



# Data and decision making in the transport sector following the Kaikōura earthquake

*Daniel Blake, University of Canterbury*

*Liam Wotherspoon, University of Auckland*

*Joanne Stevenson, Resilient Organisations*

*Margaret Trotter, Vivienne Ivory, WSP Opus NZ*

*Geoff Parr, Tim Herbert, NZ Ministry of Transport*



# Talk overview

- Context
- Project objectives & aims
- Approach
- Insights & lessons
  - enablers of effective data exchange
  - consequences of effective & less effective communication channels
  - remaining challenges
- Performance monitoring & 'Actor map'
- Opportunities



# Context

- Significant disruption to New Zealand's transport system following Mw 7.8 Kaikōura earthquake (14 November 2016)
- Substantial damage to road, rail & port infrastructure
- Implications for many transport users
- Cascading consequences elsewhere

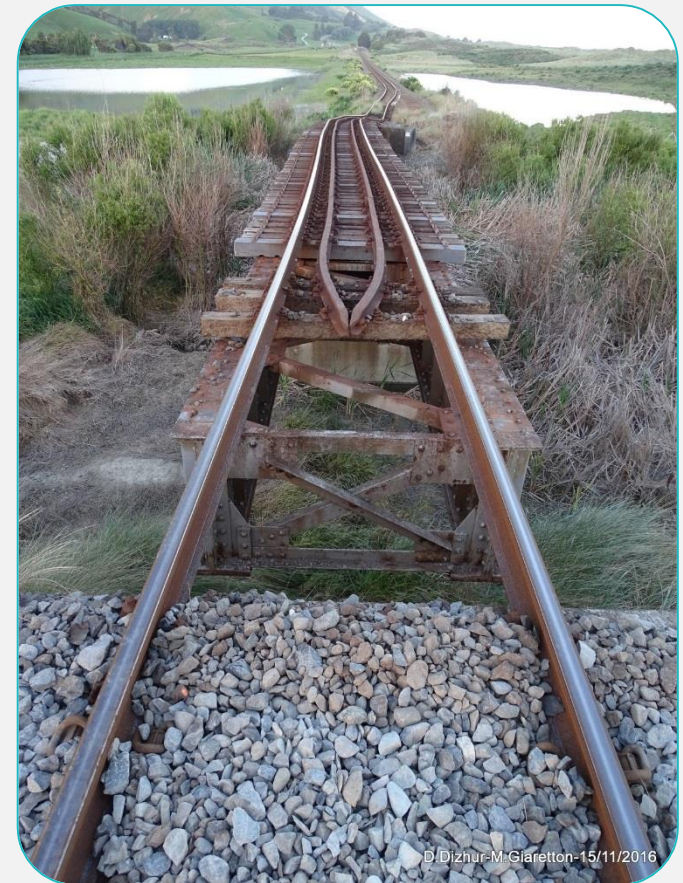


**Large amounts of information and data produced, managed, analysed and exchanged within and between organisations to assist decision making.**



# Project aims

1. Observe & understand the pace of adaptation in the transport sector to earthquake-related disruptions.
1. Understand how information was used to make decisions about all transport modes.
1. Identify measures for on-going performance monitoring of transport systems.



# Approach

**Stakeholder workshop**  
*(workshop summary report)*



**Extended engagement - interviews**



**Data collation & monitoring framework**



**Final report**  
*(now reviewed with edits submitted)*



# Insights – data use & exchanges

- **New sources of data exchanged** including geospatial, telematics, damage classification systems, customs data.
- **Existing partnerships and communication channels key** e.g. MoT Transport Response Team, NZ Transport Agency – KiwiRail.
- **New relationships & communication channels developed** e.g. Police – NZ Transport Agency daily reporting system, NCTIR alliance.
- **Limitations to information exchange** e.g. commercial & competitive sensitivities between ports, awareness of organisational structures.



# Insights - enablers of effective data exchange

- **Existing partnerships & agreements**
  - actors knew who to contact
  - easily pulled from regular roles
  - transitions from SCIRT to NCTIR
- **Sector coordinators with ministries & govt agencies**
  - filtered information requests
  - reduced burden on operational staff
- **Public-private industry groups**
  - facilitated intra-industry support. E.g. KE-TAG
- **Contacts in the media**



# Insights - consequences of data exchange set-ups

## Effective channels allowed:

- Improved response & recovery between modes
  - *e.g. road maintenance & ferry timetabling.*
- Information consistency (sector representatives).
- Conduit of information (*e.g. NCTIR*).



## Less effective channels caused:

- Challenges with initial transport sector response planning
  - *e.g. from multitude of initial hazard and damage assessments.*
- Stretched resources
  - *e.g. to manage auto-generated false navigation information*
- Decision delays
  - *e.g. purchasing new assets (route disruption uncertainties)*



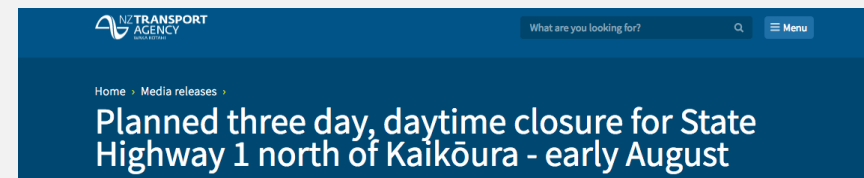
# Remaining challenges

## Strategic investment level

- Prioritisation of resilience investment vs. day-to-day requirements
- Multi-modal transport systems perspective important
- Limited capacity and amenities on some alternative routes

