

URBAN SOLUTIONS AND SUSTAINABILITY R&D CONGRESS 2023

BUILDING SUSTAINABLE, RESILIENT, AND LIVEABLE CITIES OF TOMORROW

4TH - 5TH OCTOBER 2023



Innovation and Ingenuity A Partnership for Resilience

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FREng
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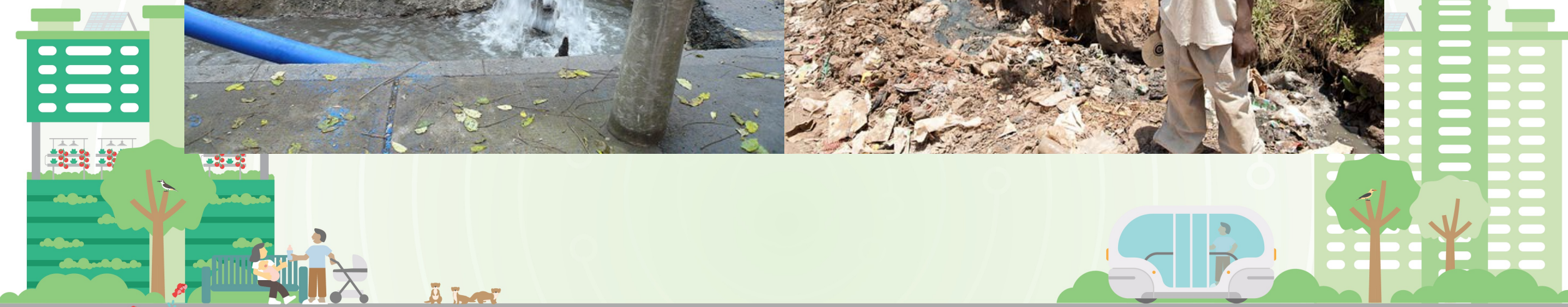
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*Empowering the
next generation.*



Innovation

Creation of new technology

AI and semiconductors (formerly Big Data and Compute) Internet of things and people

Satellites and Space, GPS and Earth Observation, Timing

Robotics and Autonomous Systems, Manufacturing

Geonomics and Synthetics Biology, Health

Regenerative Medicine, Longevity

Agri-Science, Food security

Advanced Materials and Nanotechnology, Construction and process

Energy and its Storage. EVERYTHING

New Processes

Co Creation

Multidisciplinary Collaboration

System of systems engineering

Rapid Prototyping

“Throughout my research career, collaboration and diversity has been an inescapable key to success.

This has meant seeking out diverse expertise and perspectives to build curiosity, connection and collaboration”

Dame Angela Mclean, UK Govt Chief Scientific Adviser, 2023



Ingenuity

- The origin of the word Engineering
- Putting technologies together, new and old, to deliver functions, services and outcomes
- Taking risks with integration
- Mission or outcome focused
- Teams of mixed expertise during whole lifecycle



Resilience

Systemic Resilience is a property of an infrastructure system that arises dynamically when the national infrastructure is organised in a such a way that it can provide agreed critical services (power, heat, communications channels, mobility services, potable water, and wastewater and waste removal) despite endogenous and/or exogenous hazards, and despite the addition, modification and removal of infrastructure components.

Principles for Resilient Infrastructure will:

- I. Assist in raising awareness and setting a common basic understanding of what “resilient infrastructure” constitutes;
- II. Form the basis for planning and implementation of infrastructure projects that take resilience as a core value;
- III. Raise engineering designs based on available and reliable data so parameters of safety and disaster risk mitigation are in place on new and retrofitting projects;
- IV. Set out the desired outcomes of national infrastructure systems to establish resilience of critical services; and,
- V. Assist the public and private sectors in making risk-informed policy and investment decisions.



A PROACTIVE APPROACH IS NEEDED TO MAKE THE UK'S INFRASTRUCTURE RESILIENT TO FUTURE CHALLENGES

The UK's water, energy, digital, road and rail infrastructure has, for the most part, proved resilient to shocks and stresses over recent years. But there may be different or harder challenges in the future.

RECENT EVENTS HAVE EXPOSED VULNERABILITIES



The 'Beast from the East' in 2018 left **200,000** people without water for 4 hours and **60,000** people without water for 12 hours across the UK



A power outage in August 2019 led to **1.1 million** customers being disconnected from the grid



In December 2018, over **30 million** of O2's mobile network users were unable to get online for almost a whole day



In May 2018, rail timetabling changes disrupted Northern Rail and Govia Thameslink passengers' travel plans for **several weeks**

THE COMMISSION RECOMMENDS:

The system architecture needs to...



