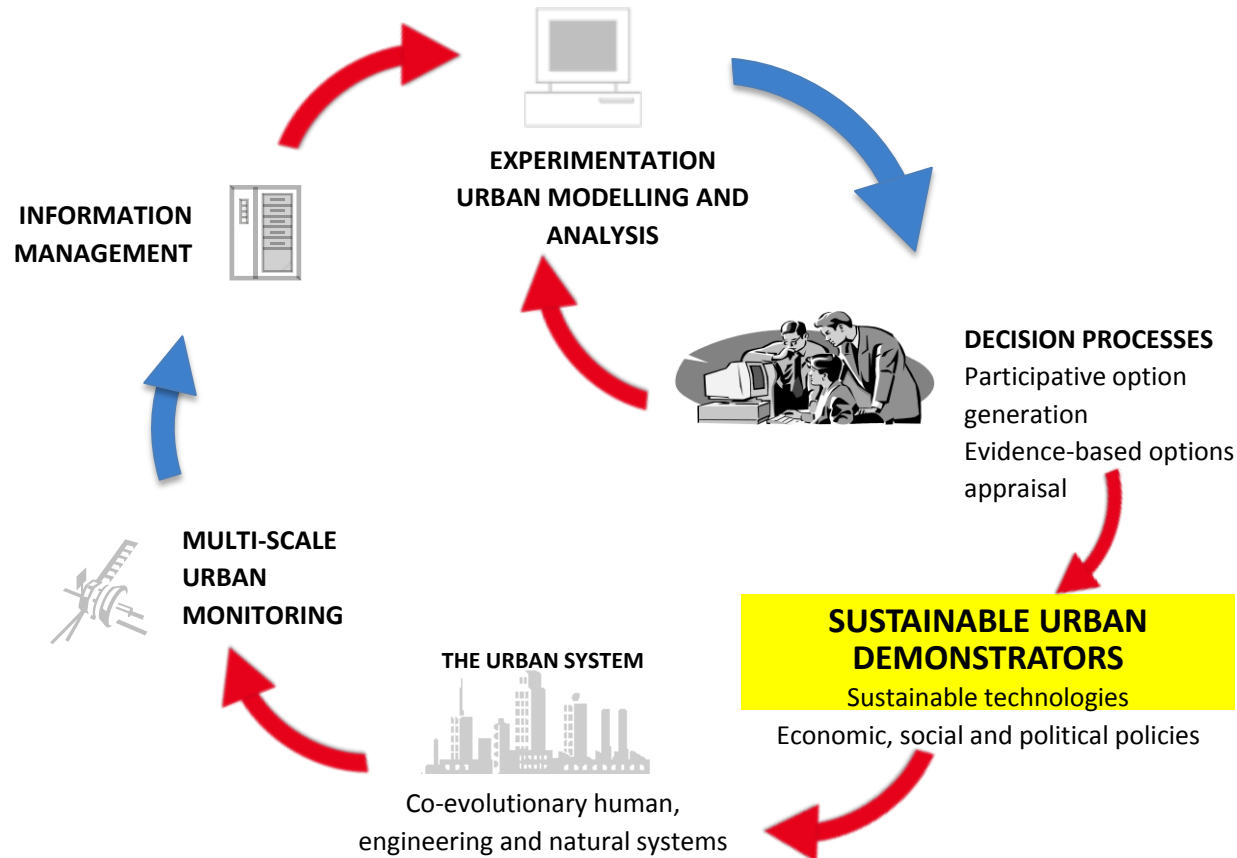
Collaborative decision making process



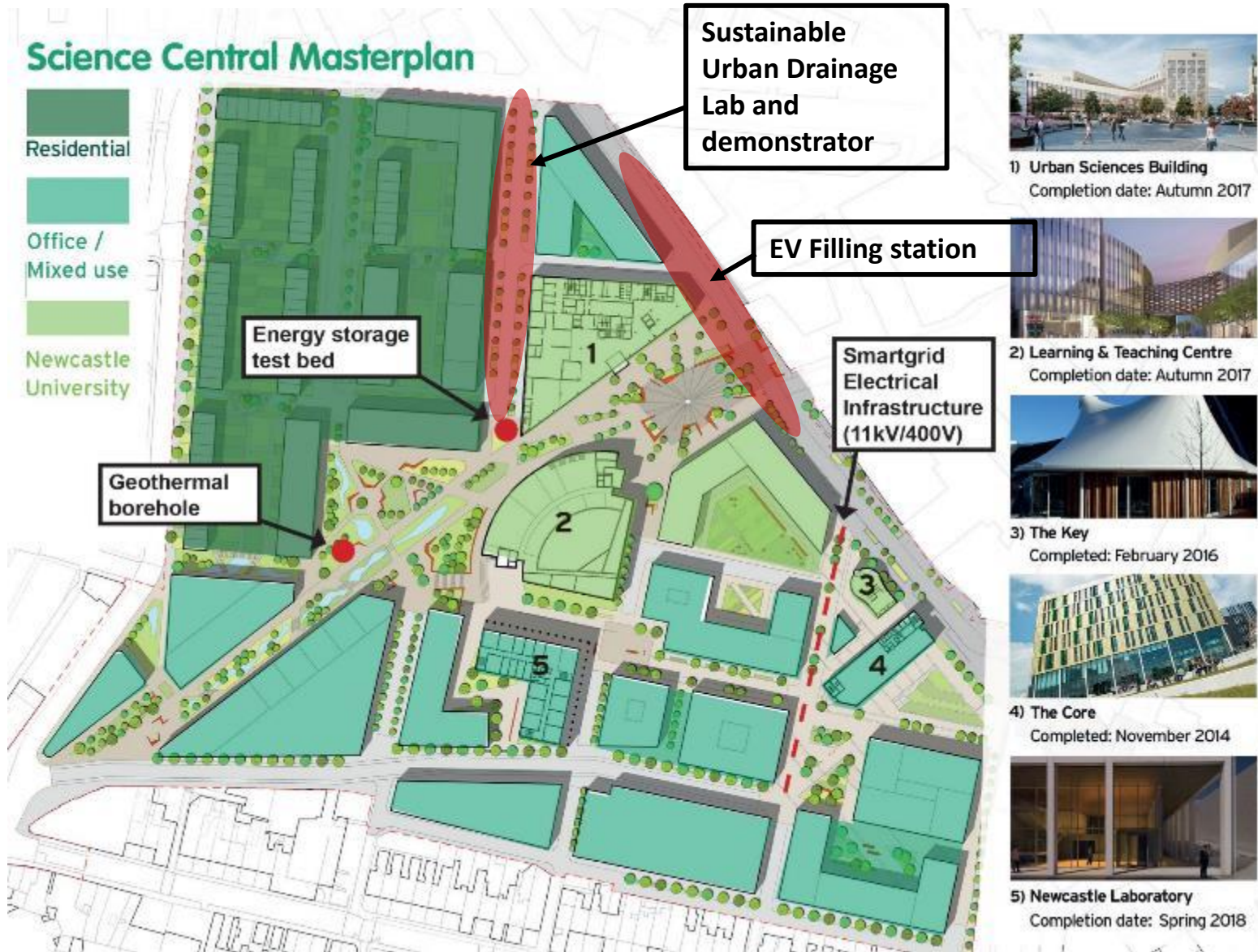
Visualisations of research outputs



Living Laboratory: Integrating research methodology



The Site as a Living Laboratory: Demonstrators on Science Central



The Site as a Living Laboratory: Sustainable Drainage

There are two clear flow pathways across site

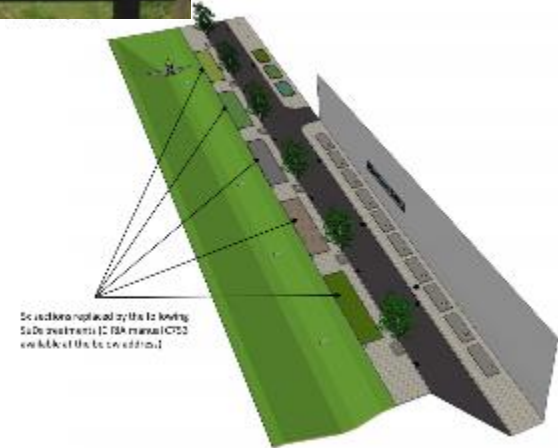


Flooding issues in town!

Solution: Green space for conveyance across the site.
A space to be proud of both storing and delaying flood flow



.....and a research facility



Urban Sciences Building



Buildings as Living Laboratories: USB Green Roof Infrastructure

Green Roofs

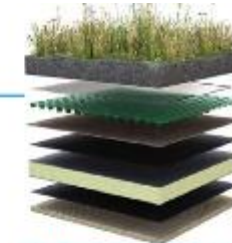
BIODOME (GI 1)

- Heat scavenging plant is located next to potential location for Biodome connection. Details to be developed by research group

HEAT EXCHANGER ROOM

- Heat scavenging / recovery area (E3, E4 & HVAC3)

