



# Post Event Demand Surge

Nick Phin

**AON** BENFIELD

# Agenda

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- What is demand surge?
- Why is it important?
- What is our approach?
- How can we use this framework?
- What are some things to consider?



# What is demand surge?

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- A component of post event loss amplification
- Inflation in prices as a result of the increase in demand for resources relative to supply in the market
- Demand > Supply → Inflated Prices
- Examples of demand surge:
  - Cyclone Larry (~20-30%)
  - Hurricane Katrina (~40%)
  - Christchurch Earthquake??
  - Victorian Bushfires??



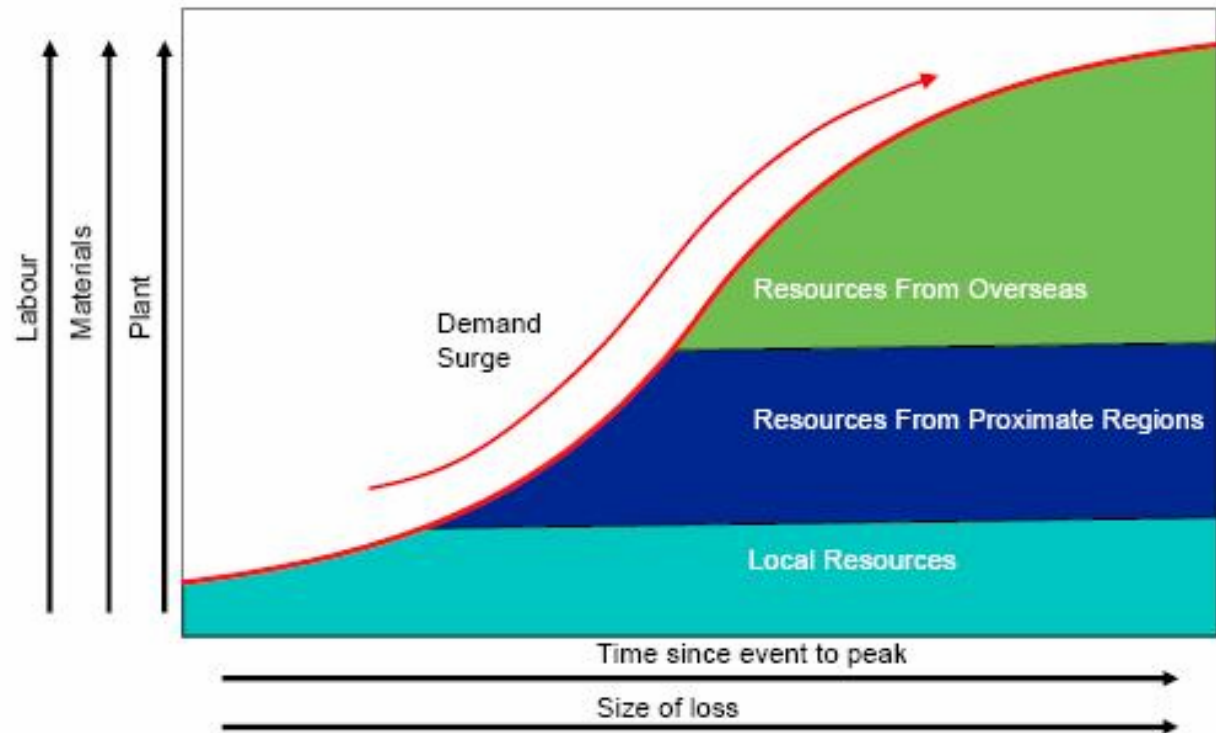
# Why is it important to consider?

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- Impacts key stakeholders:
  - Policyholders
  - Shareholders
  - Management
- Most models currently have limited capacity in dealing with demand surge
- Ratings - S & P requires the inclusion of demand surge when calculating its cat risk capital charge
- Regulatory requirements