ANTICIPATE

Face uncomfortable truths

RESIST, ABSORB, RECOVER

Test for and address vulnerabilities

ADAPT, TRANSFORM

Drive adaptation and value resilience properly

The Commission recommends that...



Government sets resilience standards

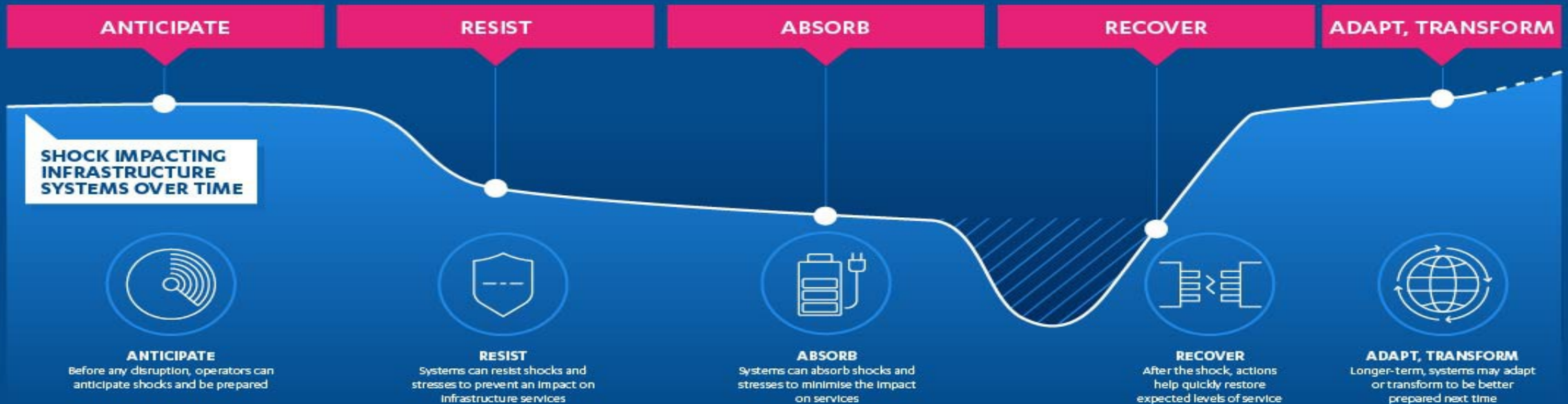
Regulators oversee regular stress testing

