



Mitigating FMCG transport bottlenecks following an extended Cook Strait ferry outage in Aotearoa New Zealand

Preliminary findings

By Nathan McDonald

Supervisors: Cécile L'Hermitte, Liam Wotherspoon & Richard Mowll

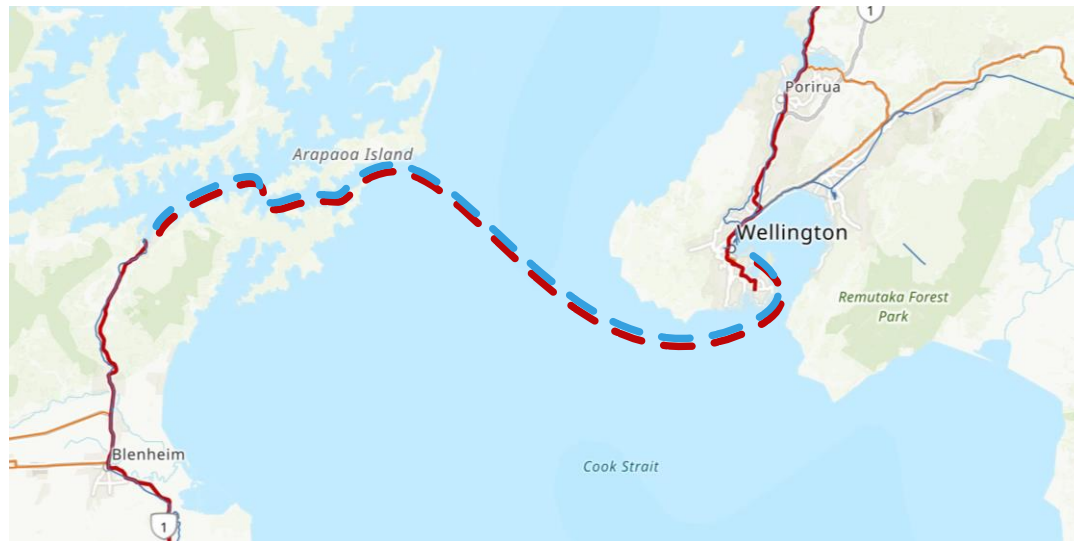
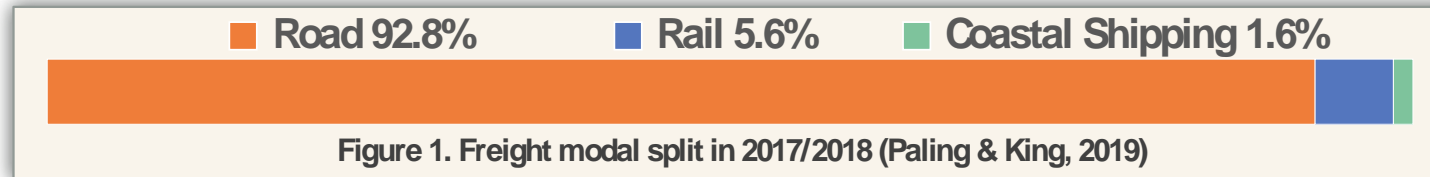


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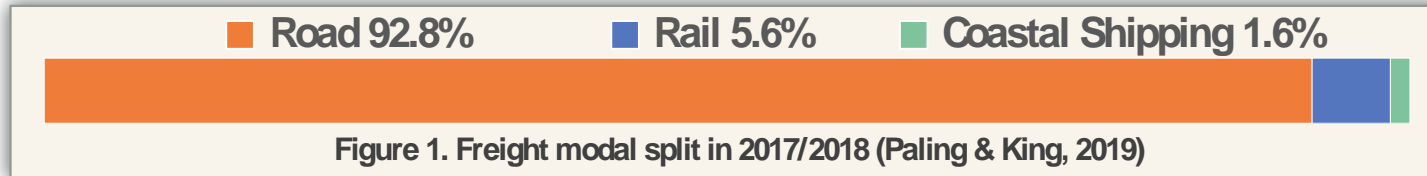


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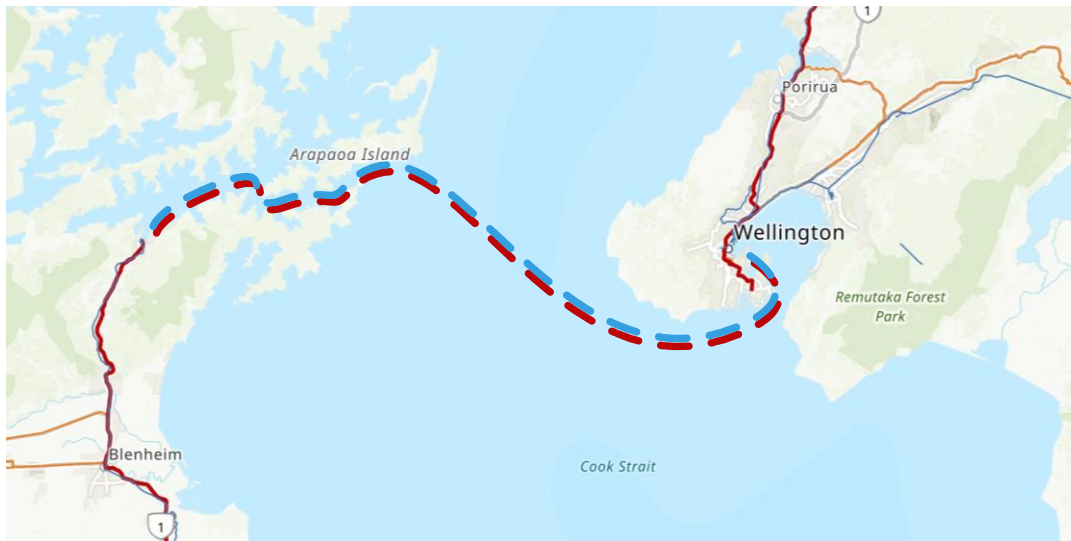
Background



Background



“The Cook Strait ferries are crucial to our economy, carrying 5.5 million tonnes of freight [annually]” (Woods, 2021)



Background



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Background



Ferry saga highlights failure of New Zealand's infrastructure planning

Nick Leggett | December 16, 2023

Union wants review: "NZ's most important sea link in jeopardy"

