Earthquake Risk Mitigation for the 21st Century

Aiming for Resilient Buildings

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NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING

Earthquake risk mitigation for the 21st century

- Project drivers
- What this project is trying to achieve
- Proposed project approach
- Relationships with other resilience projects

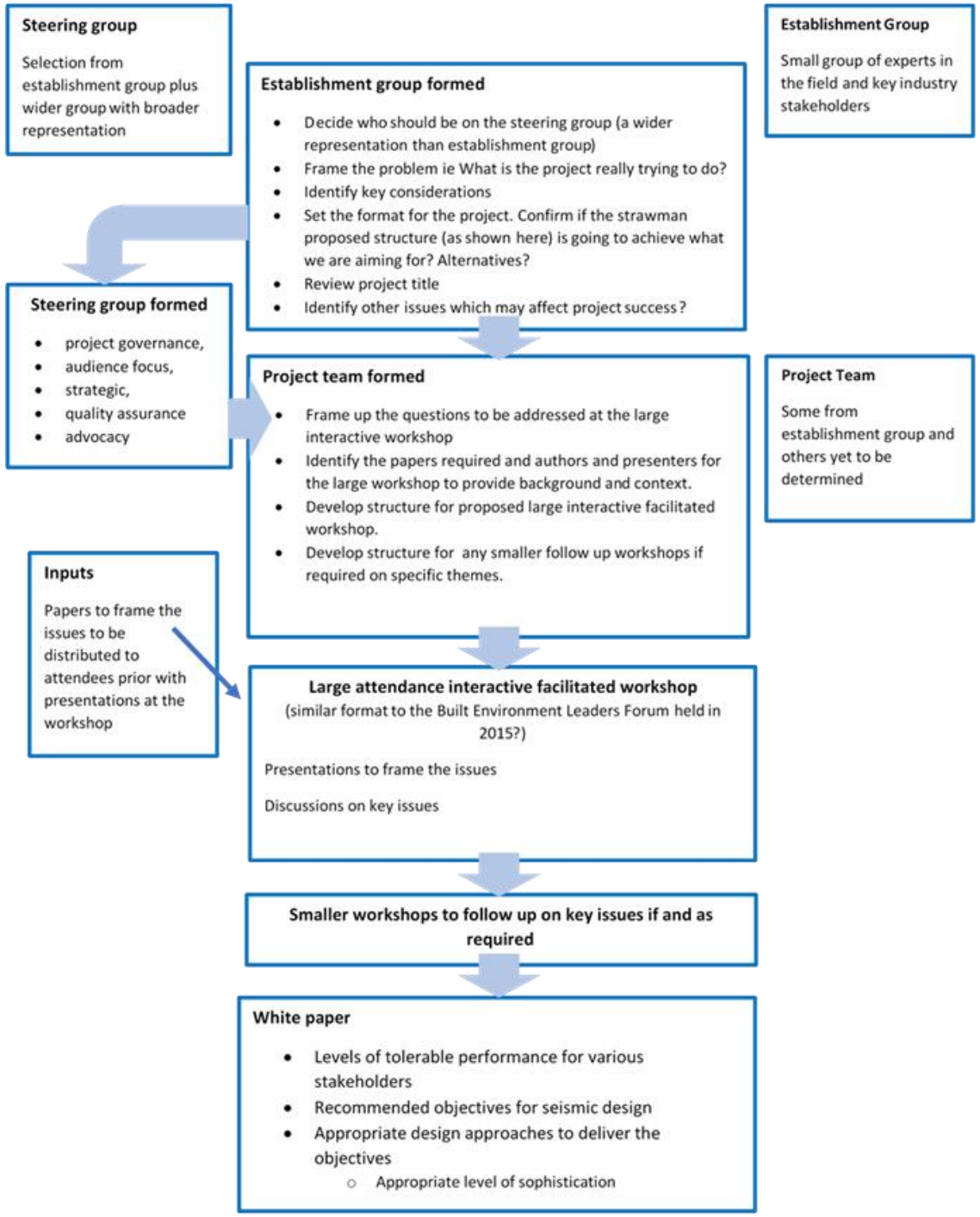
What this project is trying to achieve

- Develop a framework that articulates performance objectives for different building usages through the perspective of user expectations. The framework should:
  - Encompass technical standards that are scalable for different desired outcomes above the mandated code minimum (that building owners can easily opt into)
  - Use consistent clear language, and
  - Have scope to describe existing building characteristics (and potentially utility infrastructure) in relation to the agreed standards

Proposed Project Approach

- Multi – phased approach
  - outputs a “white paper” or series of “white papers”
- Phase 1
  - levels of tolerable performance for various stakeholders
- Subsequent Phase(s)
  - Recommended objectives for seismic design
  - Options for appropriate design approaches to deliver the objectives and appropriate level of sophistication

Phase 1 Methodology



Establishment stage tasks

1. EQ Engineering Community Engagement
2. Clarify relationships between the different seismic projects
3. Project establishment
   - Framing the problem ie what is the project trying to do
   - Identifying the key considerations
   - Setting the format for the project
   - Reviewing the project title
   - Identifying other issues which may affect project success
   - Agreeing on steering committee membership and project team

