



Keeping goods moving in the wake of a disaster

Research in logistics and supply chain management

**Infrastructure Research Day
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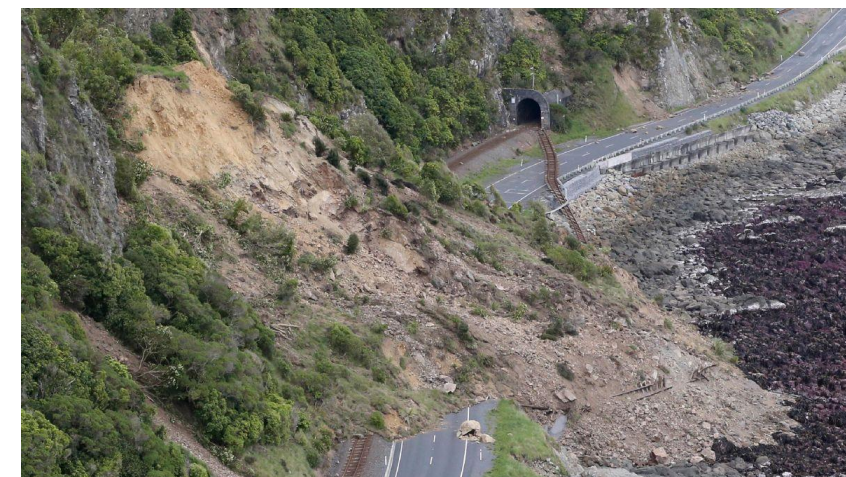
Hamilton – Kirikiriroa



QuakeCoRE
NZ Centre for Earthquake Resilience
Te Hiranga Rū



- Reconfiguration of domestic freight operations in the wake of a major disaster
 - Status: completed
 - Objective
 - Identifying the factors enabling modular transport operations and rapid freight movements across transport modes
 - Focus
 - 2016 Kaikōura earthquake
 - Data collection
 - 19 interviews with 27 informants





- Factors enabling modular transport operations and rapid modal shifts

Interfaces

PHYSICAL

1. Transport linkages (roads and modes)
2. Nodal points (e.g. seaports and inland ports)
3. Vehicles (fleets and carrying capacity)
4. Standard load units (shipping containers)

DIGITAL

5. Available information (e.g. network accessibility and incoming freight)
6. Interoperable technologies (data standards and integrated systems)

OPERATIONAL

7. Operational alignment (e.g. schedules, pallet loading)

INTER-ORGANISATIONAL

8. Collaborative network (e.g. well-established industry contacts)
9. Trust (between actors, sometimes competitors)



- Making sense of the complexity of the NZ freight system in the wake of a disaster (Project #1)
 - Status: ongoing (April 2022 – April 2023)
 - Objectives
 - Identifying a disaster's direct impacts, cascading effects, exacerbating effects, and ultimate impacts
 - Establishing cause-and-effect relationships between these elements
 - Focus
 - Deliveries of fresh fruit and vegies in NZ
 - Data collection
 - 20 interviews





• Making sense of the complexity of the NZ freight system in the wake of a disaster (Project #1)