January 18, 2024 6 comments

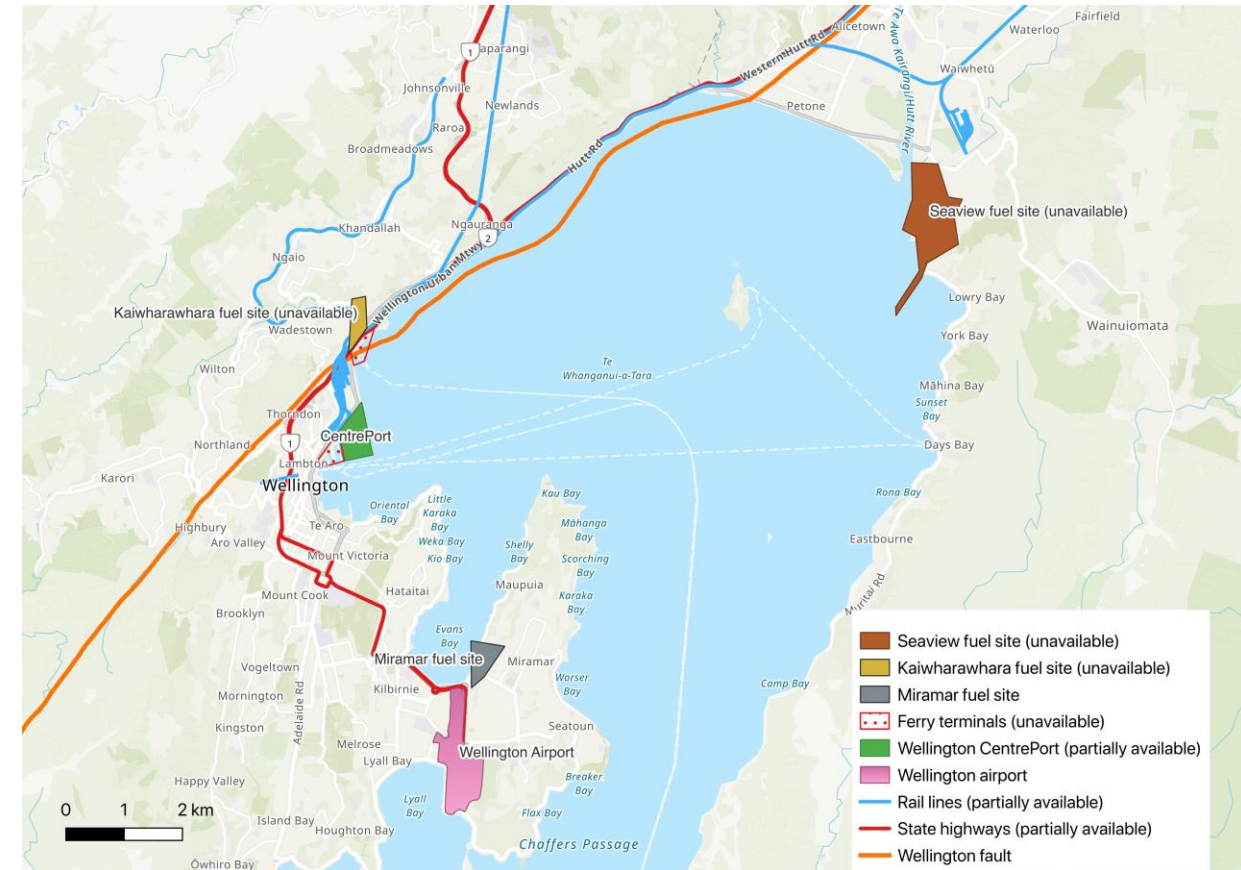


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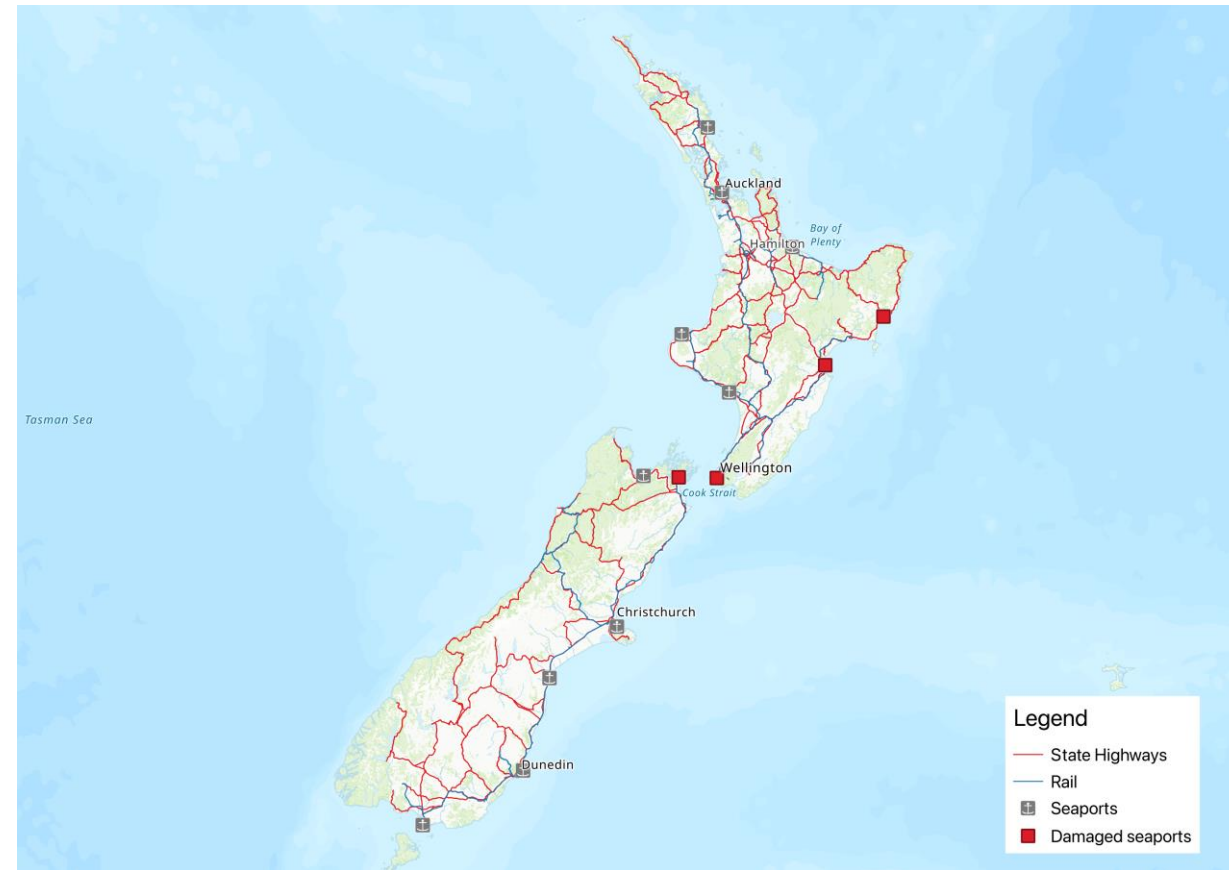


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Research scenario



(WREMO, 2019)



Research focus

Research question and objectives:

How can freight bottlenecks be mitigated following a three-month Cook Strait ferry outage?



