



Using Societal Expectations to Inform Tolerable Impacts for the Seismic Performance of New Buildings

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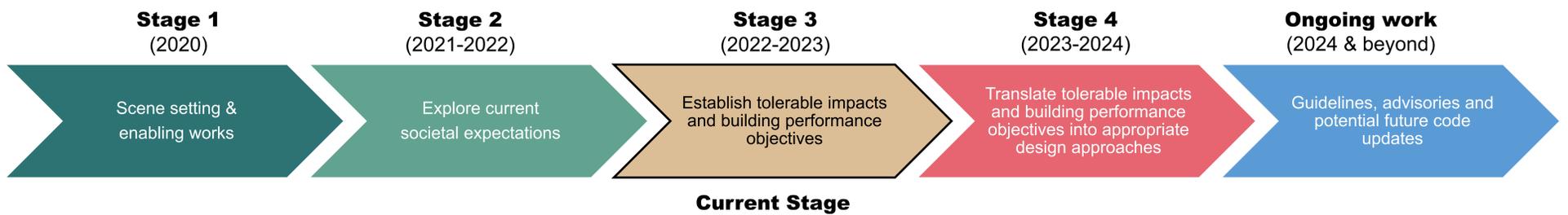
Purpose

For the first time in New Zealand, the EQC-funded NZSEE-led Resilient Buildings Project has documented societal expectations for the seismic performance of buildings. Through a series of interviews and geographic focus groups, the research focused on understanding societal tolerance to the impacts of earthquakes on new buildings. The findings reveal that communities expect more from buildings in earthquakes than simply preventing death and injury. Swift social and economic recovery and minimising the environmental impacts of earthquakes are emerging as key building performance objectives. The next stage of the Resilient Buildings Project aims to use the findings on current societal expectations to establish tolerable impacts for the seismic performance of buildings.

"I think we need to aspire to something greater than [life safety]. I think the experience out of Christchurch suggests that society wants and expects more than that."

"I think the resilience of buildings will start to become far more important. Having the ability to re-enter a workspace more freely and quickly following a moderate or severe earthquake will be hugely valued by occupiers. That's where you've got to think about what the occupier wants, not necessarily what the investor wants. Because they are the people using the assets."

The Resilient Buildings Project Stages



What are tolerable impacts?



Tolerable impact:

An impact that is bearable in a specific context based on the current values of society (including cost), where impact is a broad term that includes things such as deaths/injuries, consequences for cultural and financial wellbeing, and effects on the natural environment



Tolerable performance:

Building performance required to deliver the tolerable impact



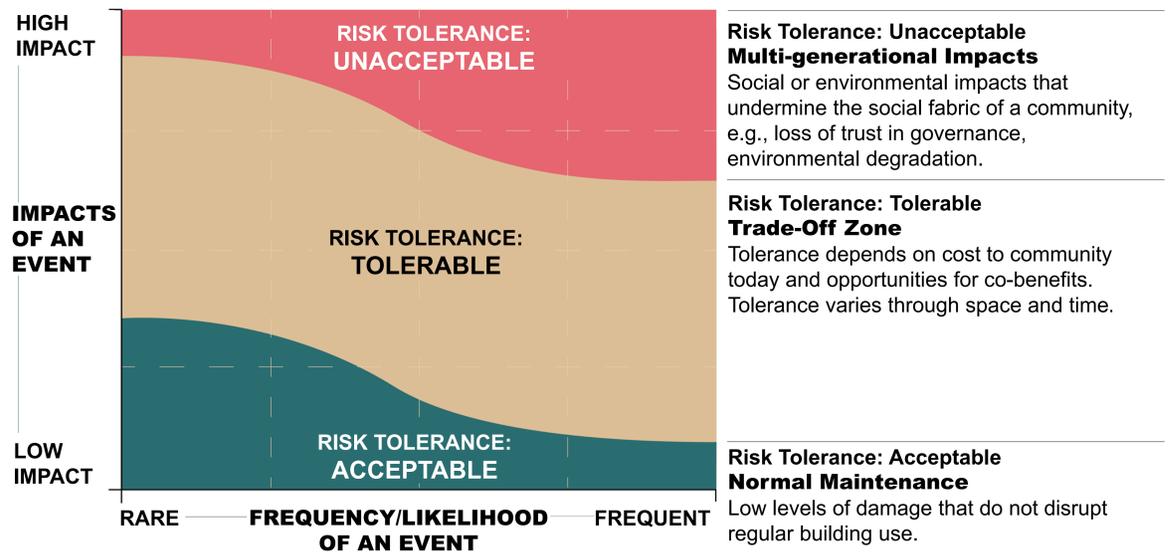
Performance objectives:

Targets for building performance in earthquakes that need to be met to achieve tolerable performance



Design criteria:

Design processes required to deliver the performance objectives



Risk Tolerance: Unacceptable Multi-generational Impacts
Social or environmental impacts that undermine the social fabric of a community, e.g., loss of trust in governance, environmental degradation.

Risk Tolerance: Tolerable Trade-Off Zone
Tolerance depends on cost to community today and opportunities for co-benefits. Tolerance varies through space and time.

Risk Tolerance: Acceptable Normal Maintenance
Low levels of damage that do not disrupt regular building use.

Completed Stage 3 Work: Establishment Workshops

Gap Analysis: Built Environment

Investigate how the built environment has changed (and may continue to change) since B1 performance objectives were set

Key Takeaways:

- Technology and an increasingly service-based economy are changing building usage.
- Land use rules are not currently well aligned with building regulation for natural hazard risk management.
- The New Zealand insurance market is underpinned by global reinsurance capital, which is increasingly constrained by aversion to natural hazard exposure.
 - Improving building resilience to mitigate the onset of damage by natural hazards will help sustain New Zealand's access to affordable risk capital.

Tolerable Performance Methodology Development

Develop a methodology for articulating tolerable impacts and establishing performance objectives in buildings

Key Takeaways:

- Consistent terminology is required within the project (and across natural hazard risk tolerance criteria more generally). A data dictionary will be developed.
- The definitions of tolerable impacts through to design criteria need to progress systematically, with each term only being considered after the criteria for the previous term have been defined.
 - Scenarios offer an effective method to communicate risk and may be used to test tolerable impacts.

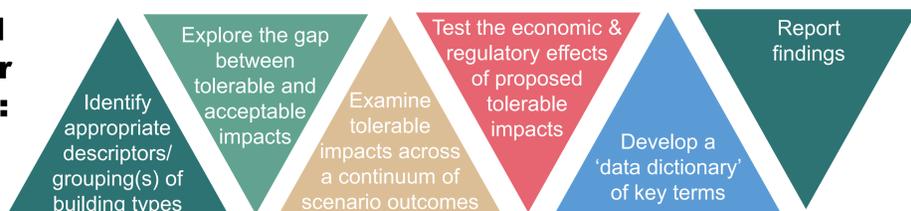
Intervention Analysis

Explore options available to address the gaps between societal expectations and current code settings

Key Takeaways:

- Improving the resilience of buildings is a system-wide issue, of which seismic performance objectives are just one part. Other parts include procurement, construction, consenting and liability management.
- "A code (minima) designed building is a barely legal building". There is a need to update communication around seismic risk and building design.
- Protection of property is not included in current legislation. Its inclusion could encourage the mitigation of damage in smaller events.

Planned Work for Stage 3:



What difference will this work make?

The aim of this project is simple but bold. It will lay the groundwork to develop resilient building design fit for the 21st century. It seeks to do this by considering the whole environment and by building consensus through wide engagement, so that society's expectations of building design standards and performance are reflected, and the system has social license to stand the test of time.