C1: Impact of product characteristics

C2: Exacerbating factors

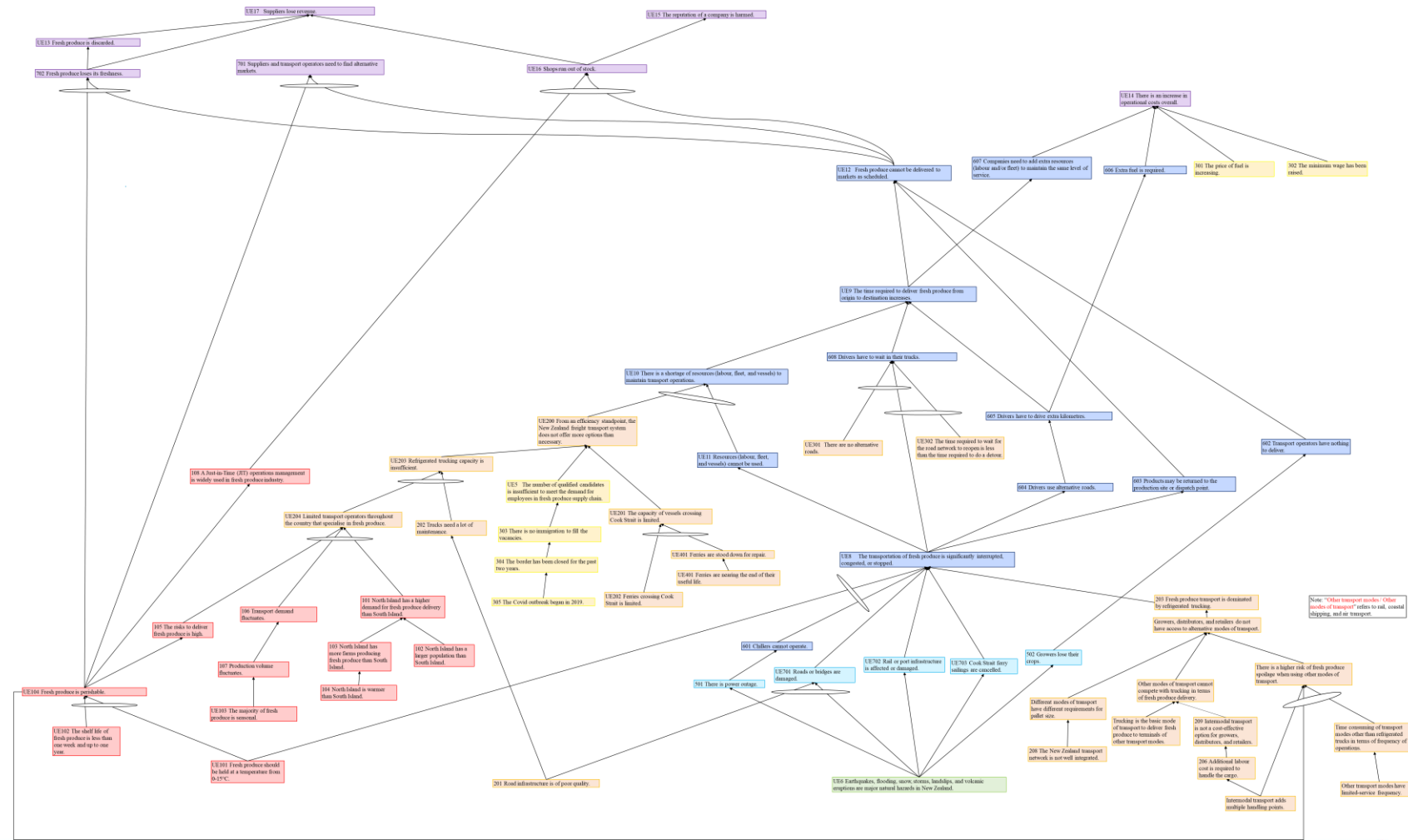
C3: Temporary shock

C4: Natural hazards

C5: Direct Effects

C6: Cascading effects

C7: Ultimate effects





- Making sense of the complexity of the NZ freight system in the wake of a disaster (Project #2)
 - Status: upcoming (April 2023 – April 2024)
 - Objectives
 - Identifying the constraints in the NZ freight system in the wake of a major disruptive event with nationwide impact
 - Establishing and visualising the cause-and-effect relationships between these constraints
 - Identifying possible solutions to mitigate freight disruptions and support timely deliveries
 - Focus
 - What-if scenario: prolonged Cook Strait outage





- Maintaining the continuity of cruise shipping supply chains in the wake of a major disruptive event
 - Status: ongoing (June 2022 – June 2026)
 - Objectives
 - Understanding the normal replenishment operations of cruise vessels in NZ
 - Identifying the constraints in the cruise shipping replenishment operations in the wake of a major disruptive event
 - Understanding the cause-and-effect relationships between these constraints
 - Identifying solutions to mitigate disruptions in cruise shipping replenishment operations
 - Focus: 3 NZ ports and 1 Pacific Island port





- Pre-positioning of emergency supplies to speed up post-earthquake responses
 - Status: ongoing (November 2022 – November 2026)
 - Objectives
 - Understanding the factors influencing pre-positioning decisions and the trade-offs between them
 - Assessing the costs and benefits of pre-positioning practices (cost-benefit analysis)
 - Focus
 - Wellington area



- Disaster impact modelling using vehicle telemetry data
 - Status: upcoming (March 2023 – March 2027)
 - Objectives
 - Understanding the underlying behaviour of NZ transport agents (e.g. route choices) in normal circumstances
 - Understanding how transport agents adapt after a disruptive event (e.g. earthquake causing road infrastructure damage)





- Resilience of resident and tourist populations
 - Status: upcoming
 - Objectives
 - Better communicating risk, potential disruptions, and alternative routes to travellers
 - Improving tourist responses in Emergency Management
 - Interested? Talk to Jo Fountain (Lincoln University)