## Operational level

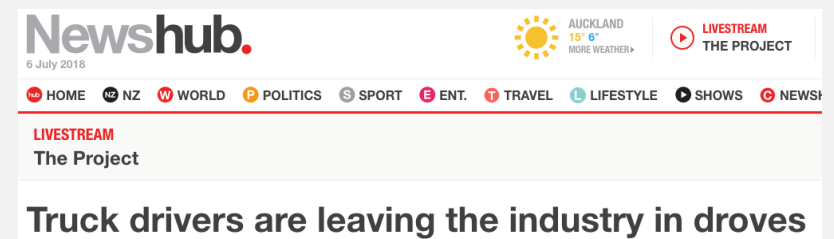
- Continued resources and traffic management requirements
- Limited machinery, vehicles and skilled drivers/operators
- Commercial & competitive sensitivities
- Maintaining lessons as people revert back to business as usual



NZ TRANSPORT AGENCY  
What are you looking for?

Home > Media releases >

### Planned three day, daytime closure for State Highway 1 north of Kaikōura - early August



**NewsHub.** AUCKLAND 15° 6° MORE WEATHER >

6 July 2018

**LIVESTREAM**  
The Project

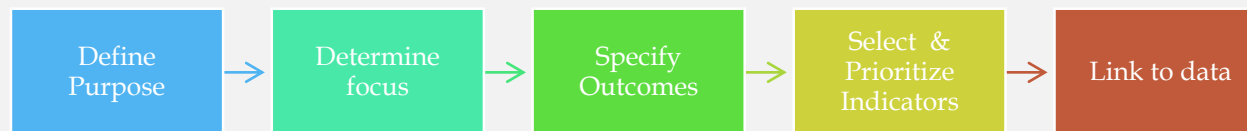
### Truck drivers are leaving the industry in droves

# Performance monitoring

## Preliminary scoping assessment of types of data and information important for future post-crisis transport performance monitoring

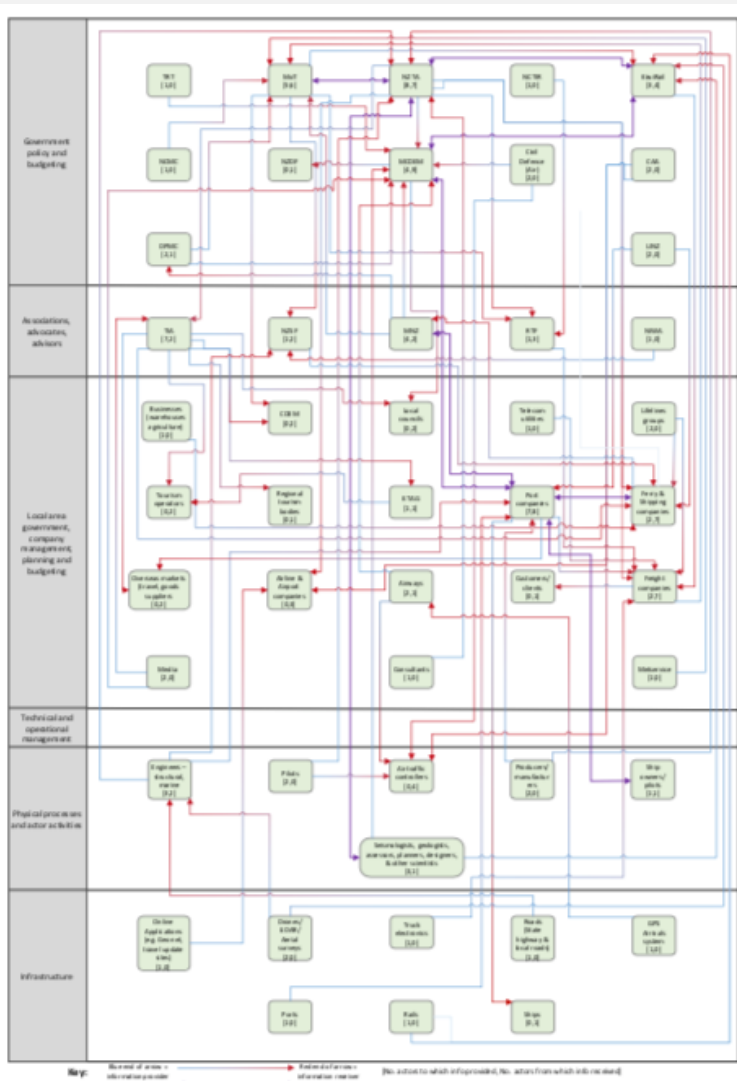
- Indicators-based approach
- Analysis of all workshop and interview data
- Considered application to framework for freight transport

Approach based on K2M decision-making tool adopted  
(see: *Ivory and Stevenson, 2017*)



We need an understanding of how information flows within transport system during response and recovery...

# 'Actors Map' Example



- Actors mapped in relation to their position
- Used in conjunction with monitoring tool
- Demonstrates high level of complexity and cyclicity in information exchanges
- Can simplify by focusing on particular component (e.g. freight)

# Performance monitoring

## Freight transport performance monitoring case study

- Most info required for critical decision making was available
- Some priority indicators were only captured following the Kaikōura earthquake or emerged after multiple requests
- Many indicators were collected on an ad hoc basis



Such indicators could be considered prior to disruption with data capture and processing systems already established.

Relationships relevant to priority indicators should be continuously maintained.



# Opportunities

To improve data sharing across departments and sectors:

- Establish & update datasets – e.g. asset inventories.
- Develop partnerships pre event, including tourism.
- Define and communicate responsibilities and expectations of each entity
- Determine sector representative involvement.
- Resilience Strategies – involve multiple transport and other infrastructure sectors.