GREEN ROOF CASSETTE TEST BED



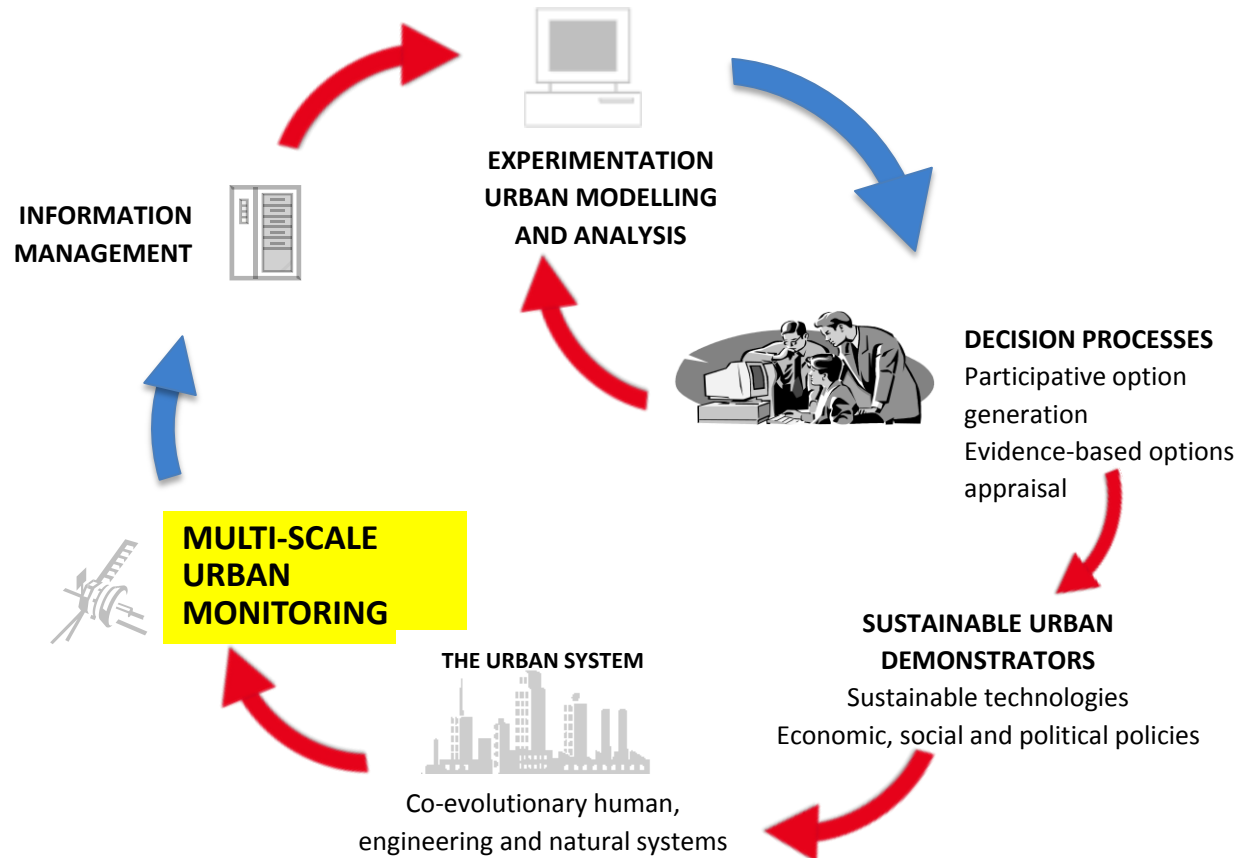
EXTENSIVE GREEN ROOF



GREEN ROOF CASSETTE SYSTEMS

PERMANENT GREEN ROOF
COMBINATION OF MOUNTAIN PLANTS
& SEDUM BLANKET

Living Laboratory: Integrating research methodology



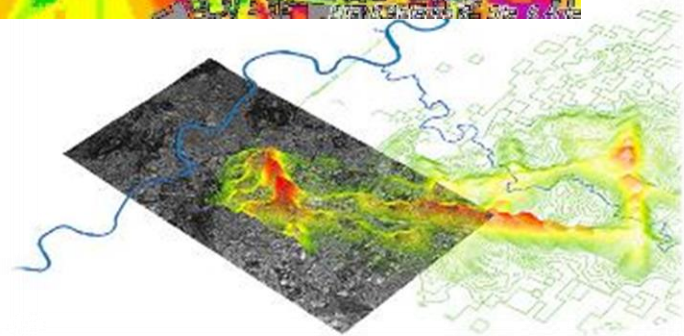
The City as a Living Laboratory



Multi-scale monitoring

Individual -> Science Central -> City-wide -> Region

<http://urbanobservatory.ac.uk/>

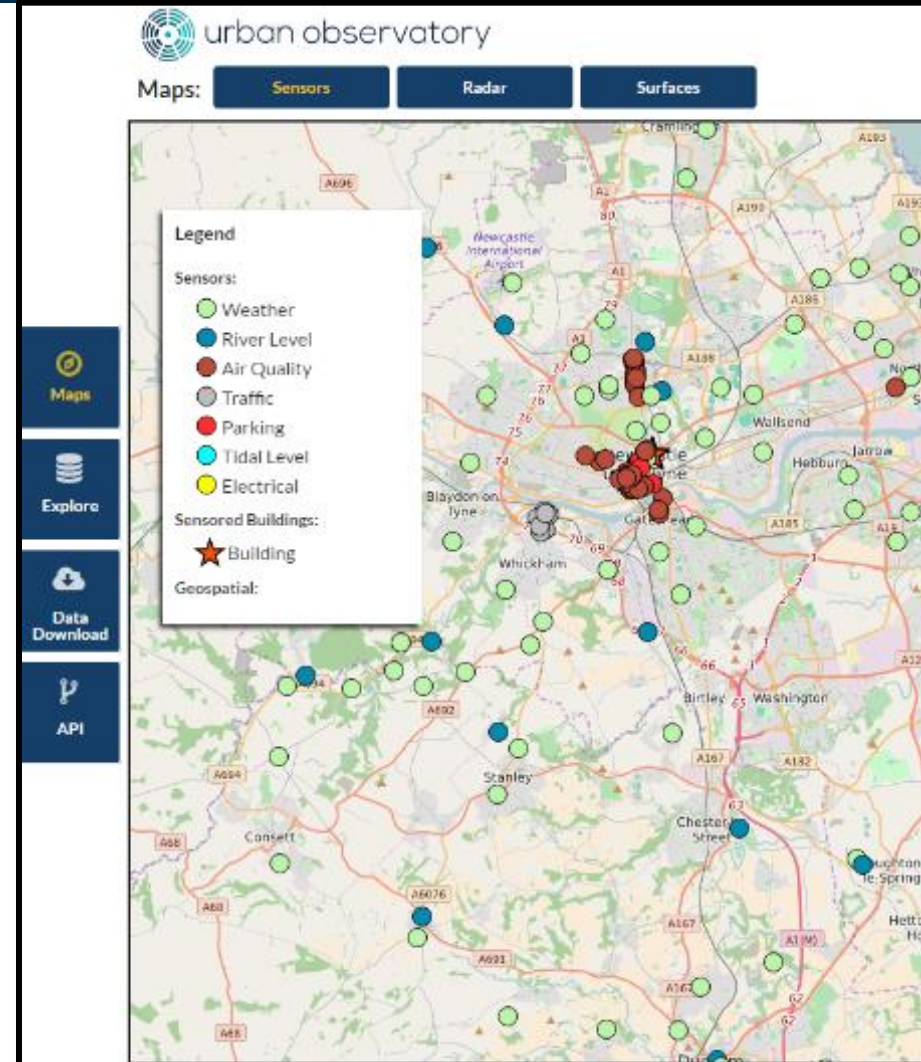


Urban Observatory

