

Focussing on a sustainable future

Jo da Silva OBE

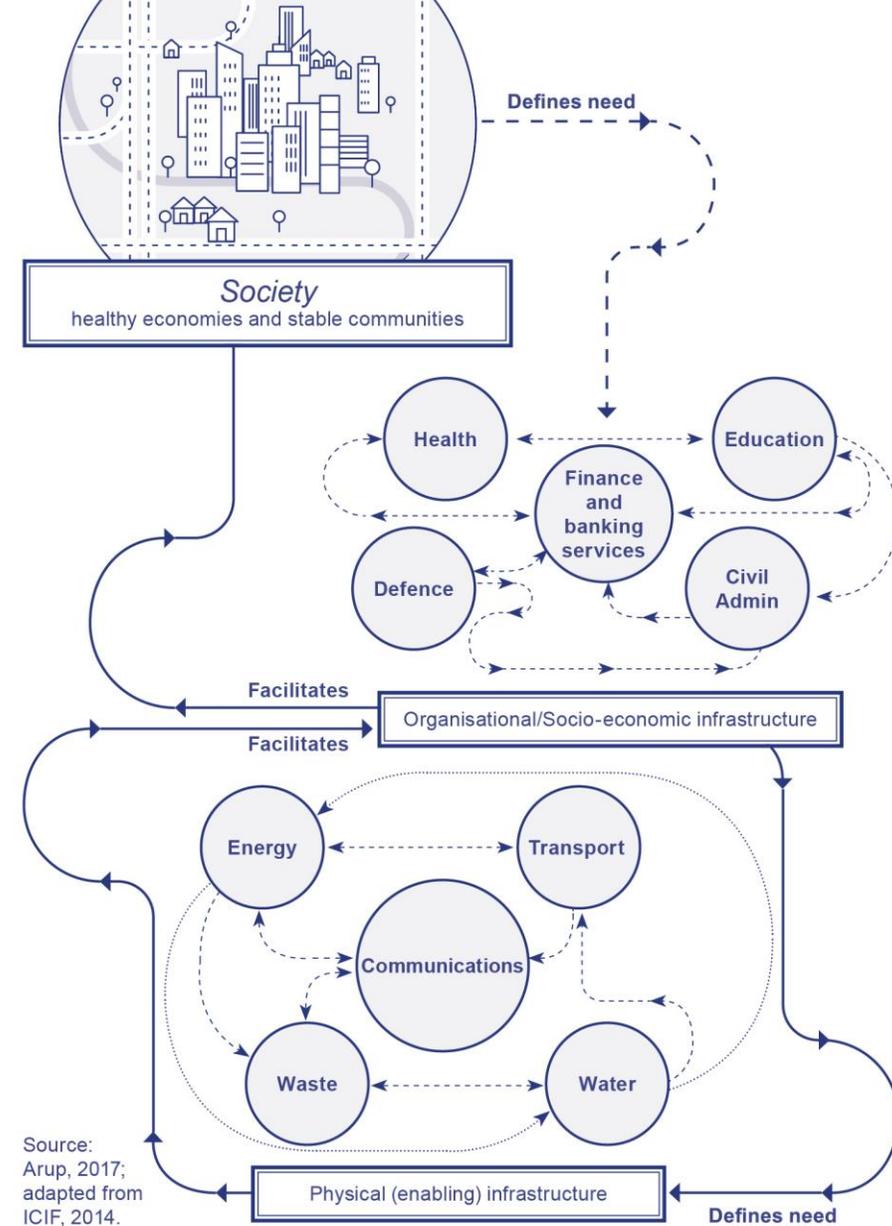
Arup Fellow / Global Sustainable Development Leader

Change is all around us. Population growth and urbanisation, climate change and resource scarcity, the fourth industrial revolution and globalisation are all having a huge impact on how we work and live.



“A reliable transport system is essential to a functioning and prosperous society”

DfT Transport Resilience Review (2014)