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How can freight bottlenecks be mitigated following a three-month Cook Strait ferry outage?

- Identify the constraints in NZ's freight system following an extended Cook Strait ferry outage.



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How can freight bottlenecks be mitigated following a three-month Cook Strait ferry outage?

- Identify the constraints in NZ's freight system following an extended Cook Strait ferry outage.
- Establish and visualise the cause-and-effect relationships between these constraints.



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Research focus

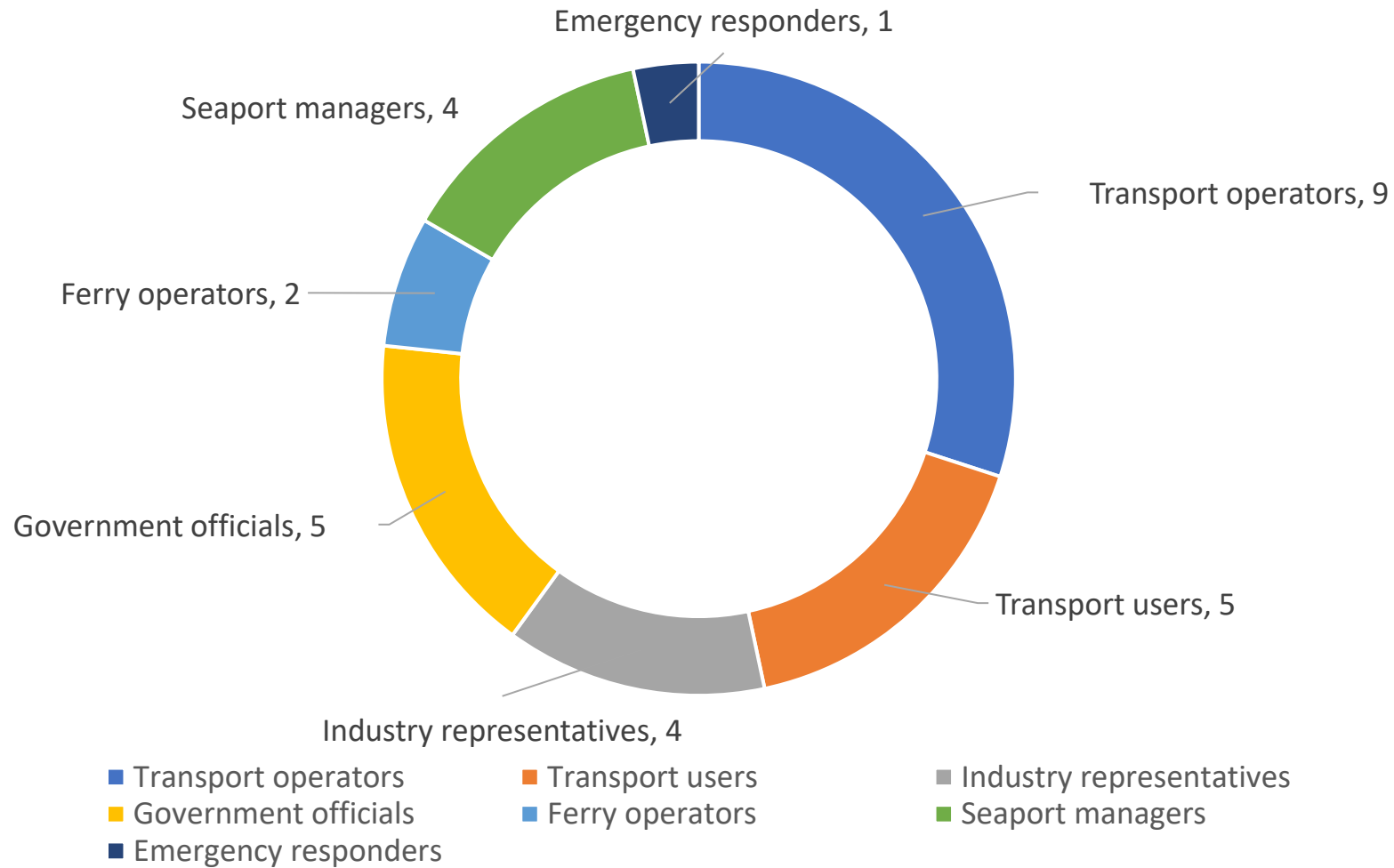
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- Identify the constraints in NZ's freight system following an extended Cook Strait ferry outage.
- Establish and visualise the cause-and-effect relationships between these constraints.
- Identify possible solutions to support FMCG deliveries between the North and South Island.



Methodology



26 interviews with 30 key stakeholders

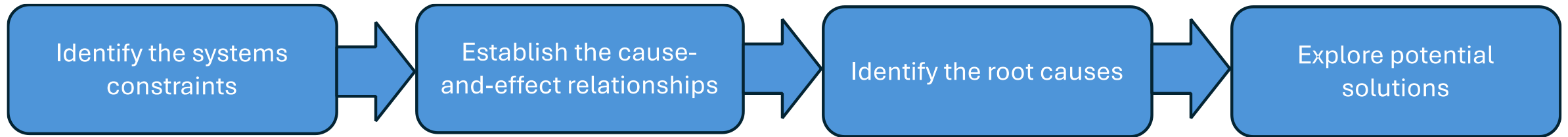


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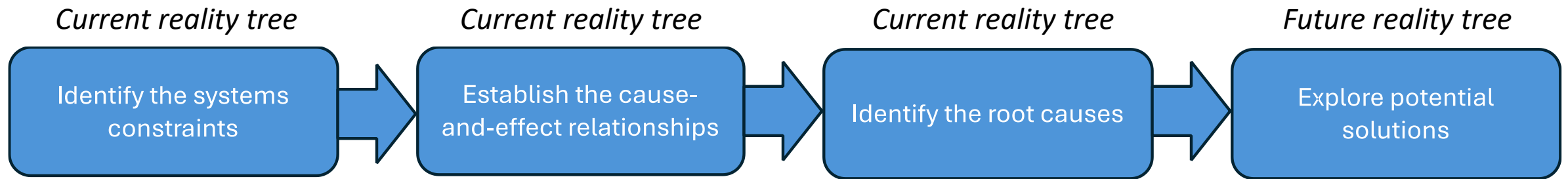
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Theory of Constraints