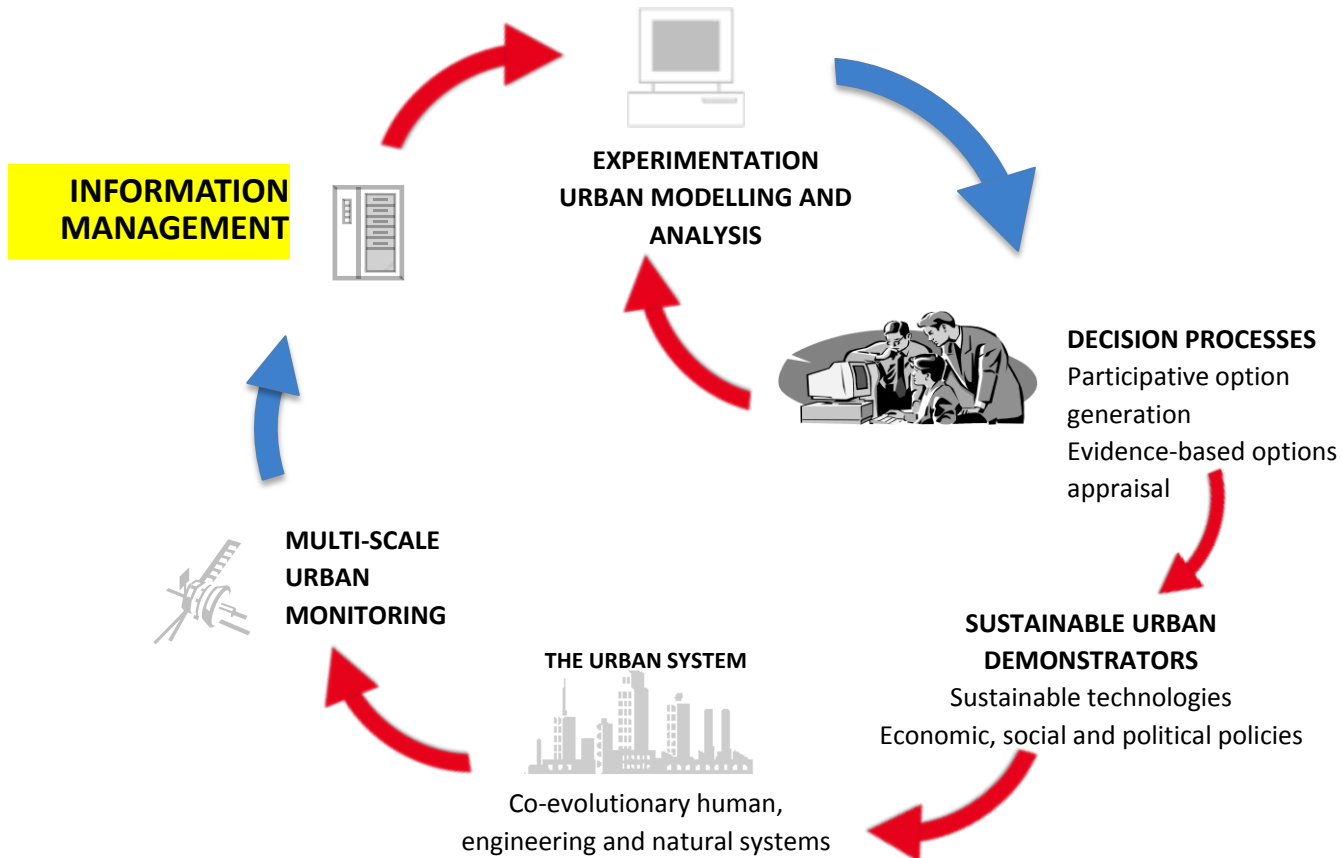
- 190 Mio records
- daily throughput of 1,000,000
- 700+ current sensors
- Hybrid of scientific and "low-cost" platforms
- 25+ data feeds (traffic, met data, congestion, air quality, parking, electricity grid, water network, tide gauge, river levels)
- 100+ building sensors
- Key building sensor integration (strain, tension, climate, internal conditions, power, energy and heat)
- Further £3.5m sensor hardware spend over the next 5 years