# Sources of demand surge

- Labour
- Materials
- Plant
- Location
- Economy
- Services



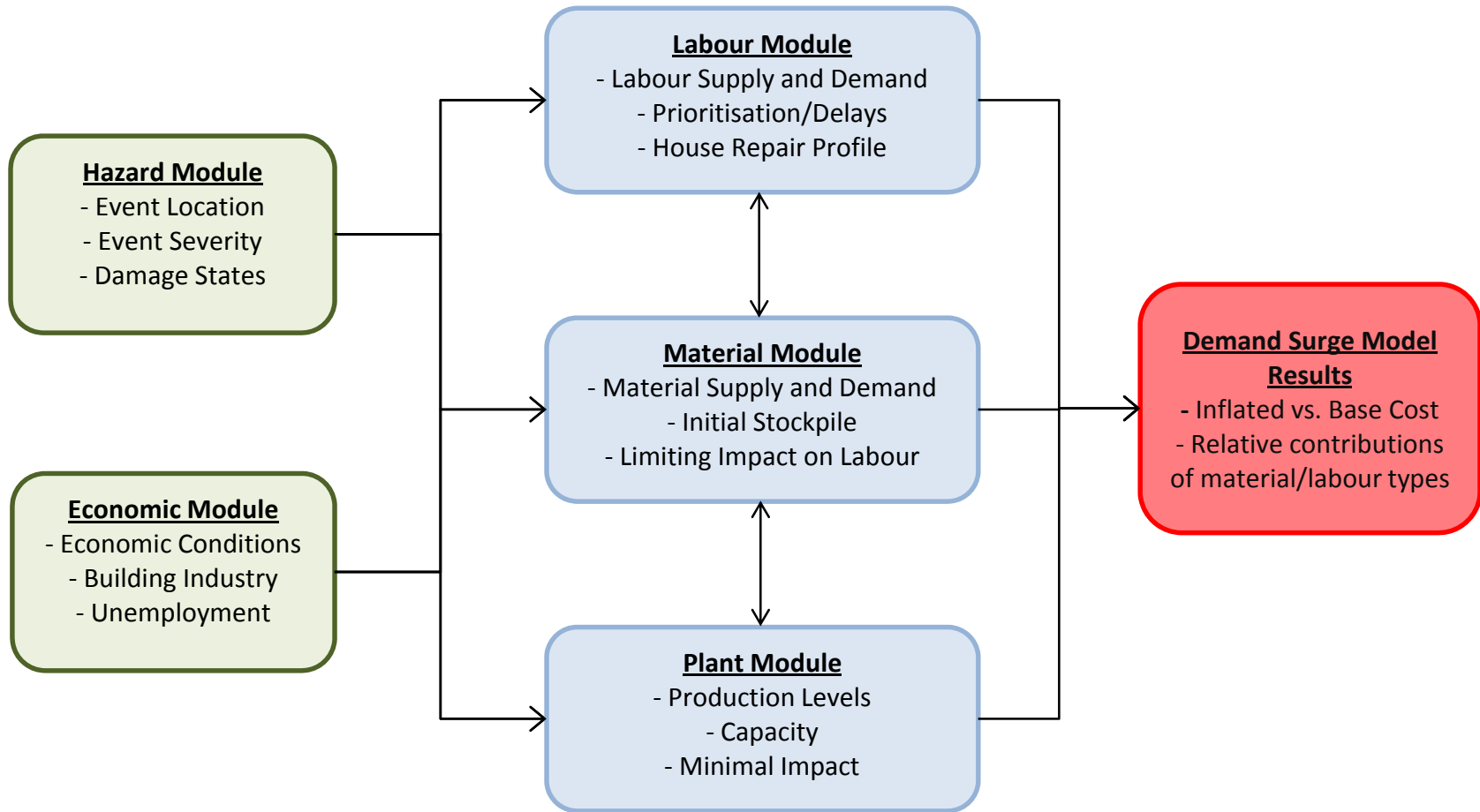


# Our approach

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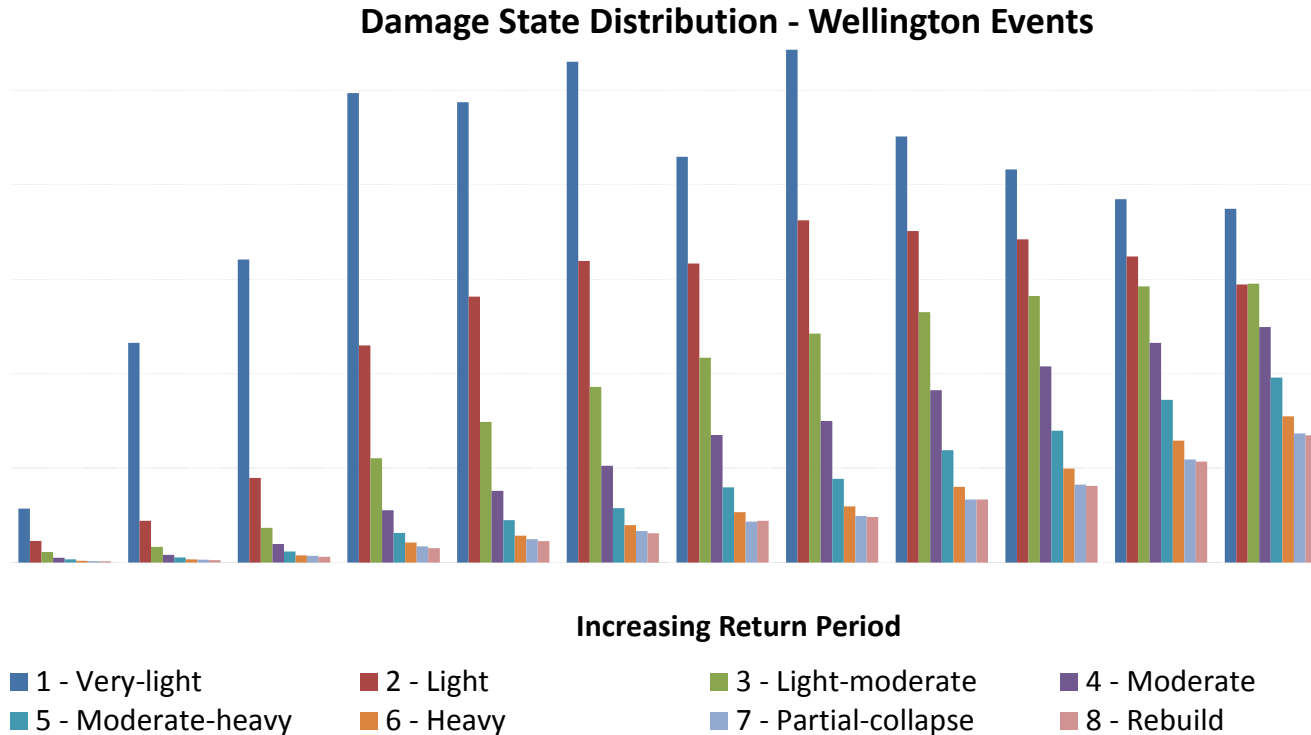
- Initial focus on NZ earthquake events and impact on Residential losses
- Detailed 'bottom up' modular approach