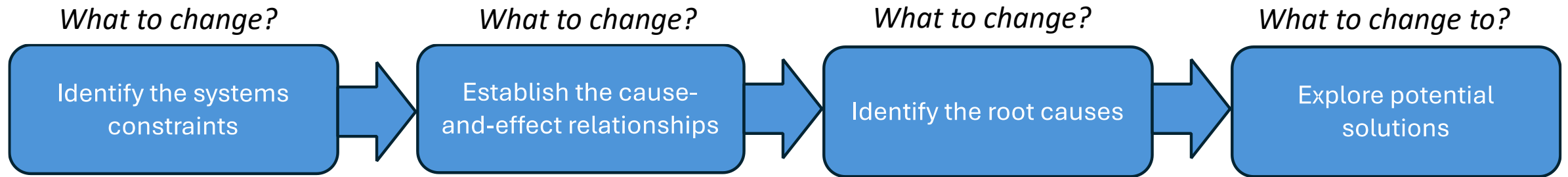
- What are the constraints?
- What are the relationships between the constraints?
- What are the root causes responsible for these constraints?
- How can the root causes be addressed?

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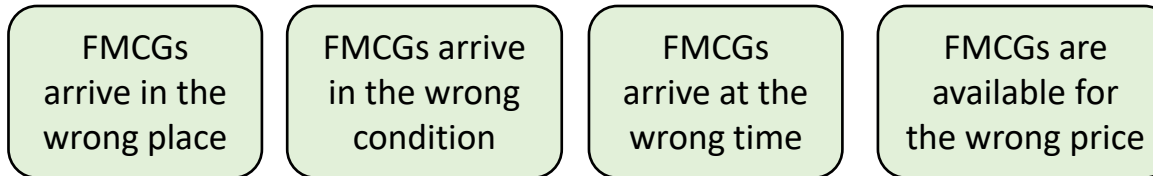
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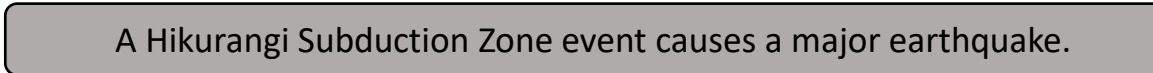
Theory of Constraints

Impact on FMCG operations:



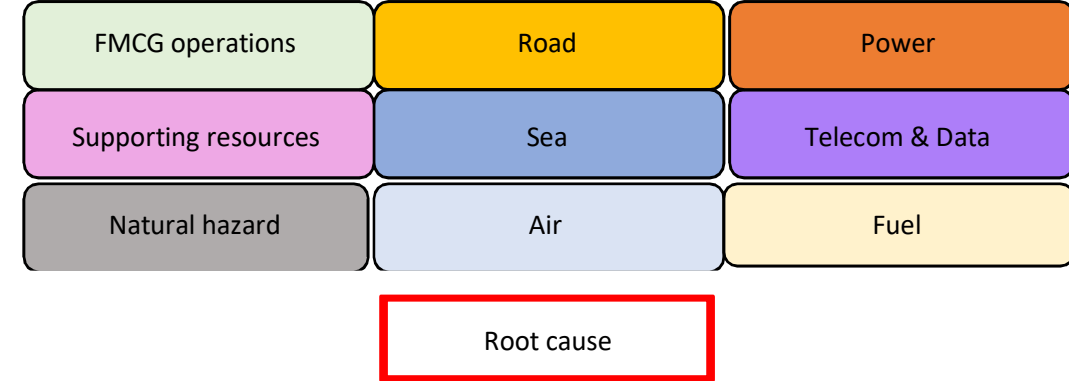
?

Natural hazard event:

