

Institute for Resilient Infrastructure: ensuring that the physical infrastructure systems underpinning our way of life can adapt to changes, both in the way we use them and in the social and physical environment in which they created, designed, built and operated.

How do we characterise Resilience?

- Metrics for Resilience of Infrastructure (IS)
- Identify and quantify **Loads**: Environmental (e.g. stress, temperature, water); Economic (e.g. resource scarcity, financial turmoil); Social (e.g. political environment, public need)
- Identify and quantify **Threats**: drastic, unprecedented or stochastic time-dependent changes in loads
- Durability: resistance of (materials, components and systems) to loads
- **Resilience: resistance of (materials, components and systems) to threats**
- Levels of investments and benefits sought
- Degrees of complexity and interdependence

How do we model Resilience?

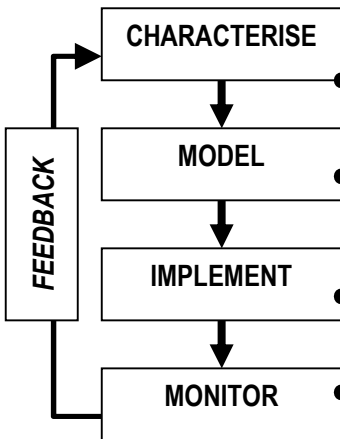
- Lifetime predictions for IS components
- Stochastics of Load-Threat prediction
- Response of (materials, components and systems) to loads
- Response of (materials, components and systems) to threats
- 2-way impacts (Environment on IS, IS on Environment) – LCA / whole life performance

How do we implement Resilience?

- Design guidelines for resilience of new IS
- Strengthening (resilience enhancement) of existing IS components
- Preserving heritage IS components
- Resilience assessment tools and procedures
- Optimisation of maintenance strategies for resilience
- Code of Practice for Resilient Design
- Strategies for reducing vulnerability (e.g. minimising critical links, distributing criticality)

How do we monitor Resilience?

- NDE procedures – assessment of existing resilience
- Remote monitoring – continuous in-situ measurement of loads, threats and responses
- Validation – confirming the efficacy of resilience upgrades
- Forensic procedures – forthright resilience analysis of failed infrastructure and dissemination



Why Civil@Leeds?: a unique, world-class combination of Engineering Science research with Management expertise that can jointly address all four facets of Design for Resilience