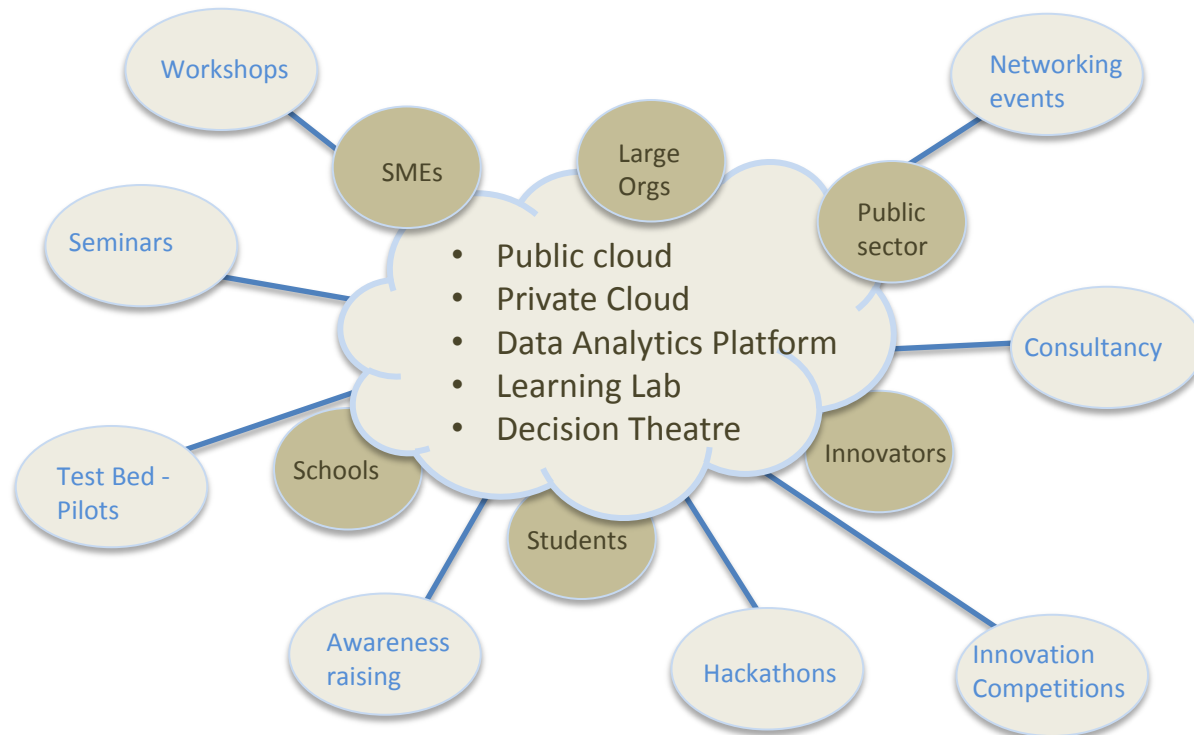
<http://www.urbanobservatory.ac.uk/>

<http://uoweb1.ncl.ac.uk/dashboard/>

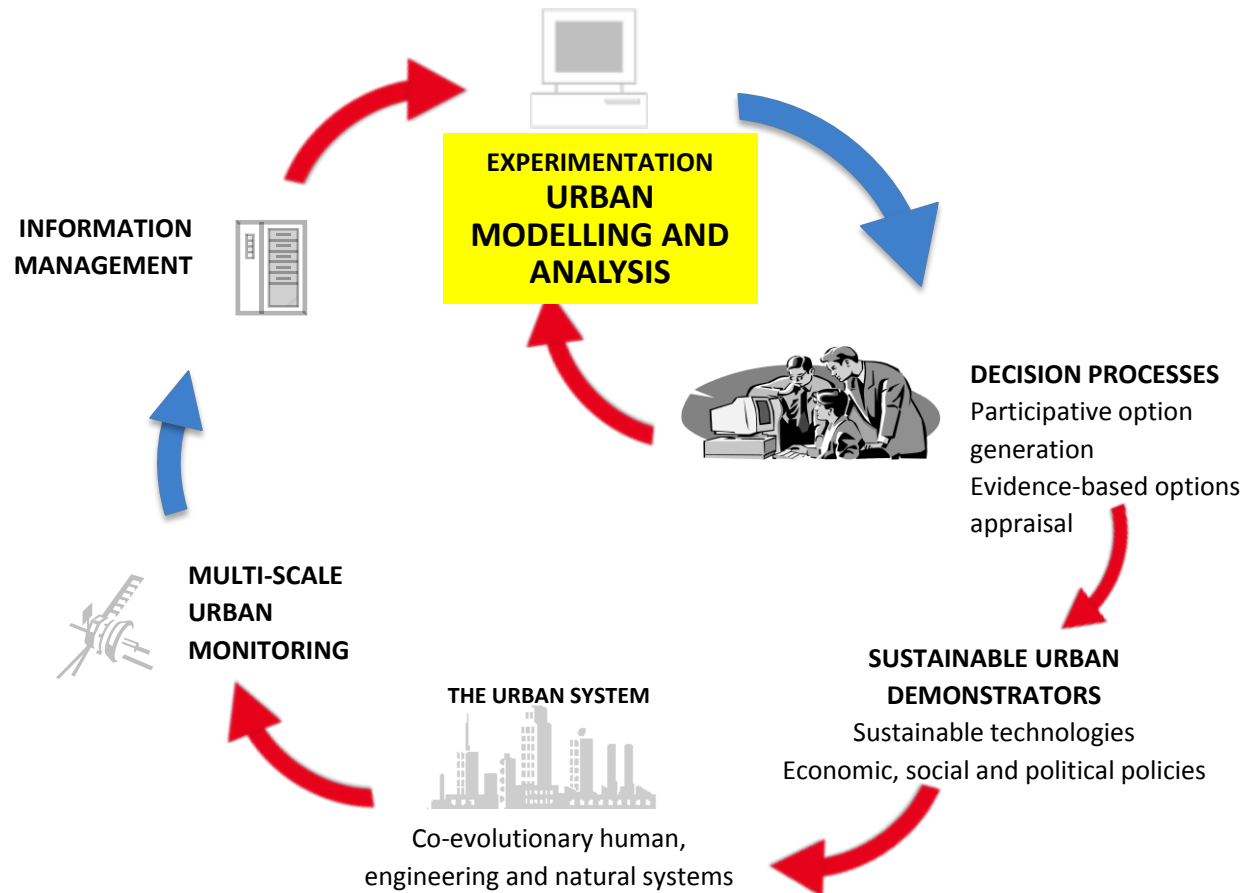


Living Laboratory: Integrated research methodology

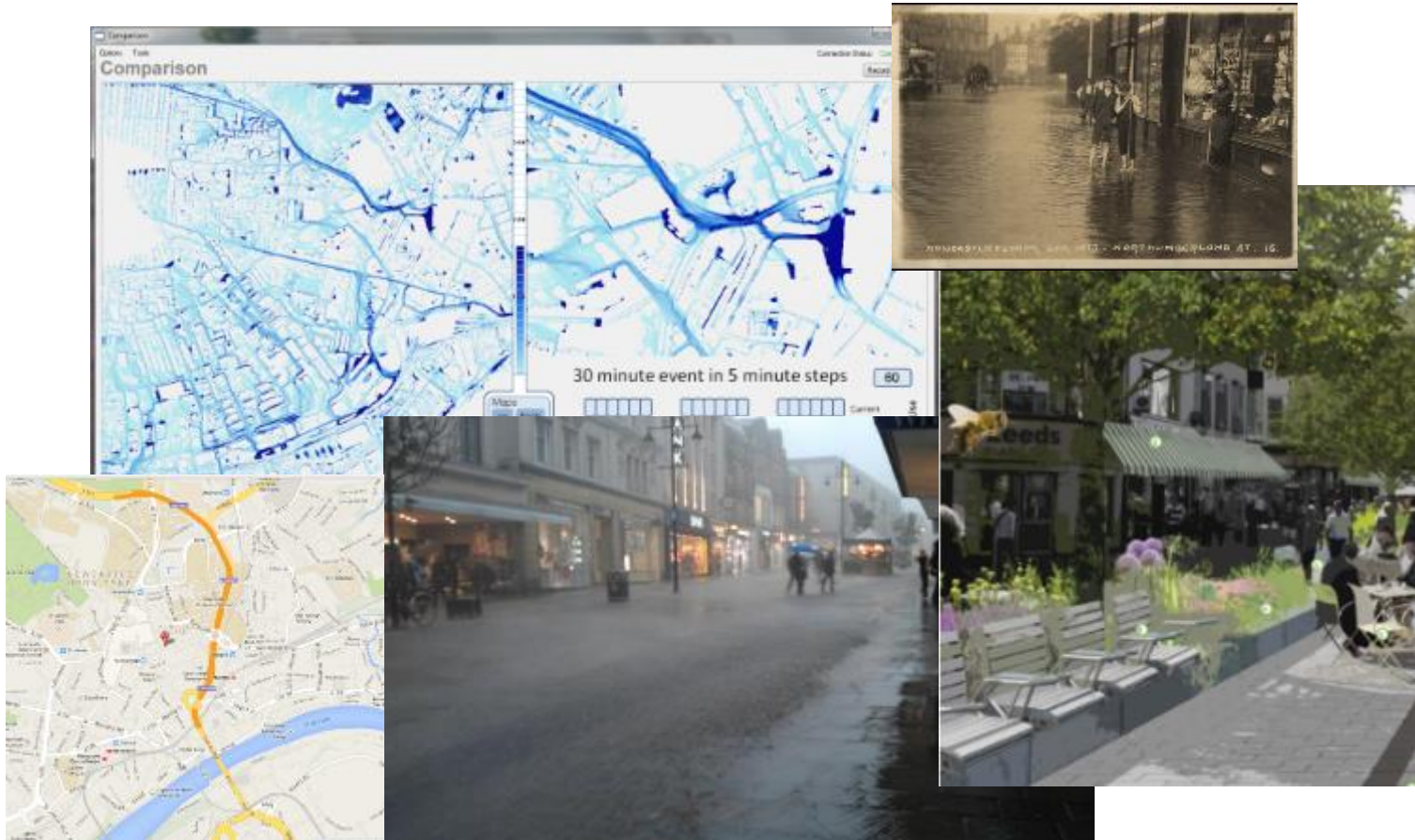




Living Laboratory: Integrating research methodology

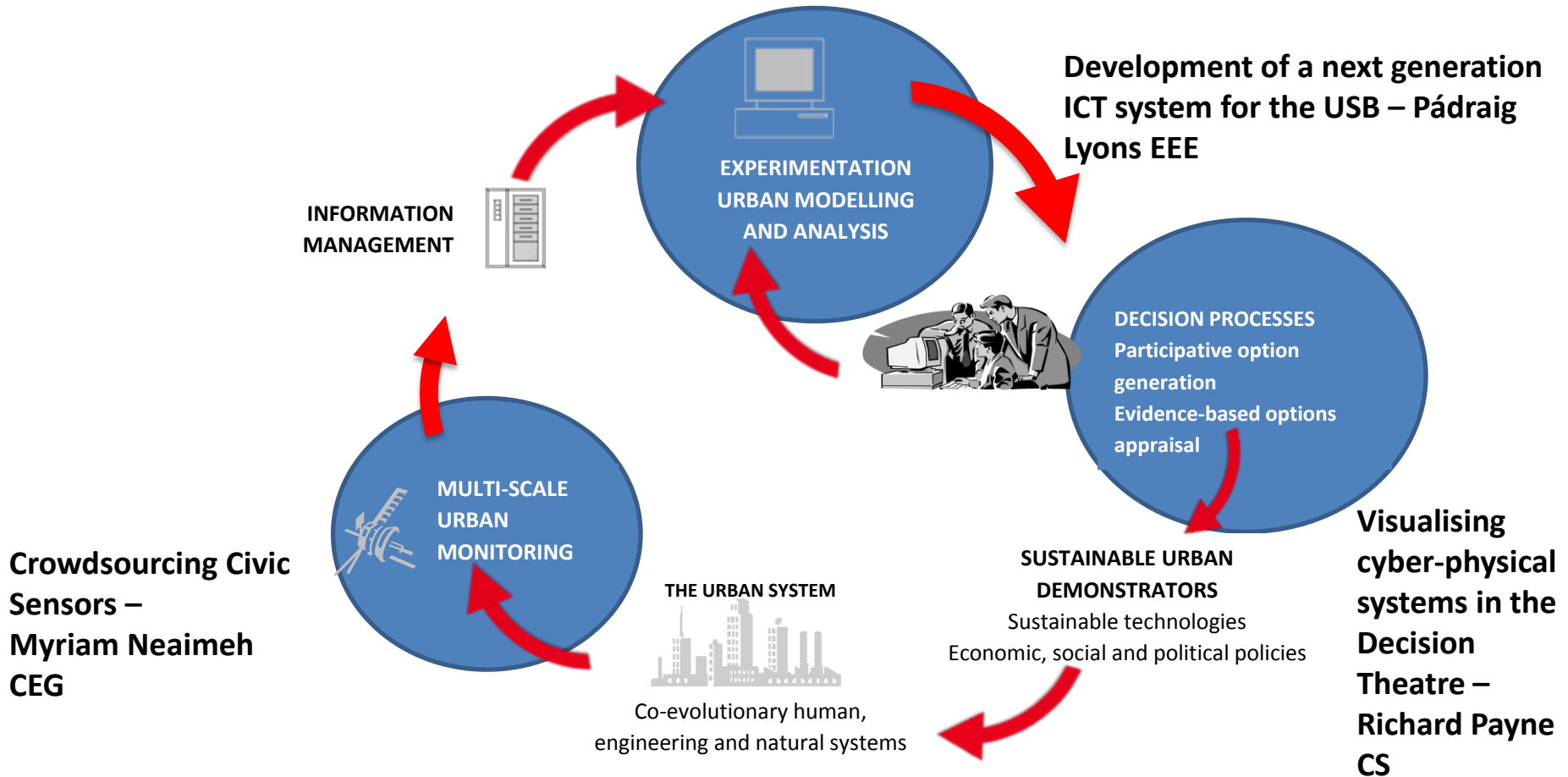