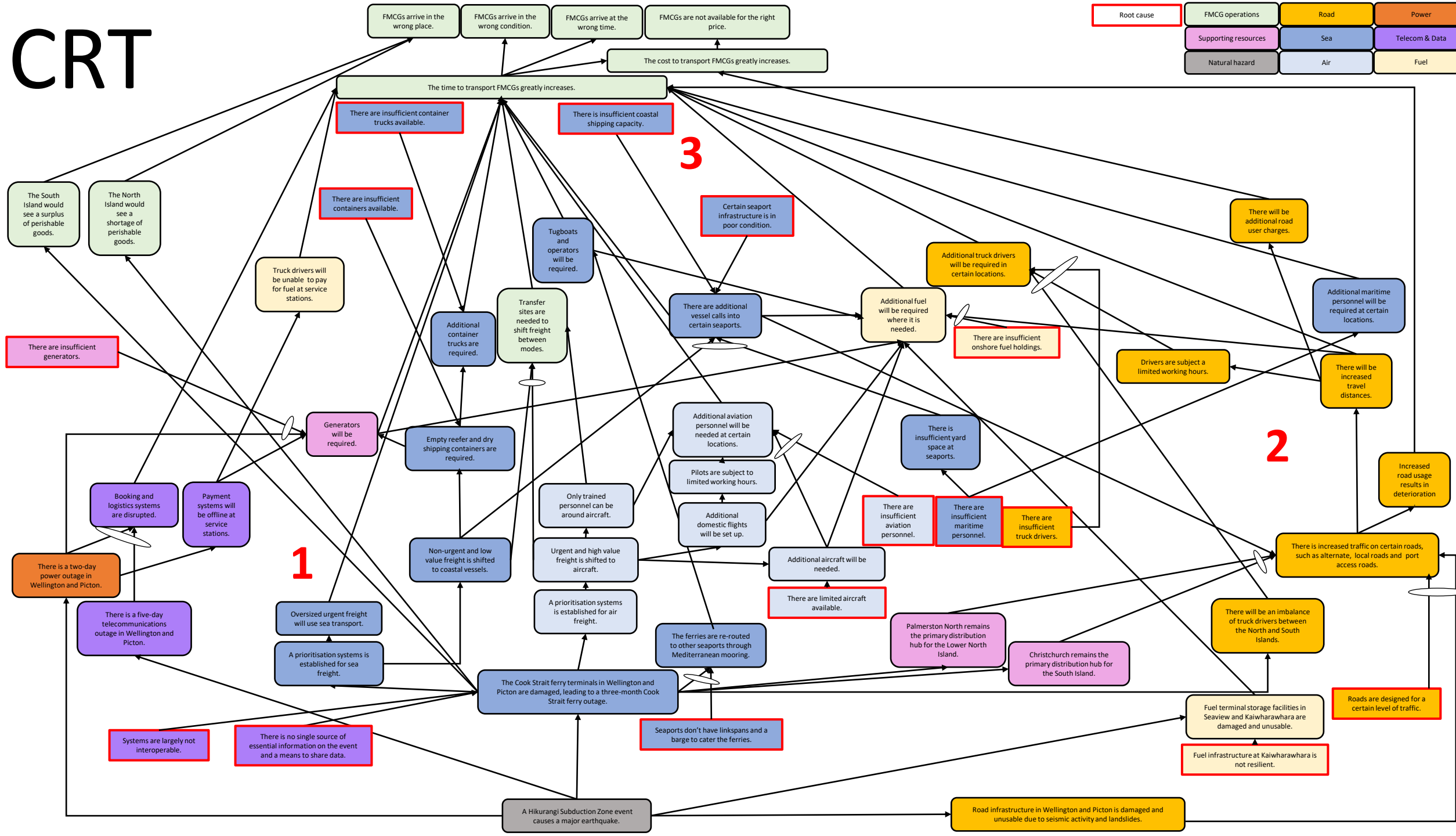


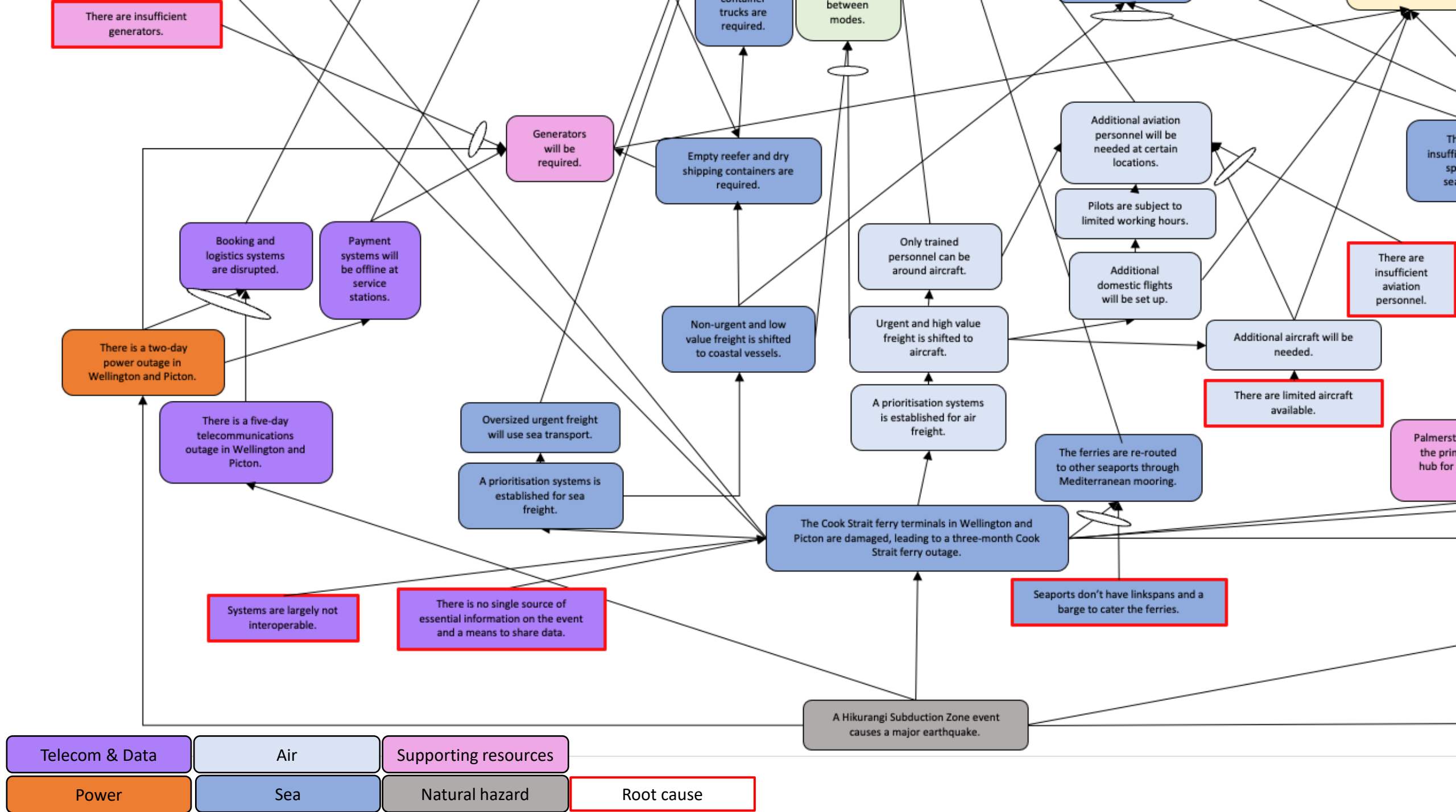
Preliminary findings

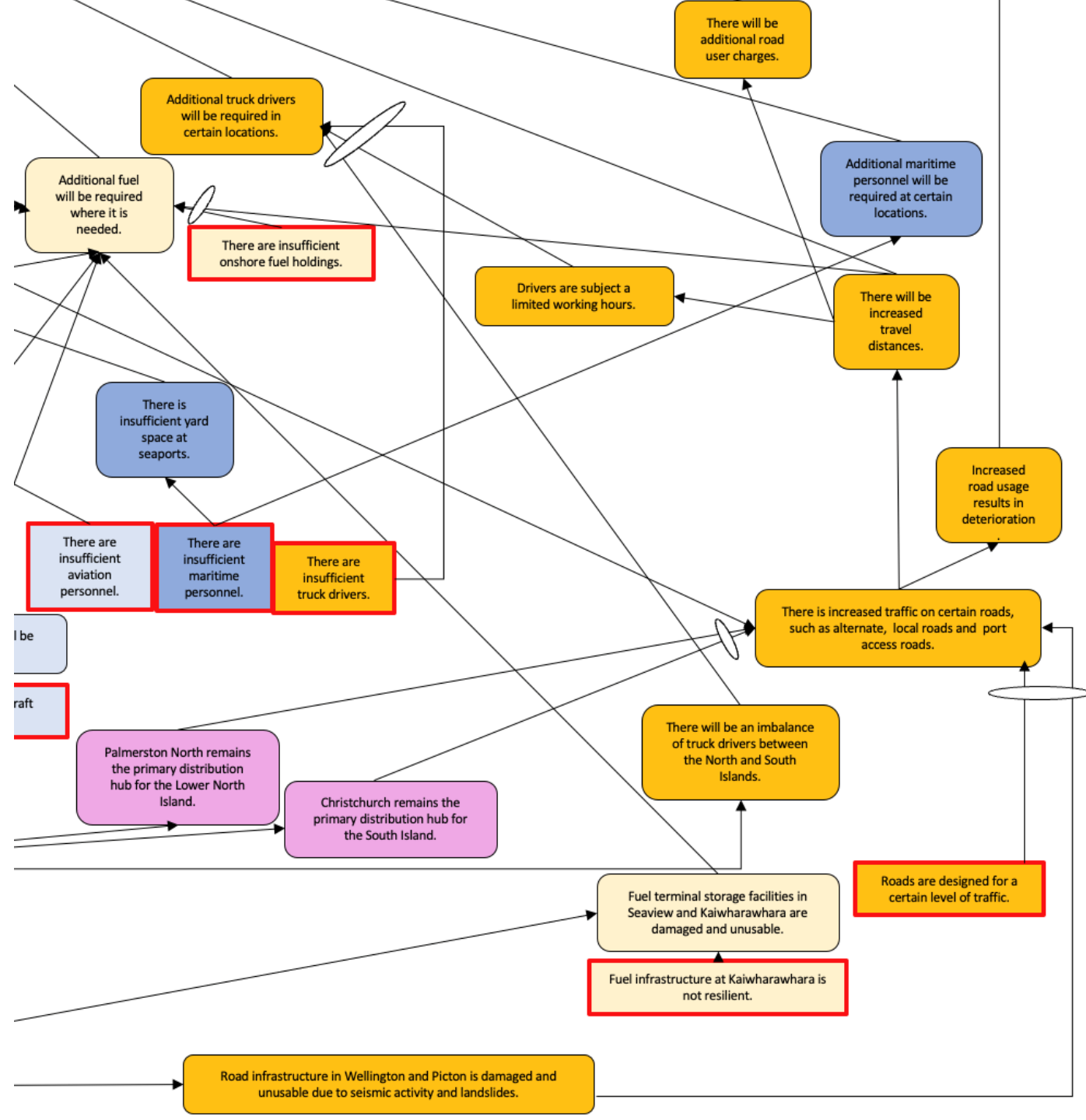
- 57 constraints impacting FMCG movement
 - 17 sea, 10 road, 9 air
 - 5 telecoms and data, 5 fuel, 2 power
 - 5 FMCG operations, 3 supporting resources, 1 natural hazard
- 92 cause-and-effect relationships
- 4 ultimate impacts on FMCG operations
 - Place, condition, time and price
- 15 root causes



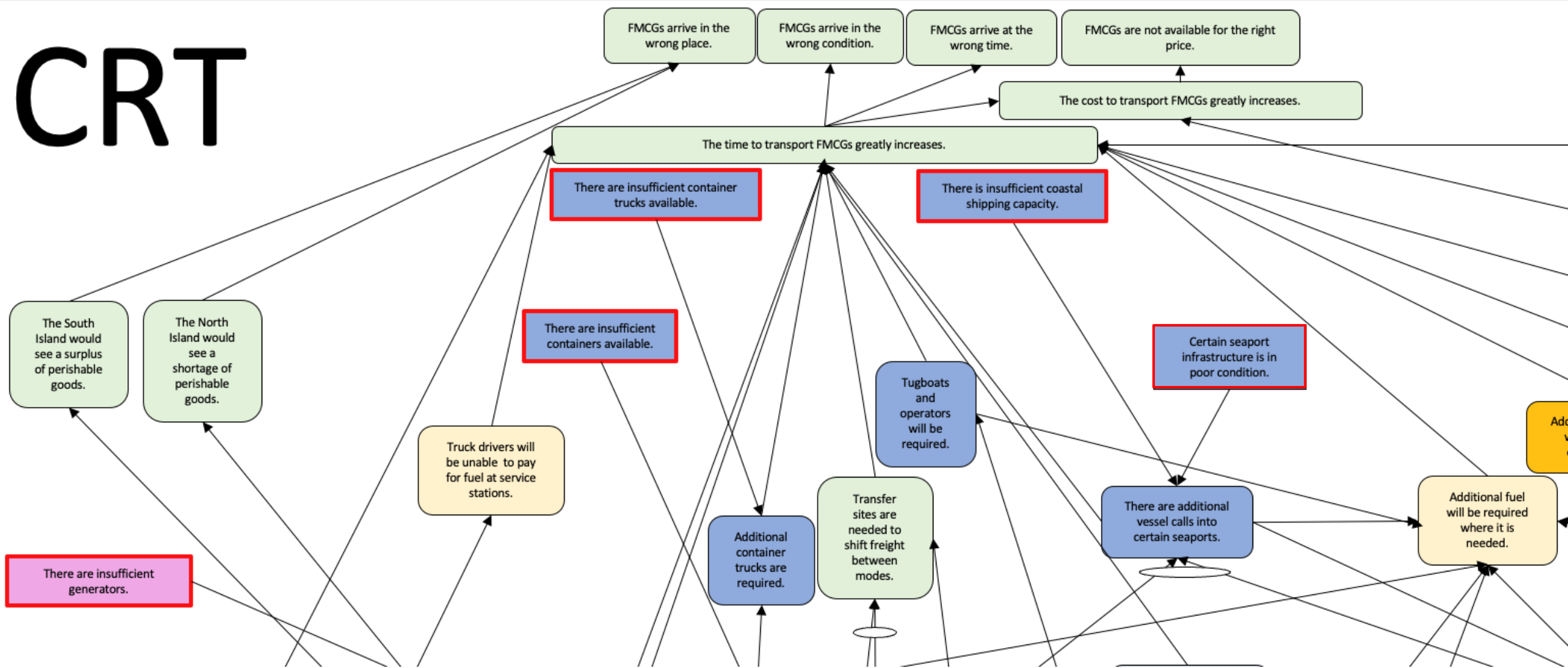
CRT







CRT



Fuel	Supporting resources	FMCG operations
Sea	Natural hazard	Root cause

Preliminary findings

- 15 root causes:
 - Systems are not interoperable
 - No central source for information and an inability to share data
 - No backup linkspans
 - Limited resources (generators, containers, container trucks)
 - Limited domestic air freight capacity
 - Limited shipping capacity for domestic freight
 - Limited onshore fuel holdings
 - Labour shortages (maritime, air, trucking)
 - Poor quality infrastructure at certain ports
 - Roads are designed for certain traffic levels
 - Poor quality fuel infrastructure