- Demand and supply of:
  - Labour occupations (e.g. plumber)
  - Materials (e.g. bricks)
- Uses a time step process
- Data sourced from EQC, Statistics NZ, Rawlinsons, Branz and RBNZ

# Our approach



# Hazard module – Damage states

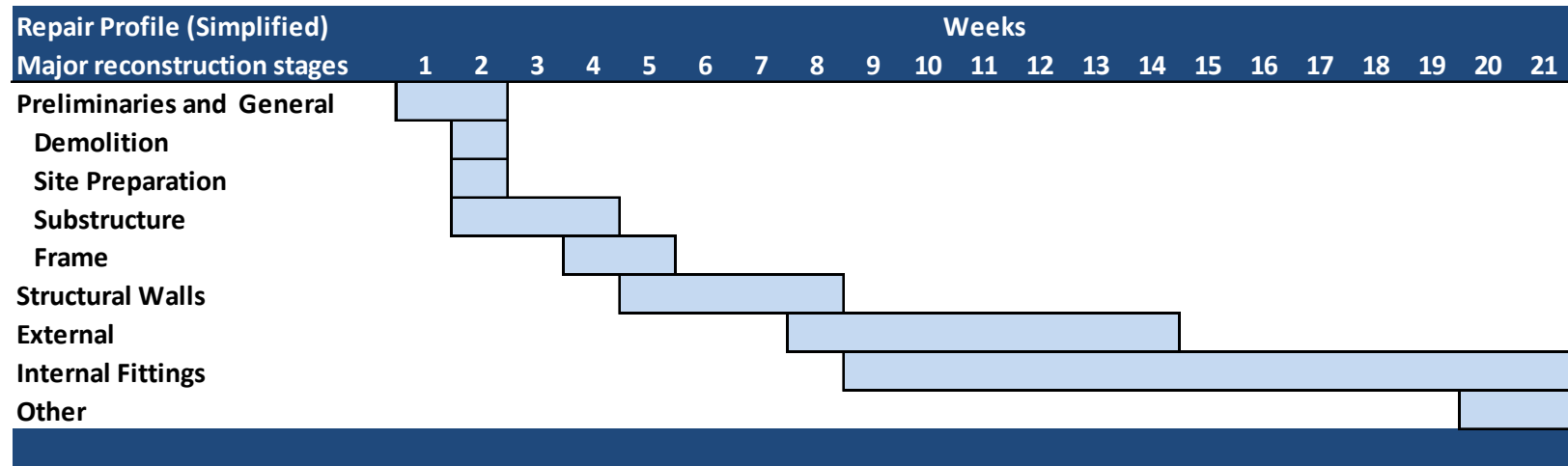
- Segmenting damaged properties
- Distribution of dwellings at varying return periods