Urban Flood modelling



- How do we enable the Living Lab to benefit a wider community for:
 - Research?
 - Innovation?
 - Learning & Teaching?

Capacity building - Seedcorn Funding for ECRs

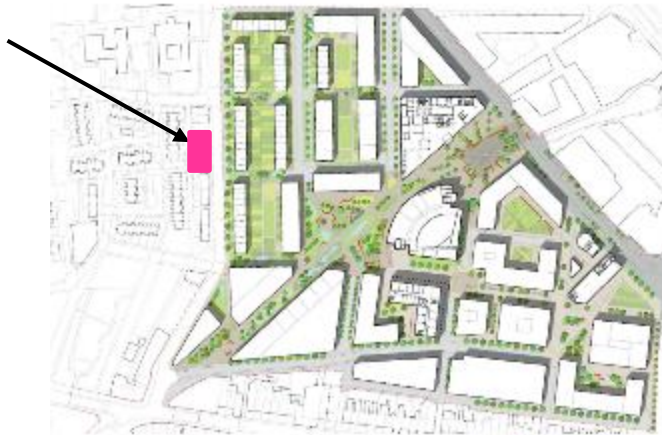


Identifying and delivering innovation



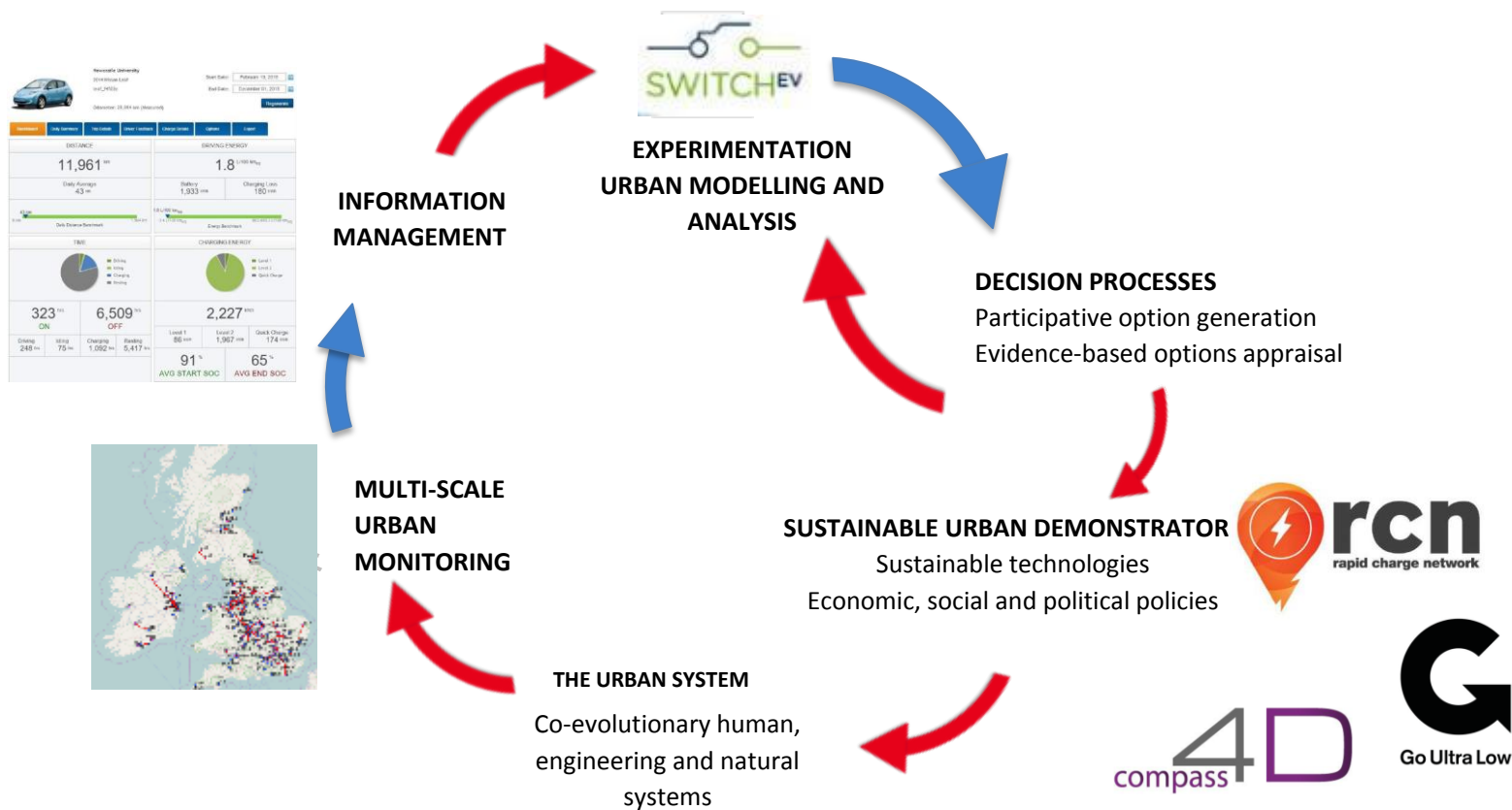
Future Homes

Theme: Ageing, wellbeing, housing, sustainability and digital



Digitally enabled housing for the lifecycle
Build four demonstrator houses to bespoke design to showcase digital technology, ageing needs and sustainability; PI Rose Gilroy
Location: Science Central, Newcastle.
Status: fund bids to Innovate UK/HCA