Preliminary findings

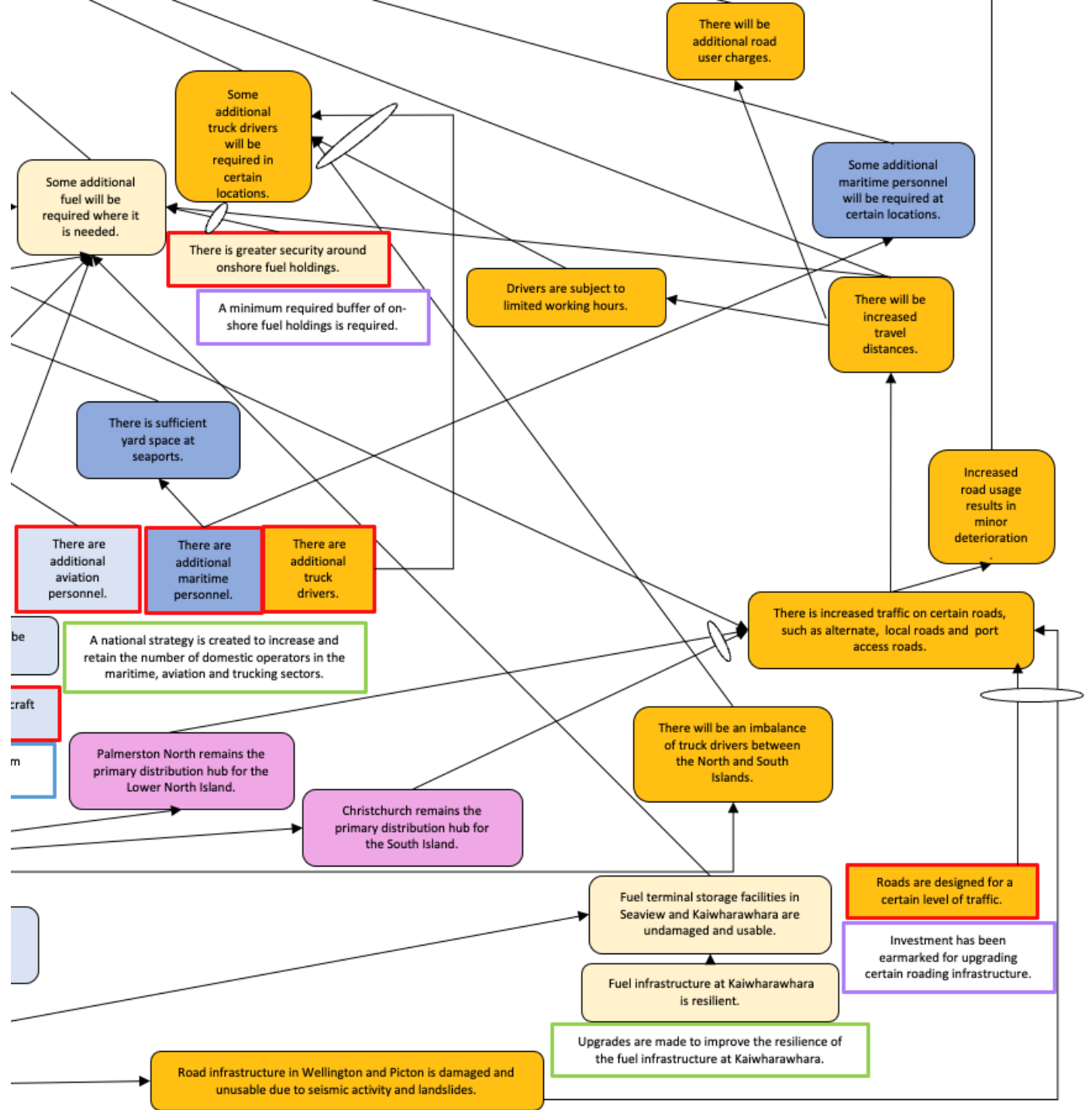
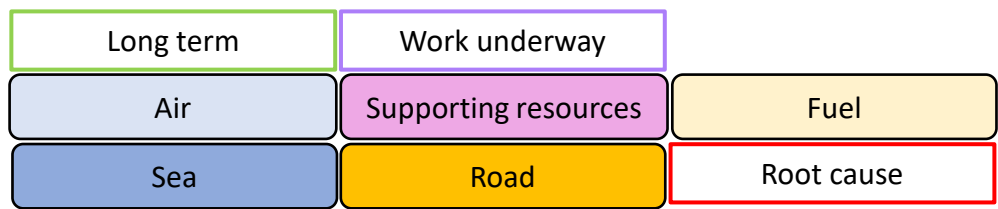
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Short term solution