# Labour module – House repair profile

- Defines the sequence in which work is completed
- Varies by damage state and construction type

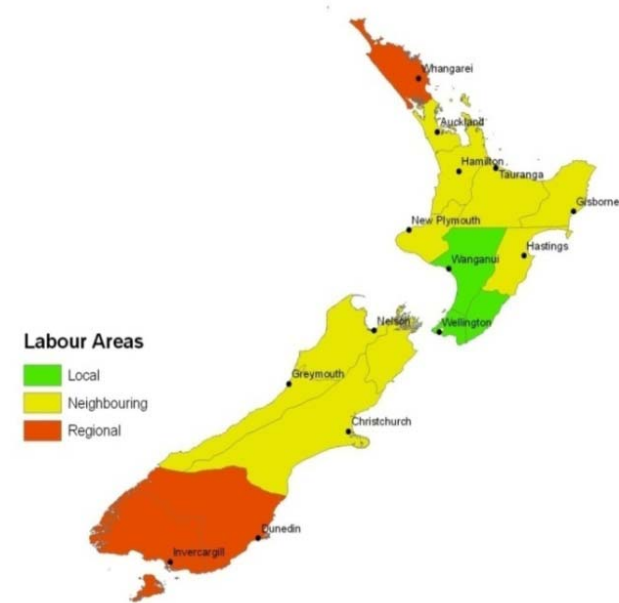
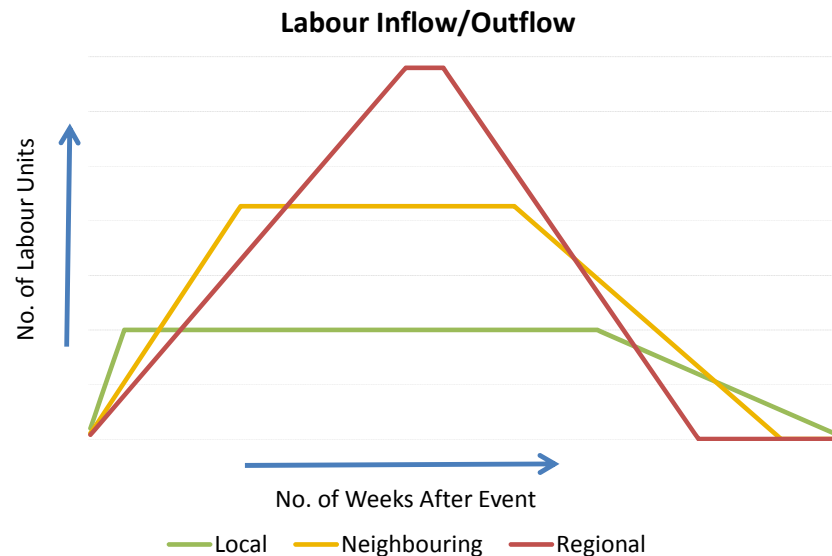


# Labour module – Time step process

	Weeks after event									
	1	2	3	4	5	6	7	8	9	10
Incoming Demand	25	50	75	100	100	75	50	50	0	0
Previous Remaining Demand	0	0	25	75	125	175	200	175	150	75
<b>Demand</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>175</b>	<b>225</b>	<b>250</b>	<b>250</b>	<b>225</b>	<b>150</b>	<b>75</b>
Incoming Supply	25	0	0	25	0	0	25	0	0	0
Available Supply	0	25	25	25	50	50	50	75	75	75
<b>Supply</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>	<b>75</b>
Demand Satisfied = Supply	25	25	25	50	50	50	75	75	75	75
<b>Remaining Demand</b>	<b>0</b>	<b>25</b>	<b>75</b>	<b>125</b>	<b>175</b>	<b>200</b>	<b>175</b>	<b>150</b>	<b>75</b>	<b>0</b>

# Labour module – Supply from Regions

- Labour is attracted to the event location as the supply of local labour is exhausted
- Hierarchical inflow - Labour supply flows are defined via arrival and departure profiles





