

Resilience to Nature's Challenges: Distributed Infrastructure

Multi-Network Research: Summary as at April 2019

1. Background

Resilience to Nature's Challenges Kia manawaroa - Ngā Ākina o Te Ao Tūroa (RNC) aims to partner researchers with stakeholders, including communities, to build shared understandings of natural hazards and risks, and to work together to develop practical risk reduction solutions. The RNC framework is intended to promote collaboration between infrastructure stakeholders and the New Zealand research community.

The resilience of lifeline networks like electricity, transportation and water is critical in enabling society to recover rapidly after a major disaster. The Distributed Infrastructure programme is developing tools to assess the performance of spatially-distributed infrastructure networks subject to extreme natural hazards. Working closely with relevant stakeholders, the programme is developing methodologies to quantify system-level performance of infrastructure networks when subject to natural hazards and cascading impacts, leading to improved resilience of communities through identification of multi-hazard related vulnerabilities in infrastructure critical for NZ society. More about this programme can be found here - [link](#).

2. RNC-supported multi-network research to date

Research title: Interdependent National Infrastructure (2016-2018)

Research partners: Various

Principal outcomes: Development of national scale model to quantify the potential magnitude and spatial extent of infrastructure outages. Outages are propagated both within networks (direct outages) and between networks where dependencies are broken and there is no network redundancies to reroute service flows.

Status: Complete

Outputs: Poster Summary – [link](#) [link](#)

Research title: Critical infrastructure impacts & adaptations in small towns following earthquakes (2018-2019)

Research partners: Various

Principal outcomes: Summary of critical infrastructure impacts on small towns and the novel adaptations made at different levels of management to improve resilience in the context of these small towns. Outcomes can inform future natural hazard planning for other agricultural regions.

Status: Complete.

Outputs: Journal paper – [link](#)

Research title: Assessing Transient Populations Exposure to Disaster Risk (2018-2021).

Research partners: Various

Principal outcomes: Identification of new, novel indicators to inform the development of a model that better characterises transient population movements in time and space across NZ. This will enable an improved assessment of the exposure of these transient populations to disaster risk.

Status: Underway

Research title: Infrastructure failure propagation following an Alpine Fault earthquake (2018-2019).

Research partners: Various

Principal outcomes: Integrated framework for simulating an end-to-end impact assessment of the hazard, cascading network disruption, and resulting recovery processes. Coupling of modelling with expert-elicited recovery priorities and the further simulation of failure, disruption and recovery across national scale interdependent networks

Status: Underway

Outputs: Conference paper - [link](#)

Research title: Geospatial hazard exposure tools for infrastructure networks (2018-2020).

Research partners: Various

Principal outcomes: Development of methodology to automatically assign ground shaking, liquefaction and landslide hazard intensities to national infrastructure networks using ground motion simulation models.

Status: Underway

Outputs: Conference paper - [link](#)