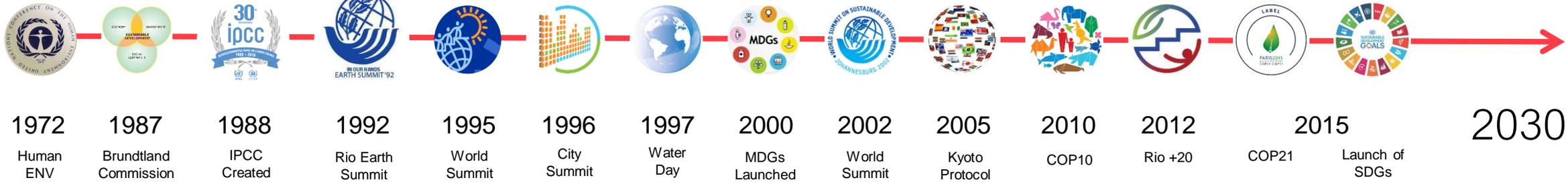


Re. the Resilience Shift

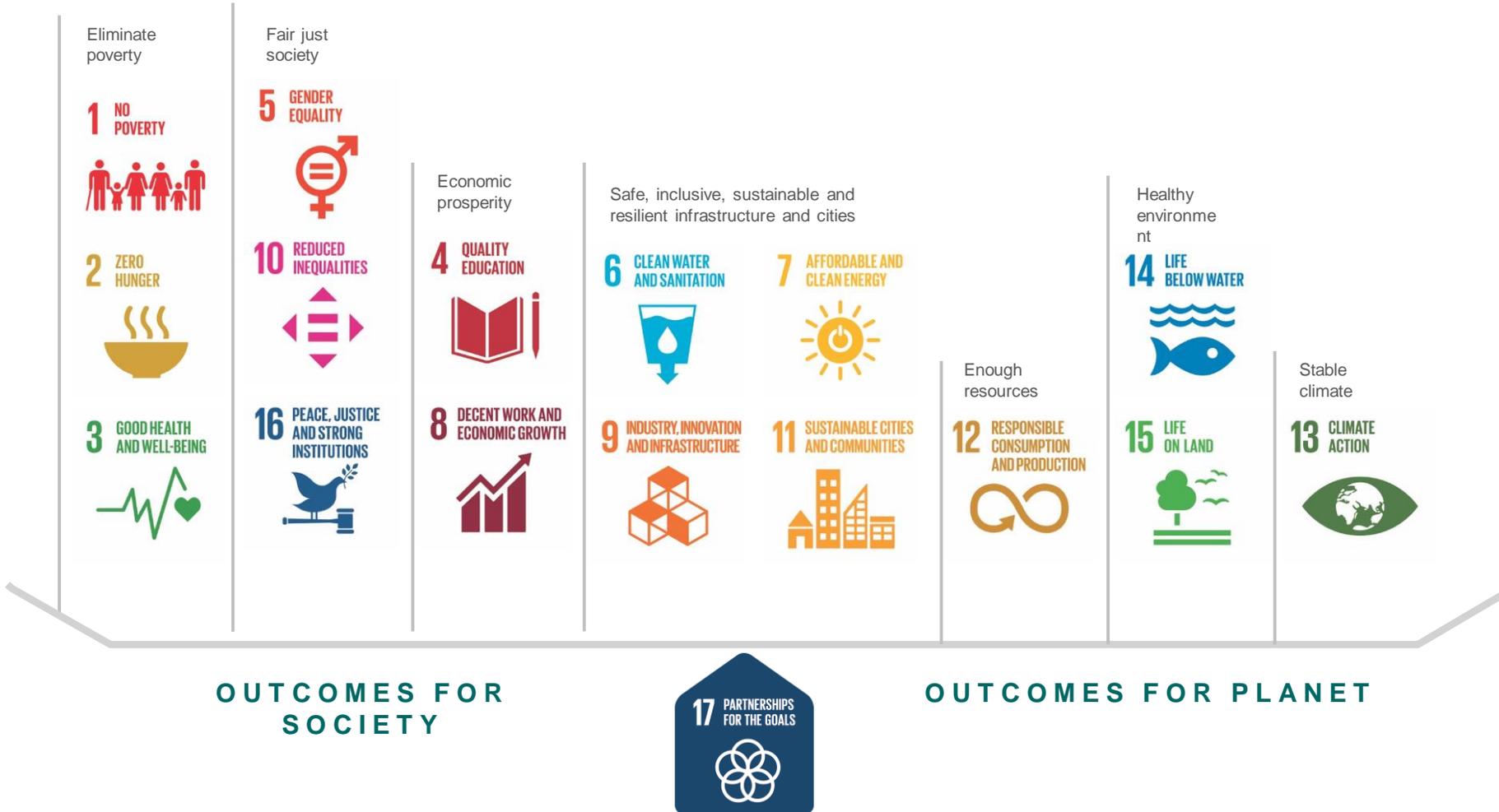


Change History







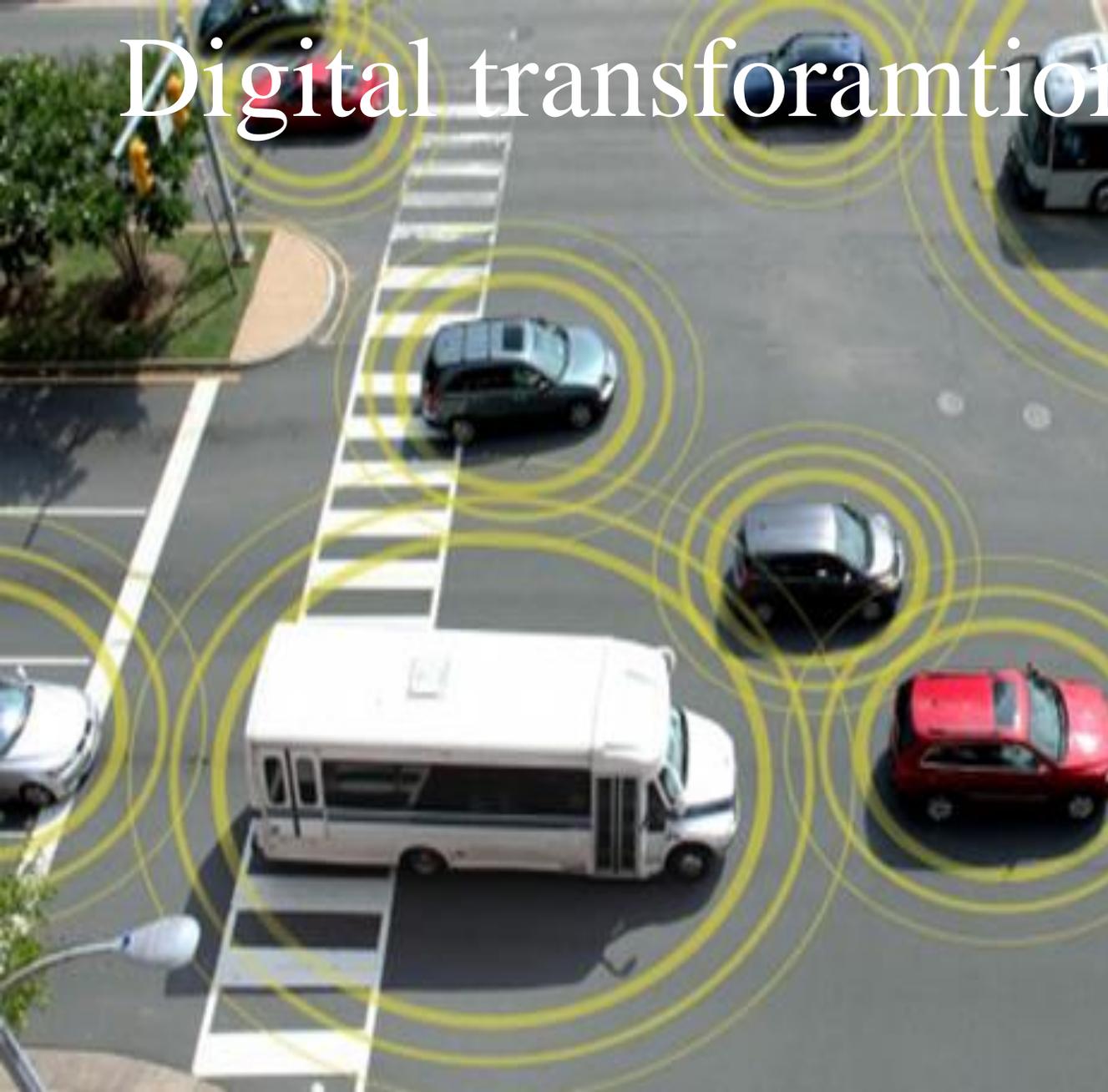






Source: Transport Infrastructure Ireland's Environmental Strategy, February 2019

Digital transformation



Urban transformation



Shocks and stresses

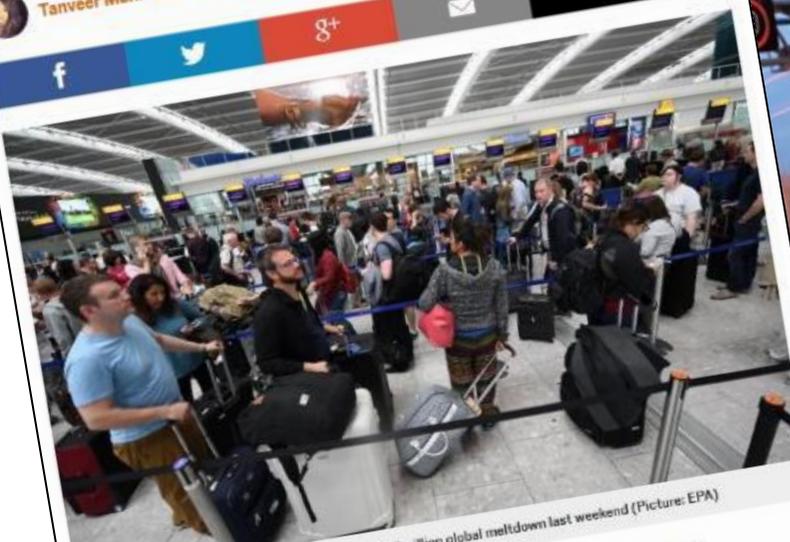


Smart

BA's £150,000,000 outage was caused by someone turning computers on and off too quickly

Tanveer Mann for Metro.co.uk Friday 2 Jun 2017 9:42 am

194



An IT engineer is to blame for British Airways' £150million global meltdown last weekend (Picture: EPA)

An IT engineer doing maintenance work at a British Airways data centre is to blame for BA's £150million global meltdown, which left 75,000 people stranded last weekend, it has emerged.

planned

Share



Guardian

HIGHWAYS ENGLAND

congested" journeys

th West over in the region's

y smart

Business Insider

Wi-fi data cent

Und

Typo blamed for Amazon's internet-crippling outage

Human error downed sites

billing issues took out far

NHS cyber-attack causing disruption one week after breach

Hospitals slowly returning to normal after ransomware attack led to cancelled operations and diverted ambulances

Your PC is at risk

Virus and Spyware Protection

London

Amazon: 'Unfortunately, one of th was removed than intended.' Photog

Security researchers recorded more than 45,000 ransomware attacks in 99 countries last week, including the UK, Russia, Ukraine, India, China, Italy, and Egypt. Photograph: Yui Mok/PA

NHS trusts are experiencing disruption one week after a cyber-attack caused havoc in more than 150 countries.

