Seismic Resilience of Residential Houses

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- Our strategy
- Research drives
- BRANZ projects currently underway
- Intended research outcomes
- Open discussions
- Collaborations

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BRANZ Strategy

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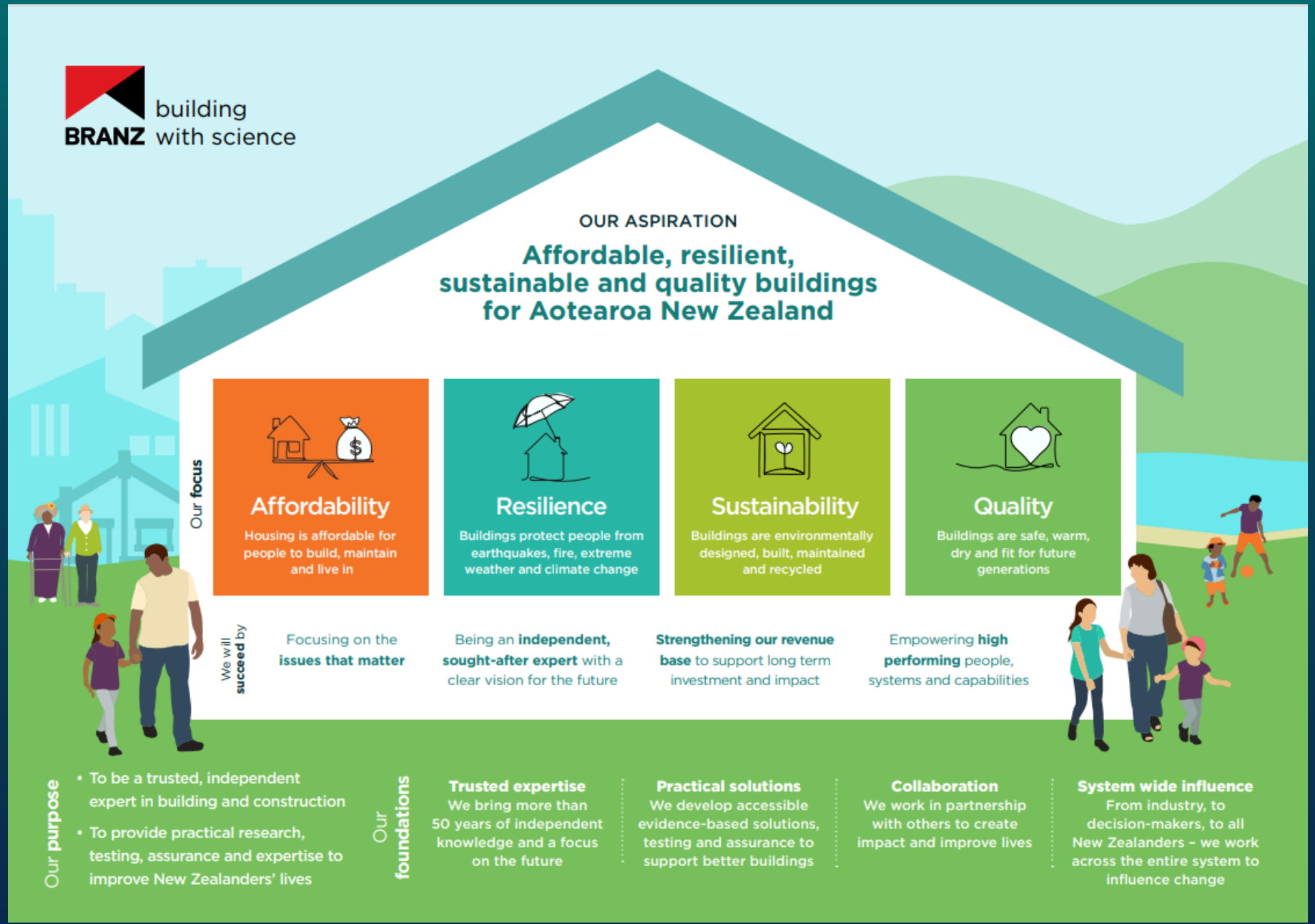

Initiatives: Earthquake damage evidence

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In Canterbury earthquakes

1. All light timber framed (LTF) houses achieved life safety, but huge cost
2. Highlighted vulnerable house stocks

Houses with hybrid bracing systems

Hillside Houses

Our projects Currently underway

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- Seismic behavior of LTF houses with hybrid bracing systems
- Seismic behavior of LTF hillside houses
- Damage controlled design of LTF houses

Research progresses : Hybrid LTF houses

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- **Investigated <u>at an elemental level</u>: "Why did the inclusion of hybrid bracing systems exacerbate the damage?"**
- **Identified the causes and developed a solution**
- **With collaborators, produced guideline for professional engineers and BCAs to use. Widely used now**

Intended outcomes:

- **Engineering dataset of common bracing systems for engineers to use**
- **Based on evidence, guideline developed for bracing designs of hybrid LTF houses**
- **Design examples of hybrid LTF houses**

Research progresses : Hillside LTF houses

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- Characterized the common practice (literature reviews)
- Hypothesis of likely seismic vulnerabilities of hillside houses (desk-top studies)
- Tested subfloor systems commonly used in hillside houses
- Yet to develop retrofit solutions and guidelines

Intended outcomes include:

- Diagrams, sketches for improving hillside house performance
- Design examples for engineering professionals

Research progresses : Damage controlled design

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Desktop and experimental studies have been conducted at a systems level, identifying shortcomings of current LTF construction standard, namely:

- **Different test procedure for bracing walls on suspended timber floors**
- **Plasterboard bracing walls have much lower energy dissipating capacities than currently assumed.**
- **Current irregularity limit is too lenient. The new NZS3604 expected to change**
- **Continue the damage quantification work for common structural systems**

Intended outcomes:

- **A guideline for 3-storey LTF houses**
- **A design example of a 3-storey LTF house**
- **Informing future LTF design standard**

Other issues about seismic resilience of houses

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- Impact of NEW TS1170.5 on house construction, especially for Wellington
- Soil-foundation-structural interactions
- Land-sliding and flooding (work with Earth Sciences Institute on landsliding)
- BRANZ's project about flooding. Effect of flooding on the condition of houses.

We want to engage with people like you!

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- **We need your input to deliver useful outputs – common practice, topology classification, common details**
- **We can work together to achieve better outcomes**
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