Infrastructure operators address vulnerabilities

Infrastructure operators produce long term resilience strategies

Regulators value resilience in decisions to support investment

THE COMMISSION HAS DEVELOPED A NEW FRAMEWORK FOR RESILIENCE



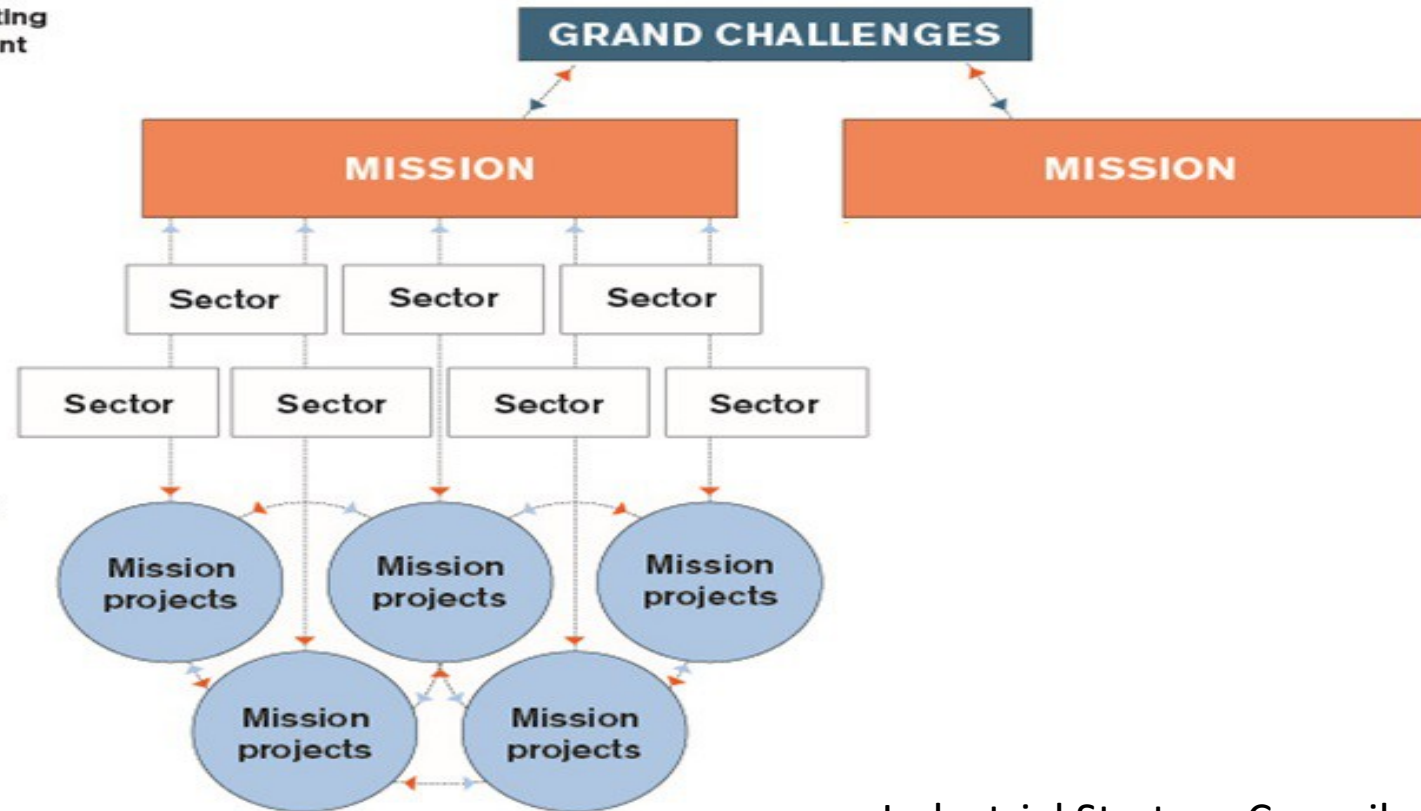
Partnership

Political agenda setting
and civic engagement

Clear targeted
missions

Cross-sectoral
innovation

Portfolio of projects
and bottom-up
experimentation

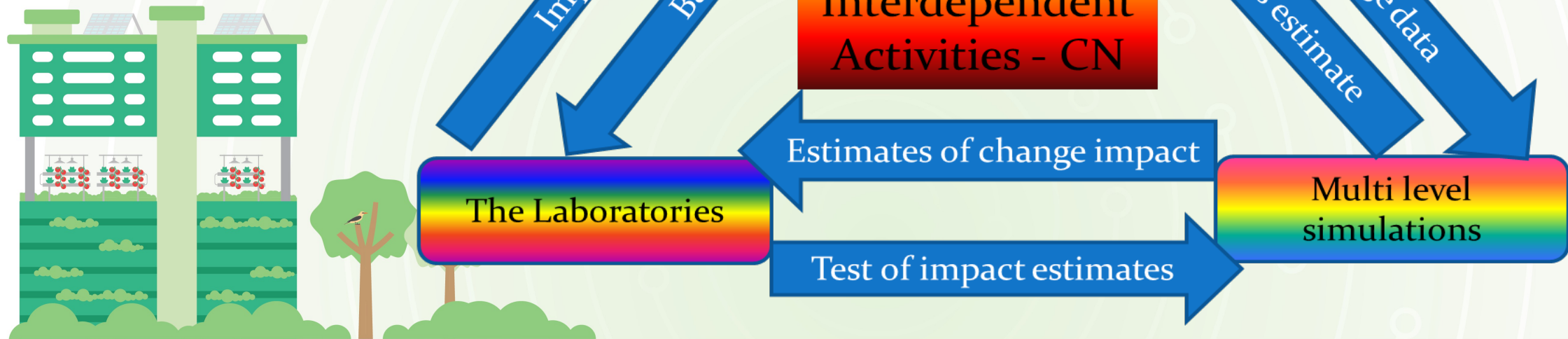


Industrial Strategy Council

Synthesis

UKCRIC: a synergistic vision for infrastructure research

- Key issues
 - Collaboration and competition coexist
 - Multidisciplinary
 - Data standards
 - Learn by doing
 - Continuity of governance



**What are the
priority
missions for
USS**

- Infrastructure and urban systems for one planet living
- Ownership, governance and business models for infrastructure and urban systems
- Transformational infrastructure and urban systems for a changing world
- Infrastructure and urban systems as drivers of equity, inclusion and social justice

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**Do you have
the skills in
the right
quantity and
knowledge
across all
disciplines**

<https://www.cdice.ac.uk/about/>

**Is the
governance
and
management
structure
appropriate**

**Is the research technology driven
or technology enabled**

https://www.ukcric.com/media/1839/23562_theory_of_change_book_publication_aw4_230214.pdf



Thank You