Guardian

Extraordinary



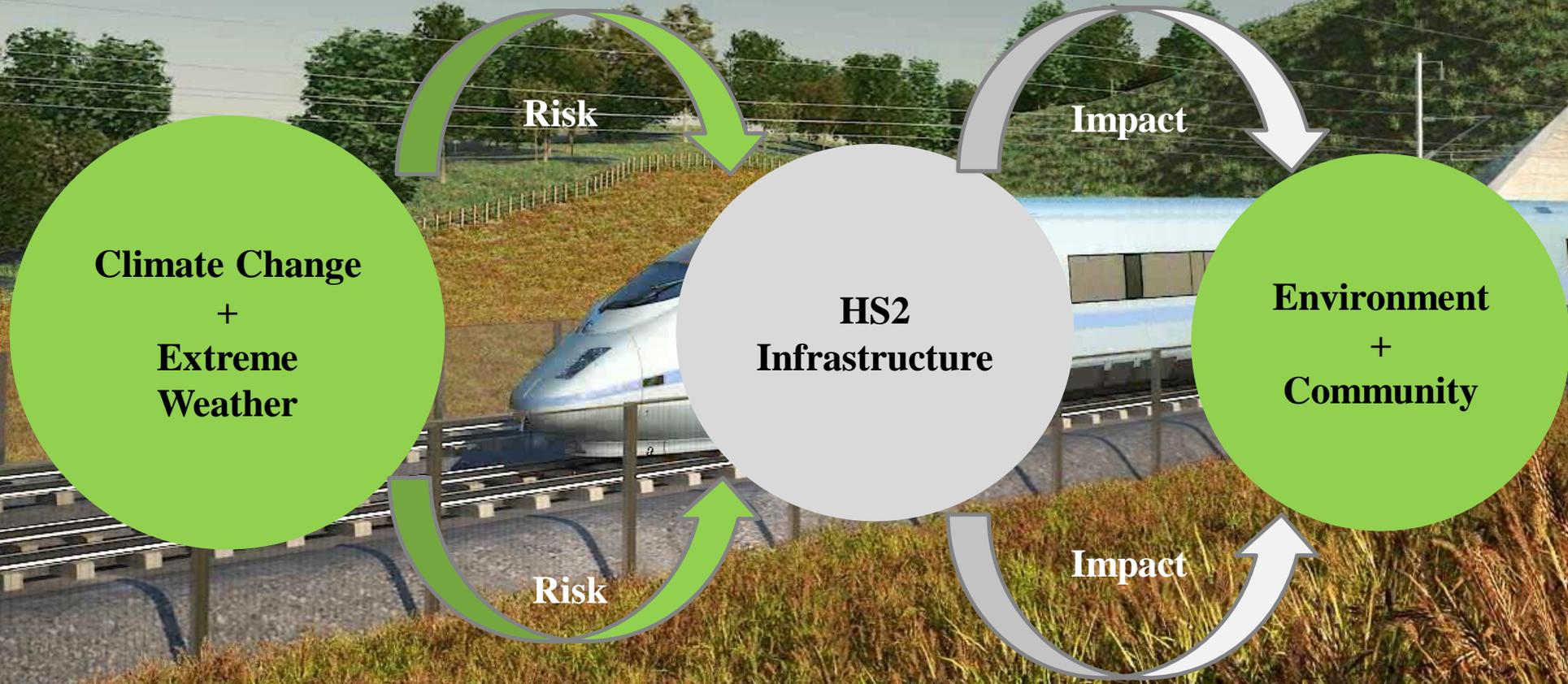
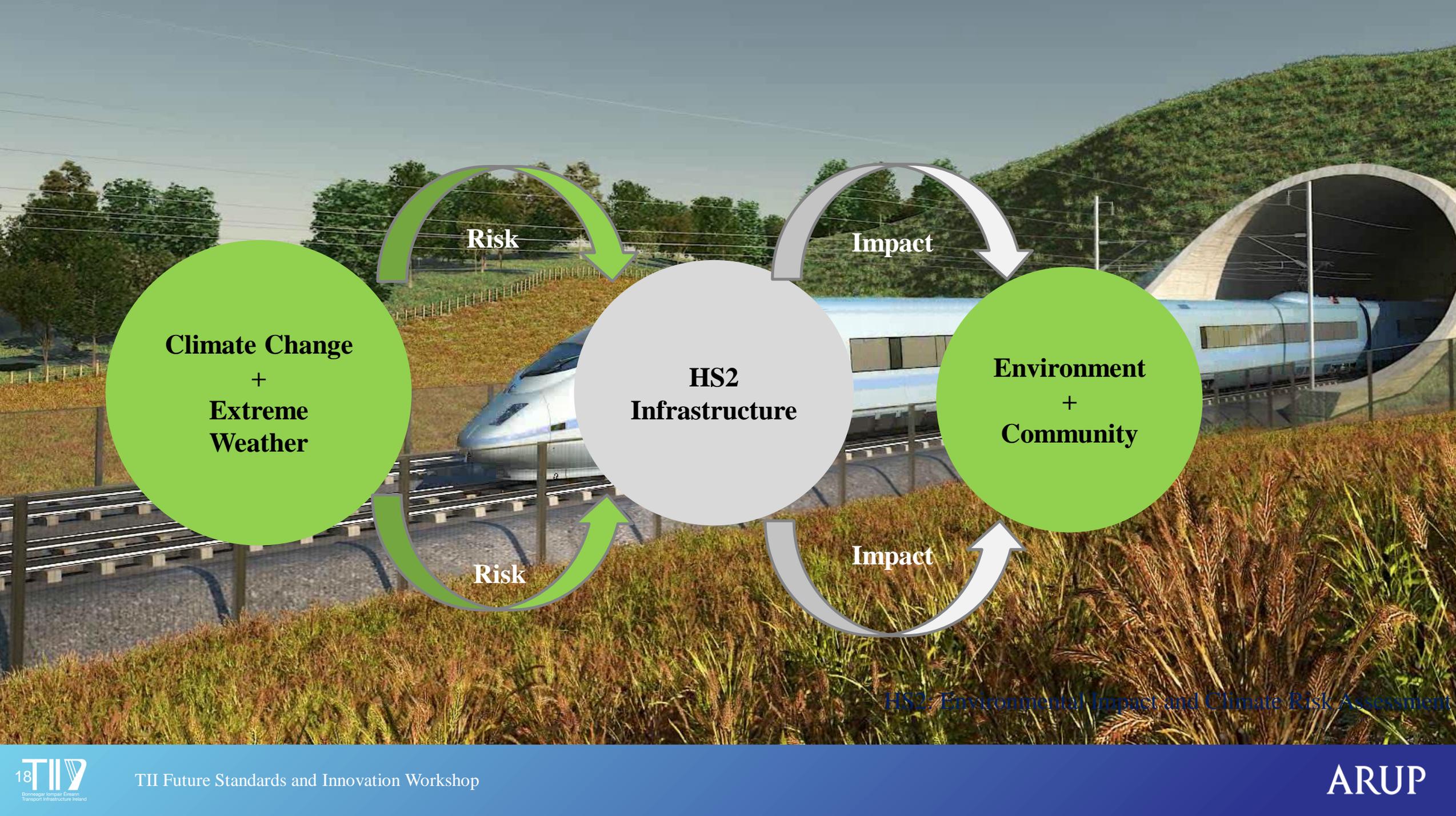
© Getty Images