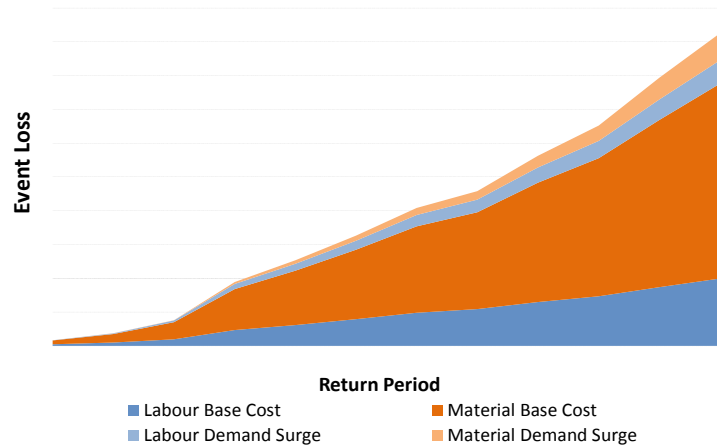
# Materials module

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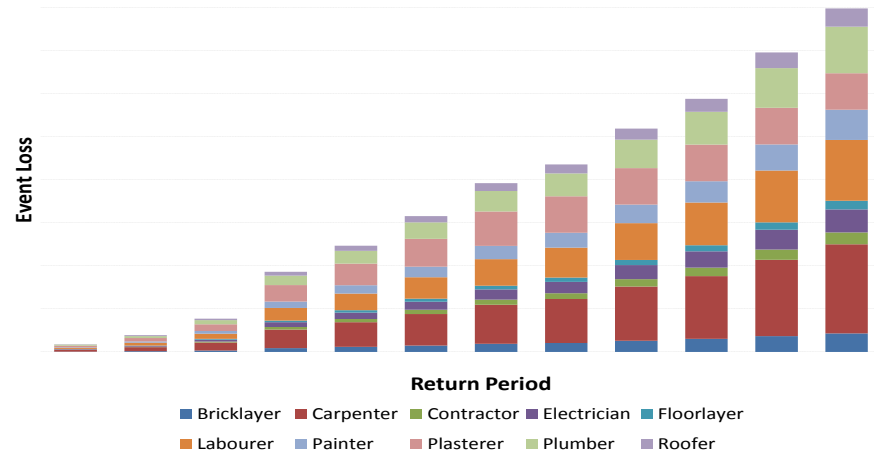
- Two material sources are assumed:
  - Domestic
  - Imported
- Price and supply rates are controlled by:
  - Material stockpile
  - Pre-event material demand
  - Productivity rates
- Linkage between labour and materials

# Model outcomes

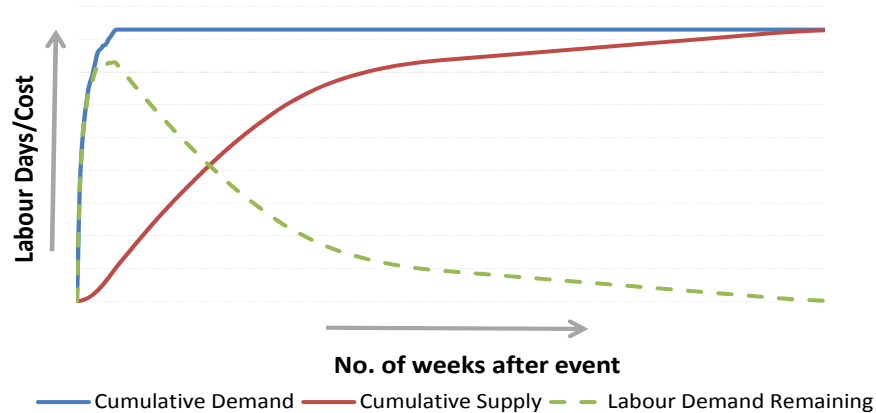
Total Inflated Cost



Event Cost - by Labour Type



Labour - Demand/Supply





# Other considerations

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- Allowances for commercial, industrial and infrastructure demands
- Economic conditions
  - Economic cycle will affect labour supply
  - Currency fluctuations affect import price
- Government intervention
  - Allocation of resources to high priority repairs
  - Caps on material prices



# Darfield Earthquake

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- Currently collecting data to calibrate the model
- Early Observations
  - The delay on reconstruction is considerable
  - Community spirit is key to cost mitigation
  - EQC management will be critical to demand surge mitigation
  - Resources are already arriving in Christchurch

# Contacts

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- Please contact us if you would like further details to be included in this report:
  - Nick Phin                                    +61 2 9650-0392    [nick.phin@aonbenfield.com](mailto:nick.phin@aonbenfield.com)
  - Jaykishan Jeyendran                    +61 2 9650-0456    [jaykishan.jeyendran@aonbenfield.com](mailto:jaykishan.jeyendran@aonbenfield.com)
  - Andrew Hulme                                +61 2 9650-0409    [andrew.hulme@aonbenfield.com](mailto:andrew.hulme@aonbenfield.com)
  - Ben Miliauskas                              +61 2 9650-0431    [ben.miliauskas@aonbenfield.com](mailto:ben.miliauskas@aonbenfield.com)

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