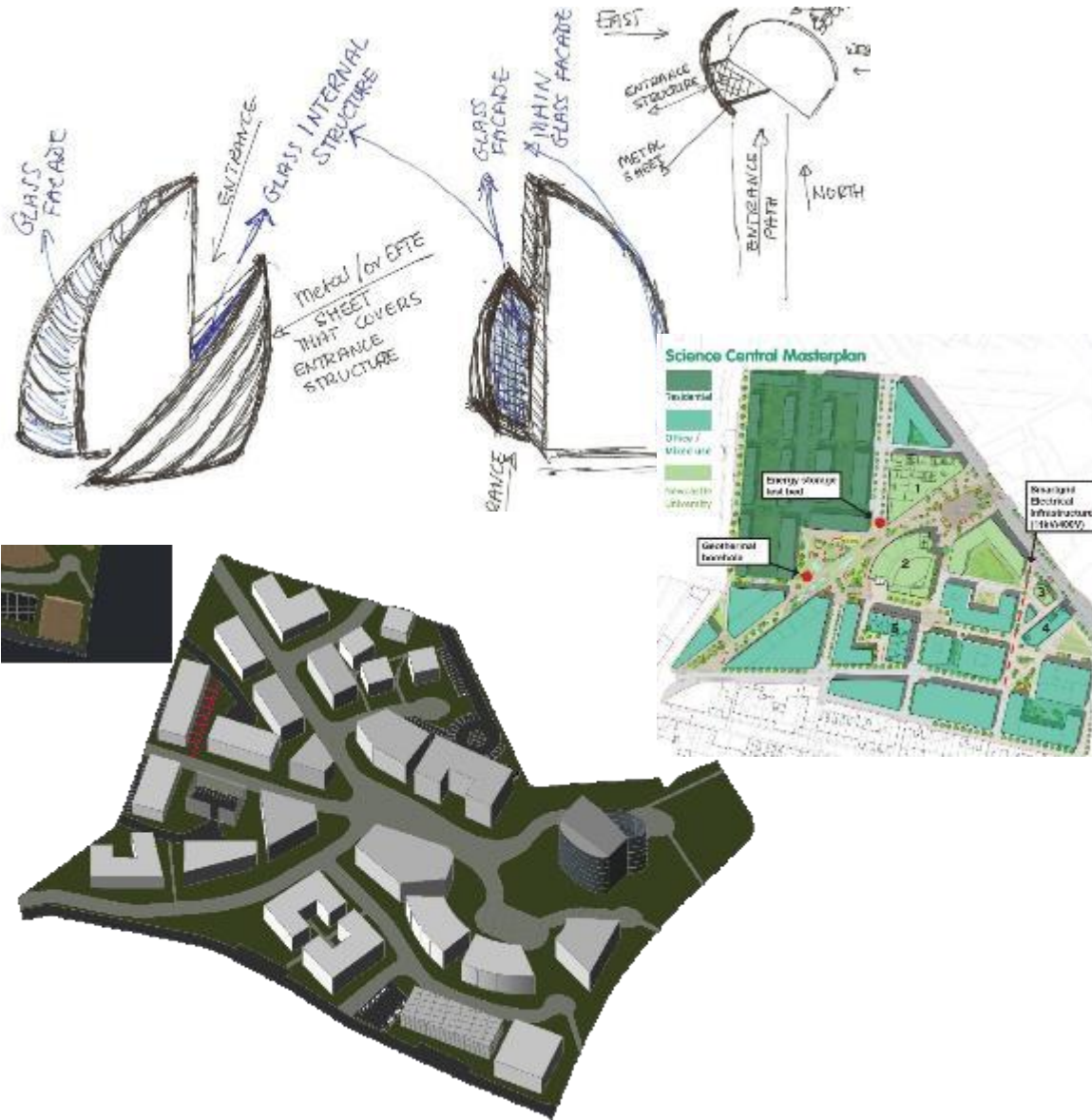


Student Projects: Carbon Capture Gardens

Science Central



Student Design Projects Science Central



Living Laboratory – a model to improve urban living?

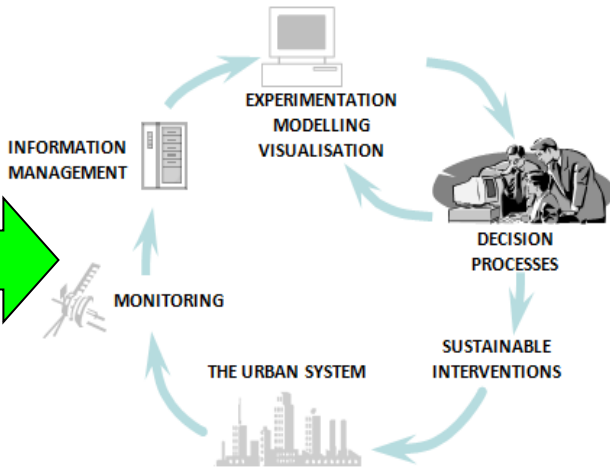
1970s.....



2010.....



2050?



- What should we do now?