1. Preventative



2. Adaptive planning

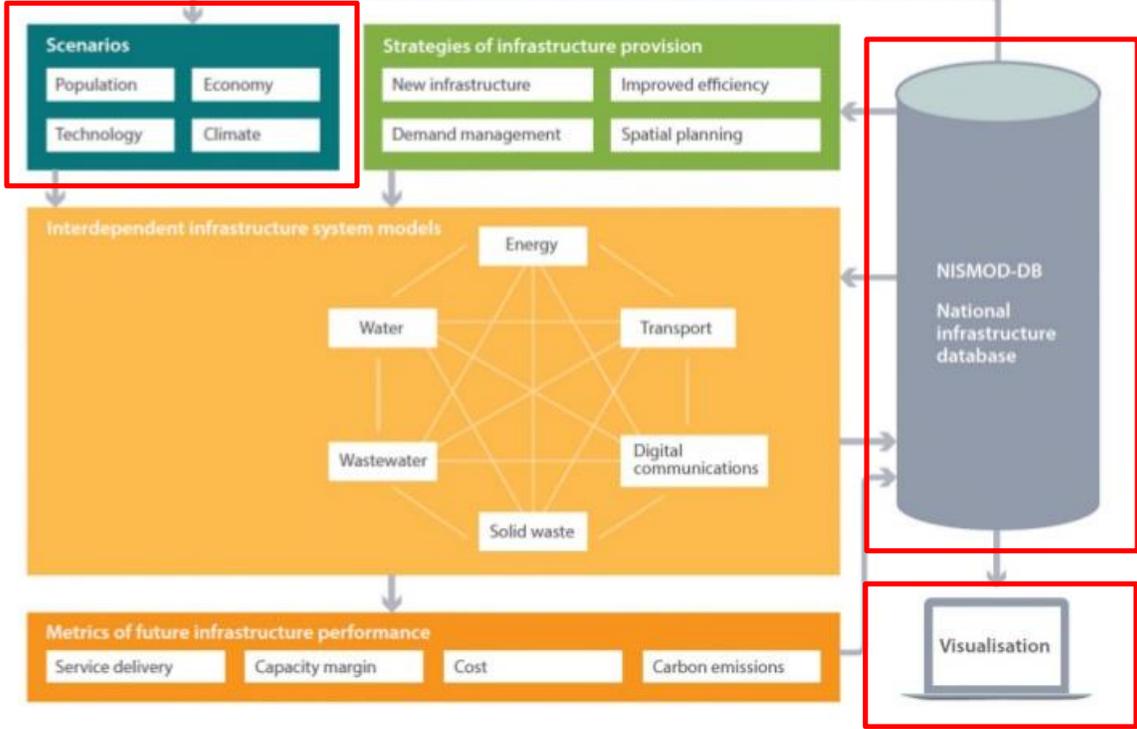




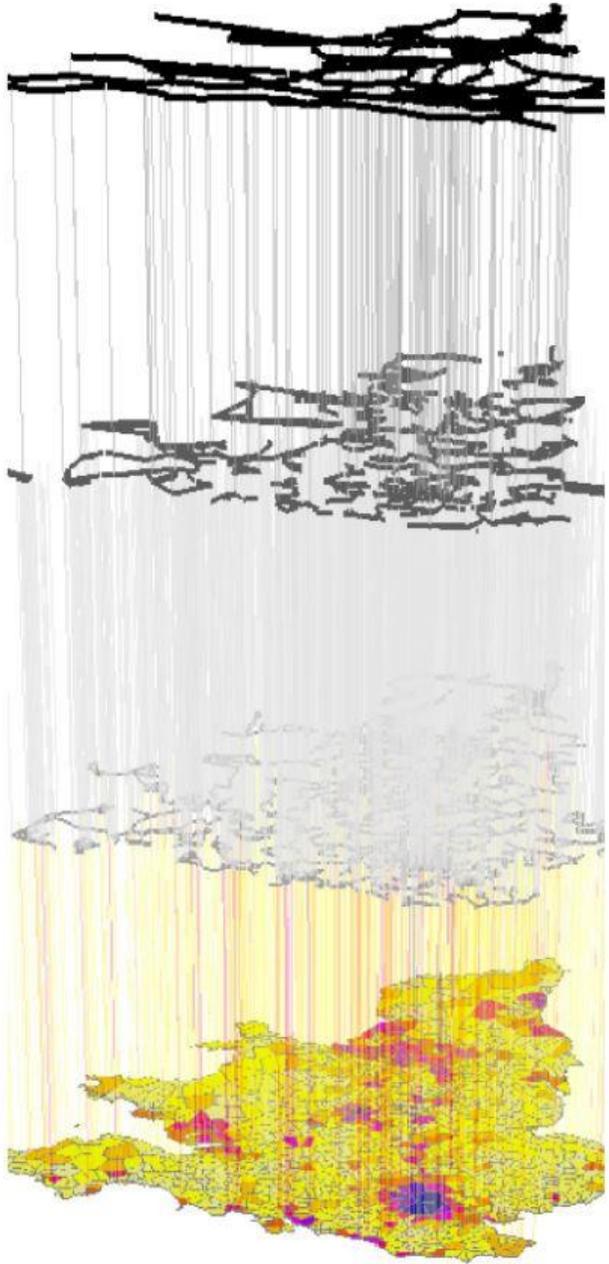
HS2: Environmental Impact and Climate Risk Assessment