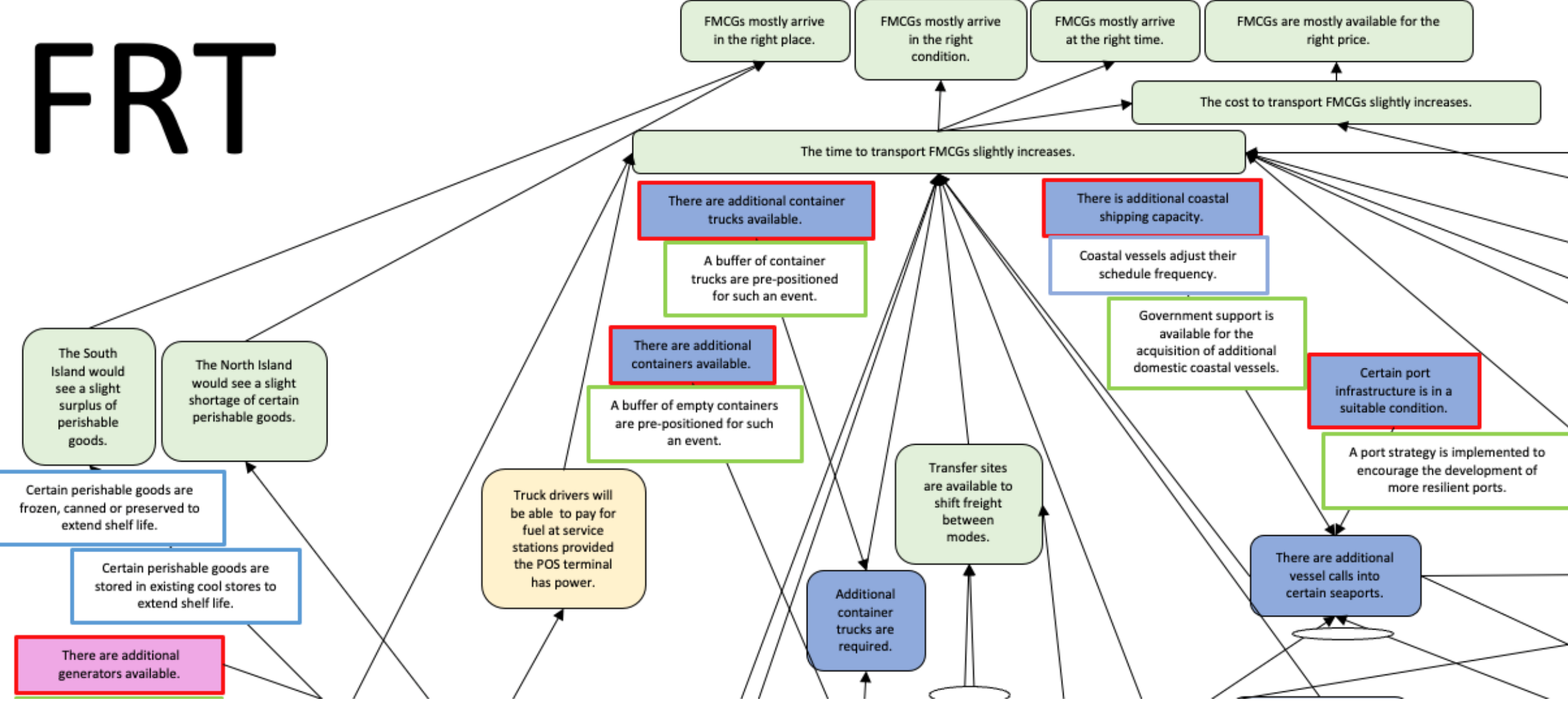
Long term solution

Work underway





FRT



Short term	Long term	
Fuel	Supporting resources	FMCG operations
Sea	Natural hazard	Root cause

Preliminary findings

Lane metres sold on the Cook Strait ferries (Ministry of Transport, 2023c)



Number of wagons and trucks moved in FY19



Northbound and southbound freight flows (Paling & King, 2019)



Number of TEU needed per truck for FMCG movement



Available domestic coastal shipping capacity



Shortage of containers



Preliminary findings

3.29 million lane metres sold for FY19

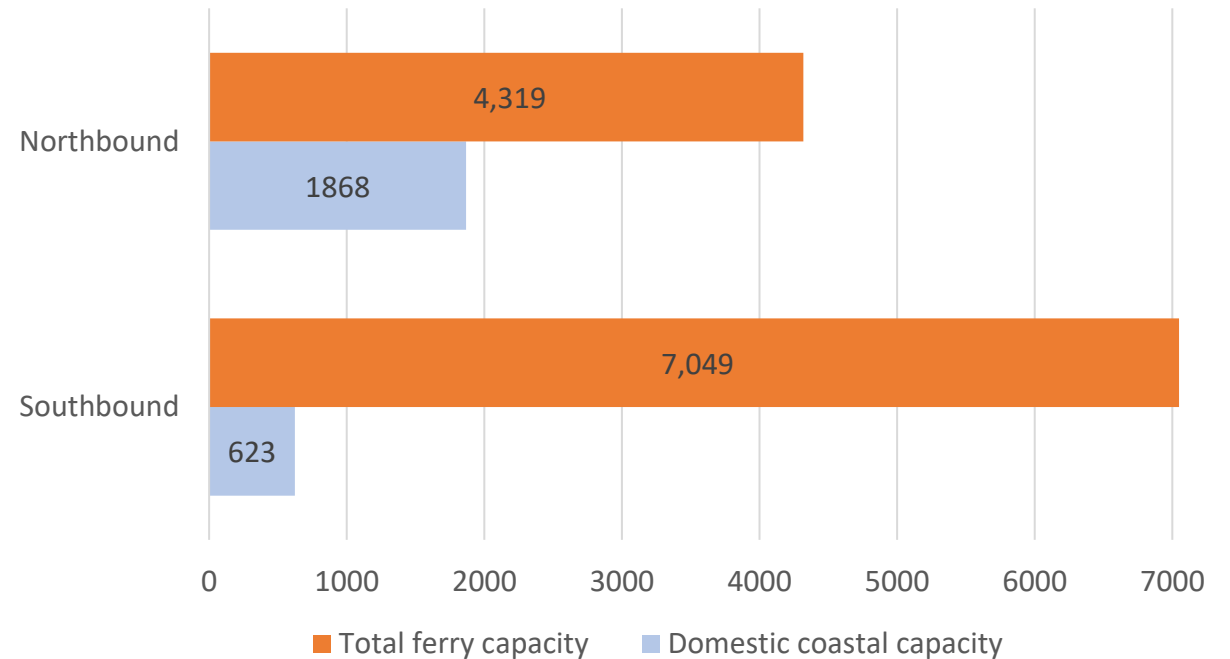
81 thousand TEU of rail freight and 170 thousand trucks

71% of all freight is southbound

2.5 – 3 TEU per truck and trailer unit

Domestic coastal capacity is at ~40% northbound and ~80% southbound

Domestic vs ferry carrying capacity over 7 days



Contribution

Knowledge

- Adds to the scarce literature looking at post-disaster freight systems through a qualitative lens

Policy

- Presents several root causes and potential solutions to address each of them
 - Can inform future policy decisions

Practitioners

- Visually details several constraints in a post-disaster freight system
 - Can inform future decision making and business continuity planning



Some recommendations

- It is important to take a systems view when addressing transport resilience
 - Understand the wider impacts on transport systems
 - No one transport mode should be prioritised



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