3. Resilient systems

Scenario analysis



Database and GIS



Visualisation tools

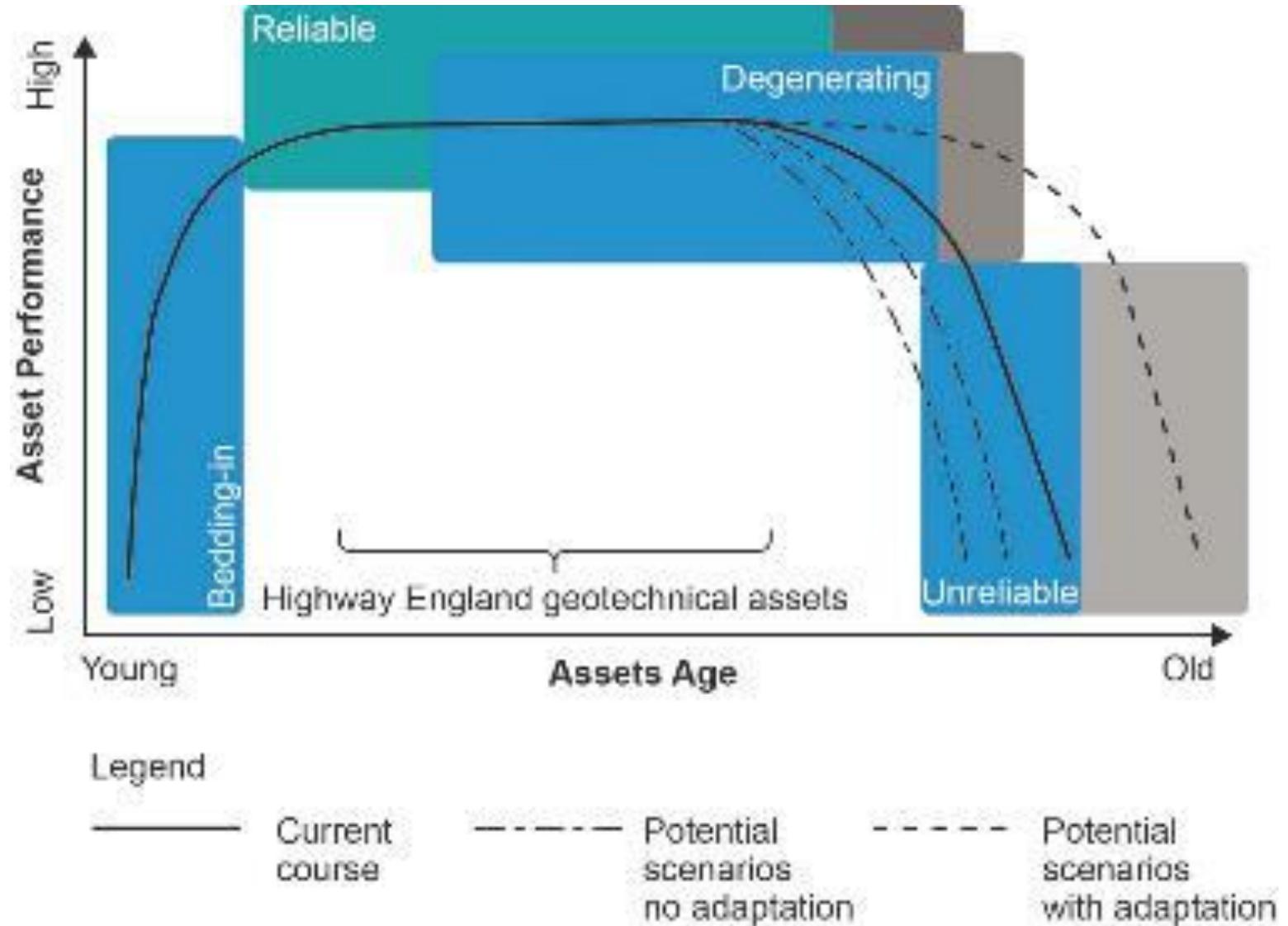
<https://www.itrc.org.uk/nismod/>

TII-IIRC NISMOD https://www.oxfordsmartcity.uk/oxblog/Getting_critical/



Fragility, criticality and interdependency

Ageing Assets



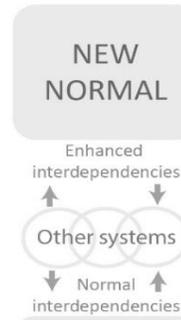
Source: Resilience of geotechnical assets to extreme weather events
 Client: Highways England

Rapid Recovery

Transforming performance

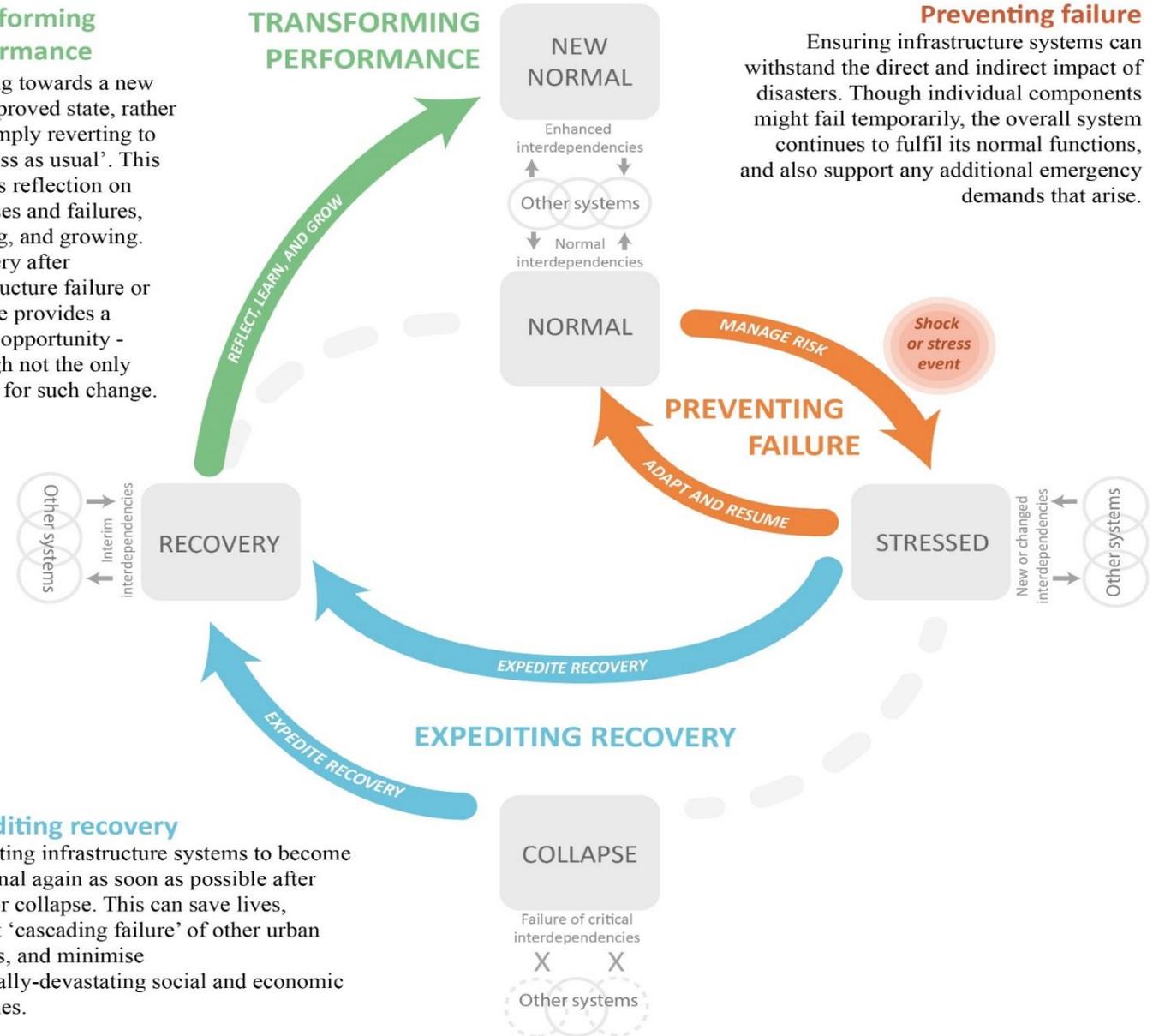
Working towards a new and improved state, rather than simply reverting to 'business as usual'. This requires reflection on successes and failures, learning, and growing. Recovery after infrastructure failure or collapse provides a crucial opportunity - although not the only avenue for such change.

TRANSFORMING PERFORMANCE



Preventing failure

Ensuring infrastructure systems can withstand the direct and indirect impact of disasters. Though individual components might fail temporarily, the overall system continues to fulfil its normal functions, and also support any additional emergency demands that arise.

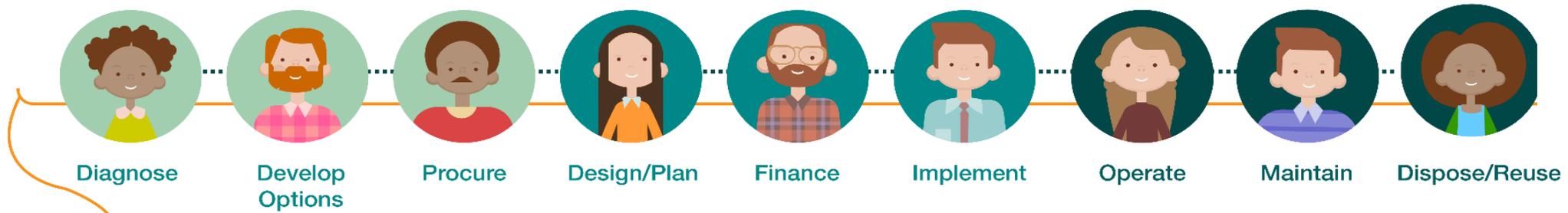


Expediting recovery

Supporting infrastructure systems to become functional again as soon as possible after stress or collapse. This can save lives, prevent 'cascading failure' of other urban systems, and minimise potentially-devastating social and economic outcomes.

Source: Future Cities (Lloyds-Arup 2017)

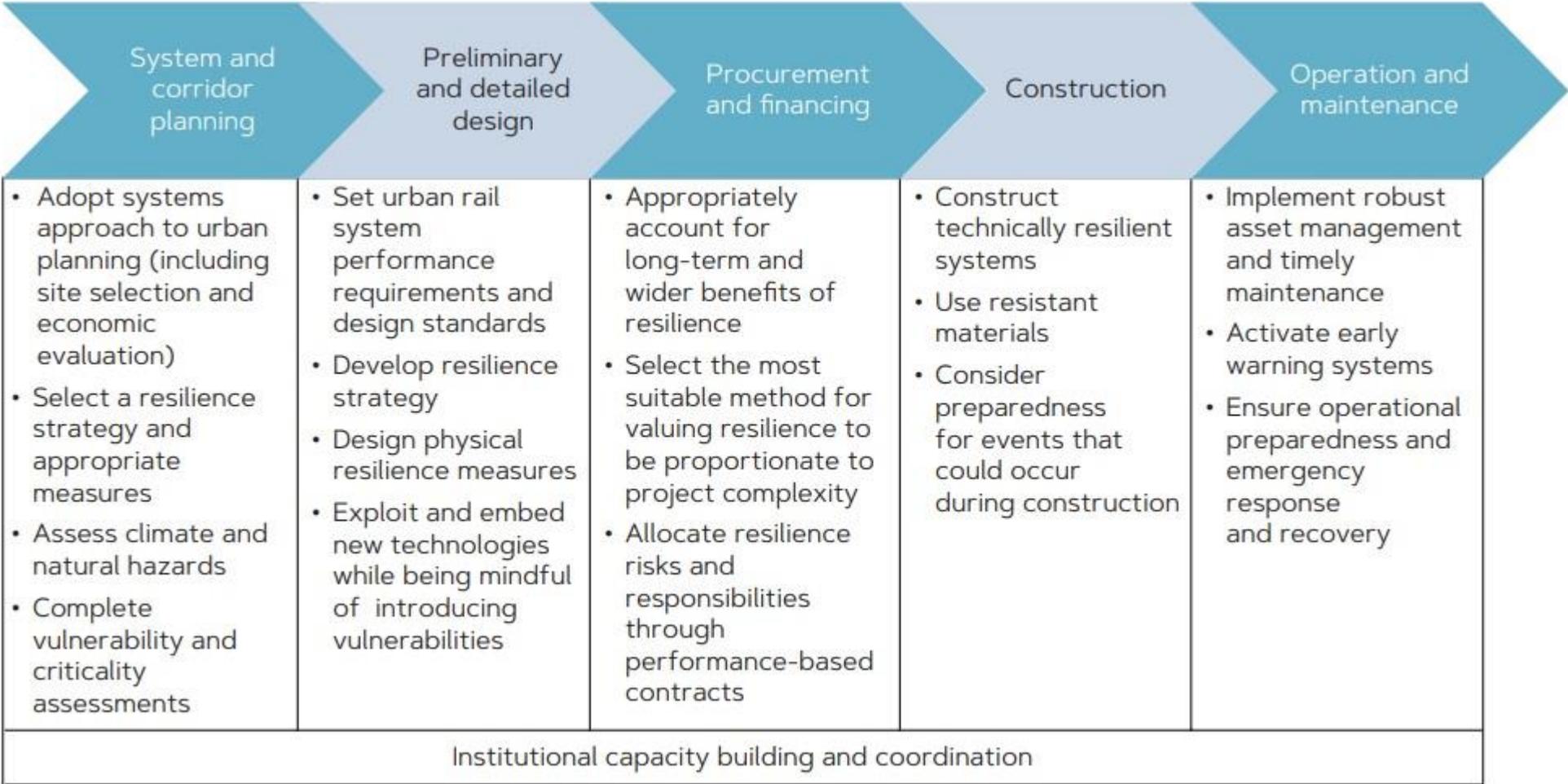
Barriers



 THE RESILIENCE SHIFT

www.resilienceshift.org

Project lifecycle



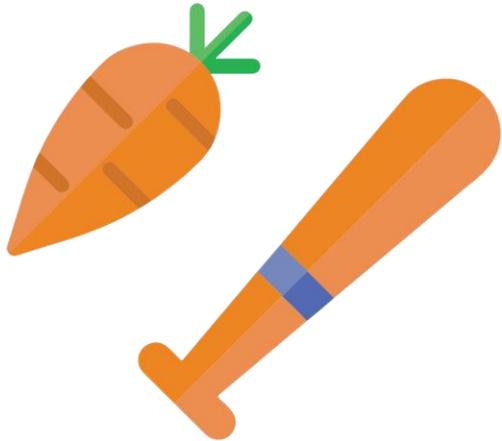
Source:
<http://documents.worldbank.org/curated/en/583011538651181032/pdf/130474-PUB-PUBLIC-document-date-9-20-18.pdf>

Multi-stakeholder approaches

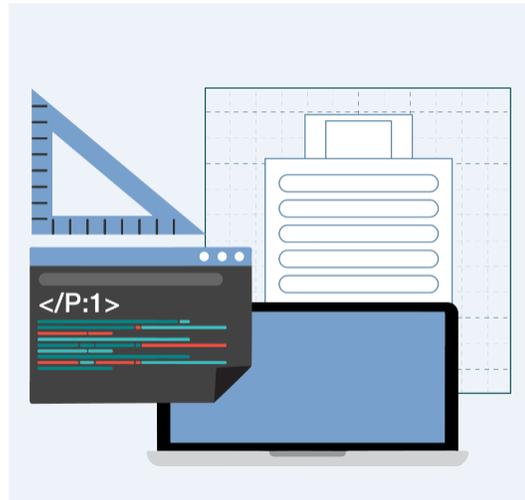
	System and corridor planning	Preliminary and detailed design	Procurement and financing	Construction	Operation and maintenance
Decision maker (government authority)	✓	✓			
Rail authority		✓	✓	✓	✓
Urban planner or designer	✓	✓	✓		
Contractor		✓	✓	✓	
Rail operator					✓
Forecast and monitoring (for example, hydro-meteorological agencies)		✓			✓
Investor		✓	✓	✓	✓
Insurance	✓	✓	✓	✓	✓
Emergency response teams				✓	✓
Passengers					✓
Media outlets					✓
Civil society		✓			✓

Source:
<http://documents.worldbank.org/curated/en/583011538651181032/pdf/130474-PUB-PUBLIC-document-date-9-20-18.pdf>

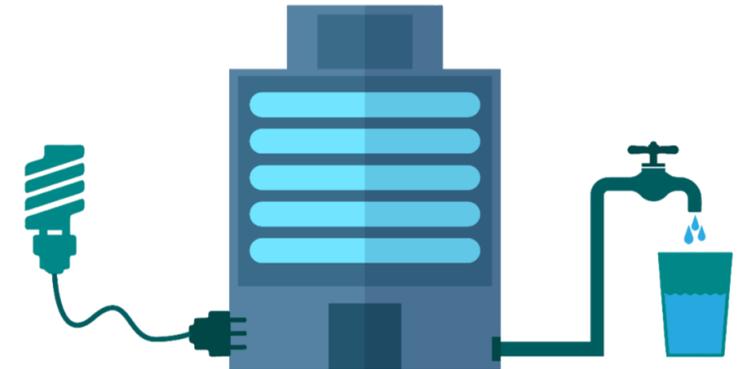
Policy



Practice



Learning



...which will accelerate critical infrastructure resilience in practice. This is either *within* (water, energy, transport, food ... so far) or *between* (useful for a cross-sector audience).

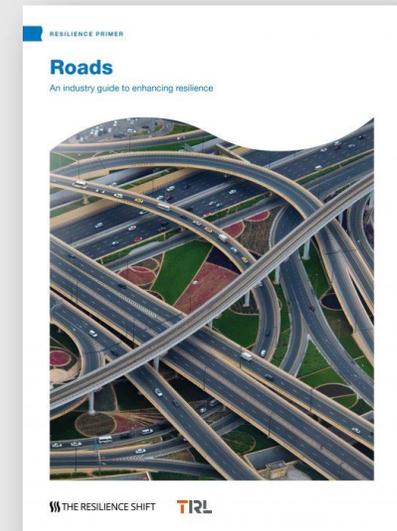
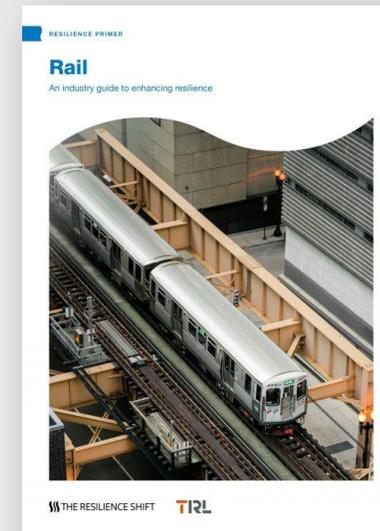
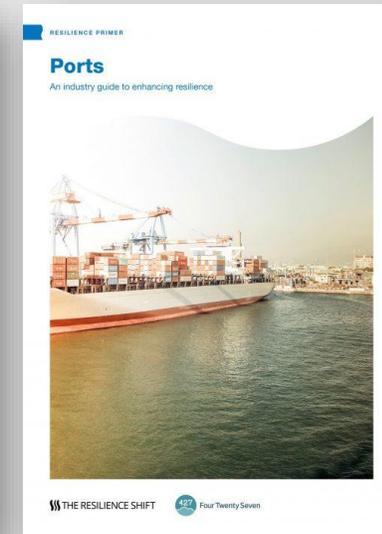
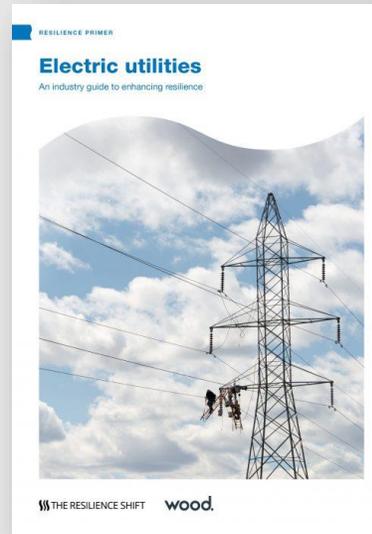
Resilience Shift Primers



Primers are part of a body of knowledge that the Resilience Shift is producing intended to help those responsible for the financing, planning, design, delivery, operation and maintenance of critical infrastructure systems to shift practice.



<https://www.resilienceshift.org/campaign/resilience-primers/>



Summary

- The world is in a crisis and **sustainable development is the best guide to a future** we might all want to live in one day
- Sustainable development is about creating **social value** as well as **safeguarding the planet**.
- The future of transport infrastructure is not about road and rail but access, **mobility** and **connectivity**.
- We need to be thinking in terms of **systems (or networks) not just assets**, and in terms of performance of those systems.
- **We cannot do it alone**. Whatever we are each responsible for is one bit of a larger system.

Thank you