Tu Kahika: Building Resilience

Identifying the Issue
- Royal Commission
- Mayor's Insurance Task Force

Technical Knowledge Development/Research
- National Seismic Hazard Model Update
- QuakeCore Research into building performance

Regulatory inputs/options research and development
- Seismic Risk Working Group
- Design, Construction and Seismic Performance of Non Structural Elements

Communication tools for building owners to brief designers
- Sesoc Low damage design project

Rethinking NZ EQ standards – Establishing user expectations and objectives
- NZSEE The Resilient Building Project Phase 1

Design tools for industry
- Isolation Guidelines

Rethinking NZ EQ standards – translating agreed user expectations into input for future building standards, and guidelines
- NZSEE The Resilient Buildings Project Phase 2

Rethinking NZ EQ standards – NZ standard development
- Revised NZ EQ standard for the 21st century

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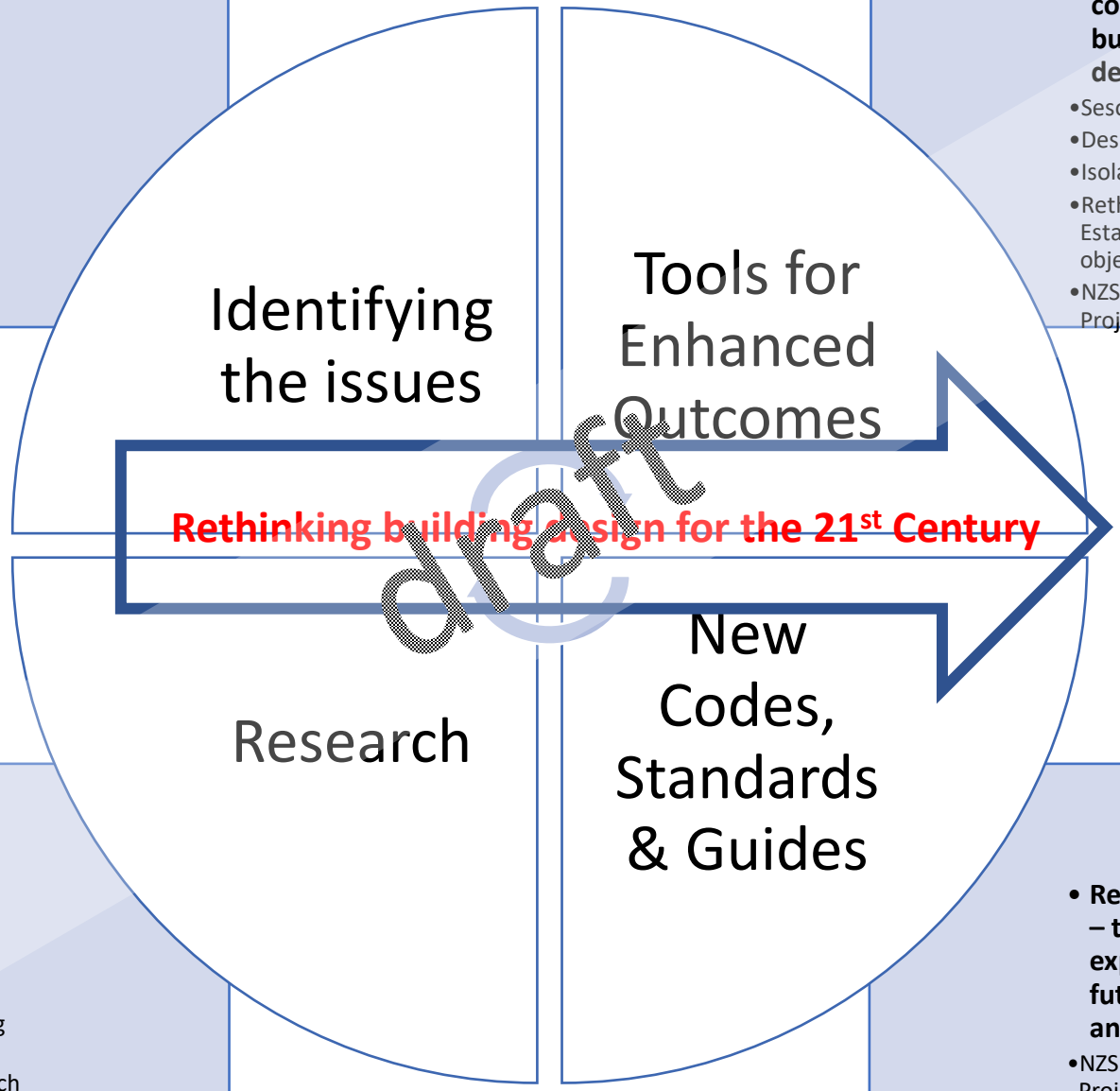

- **Technical Knowledge Development/Research**

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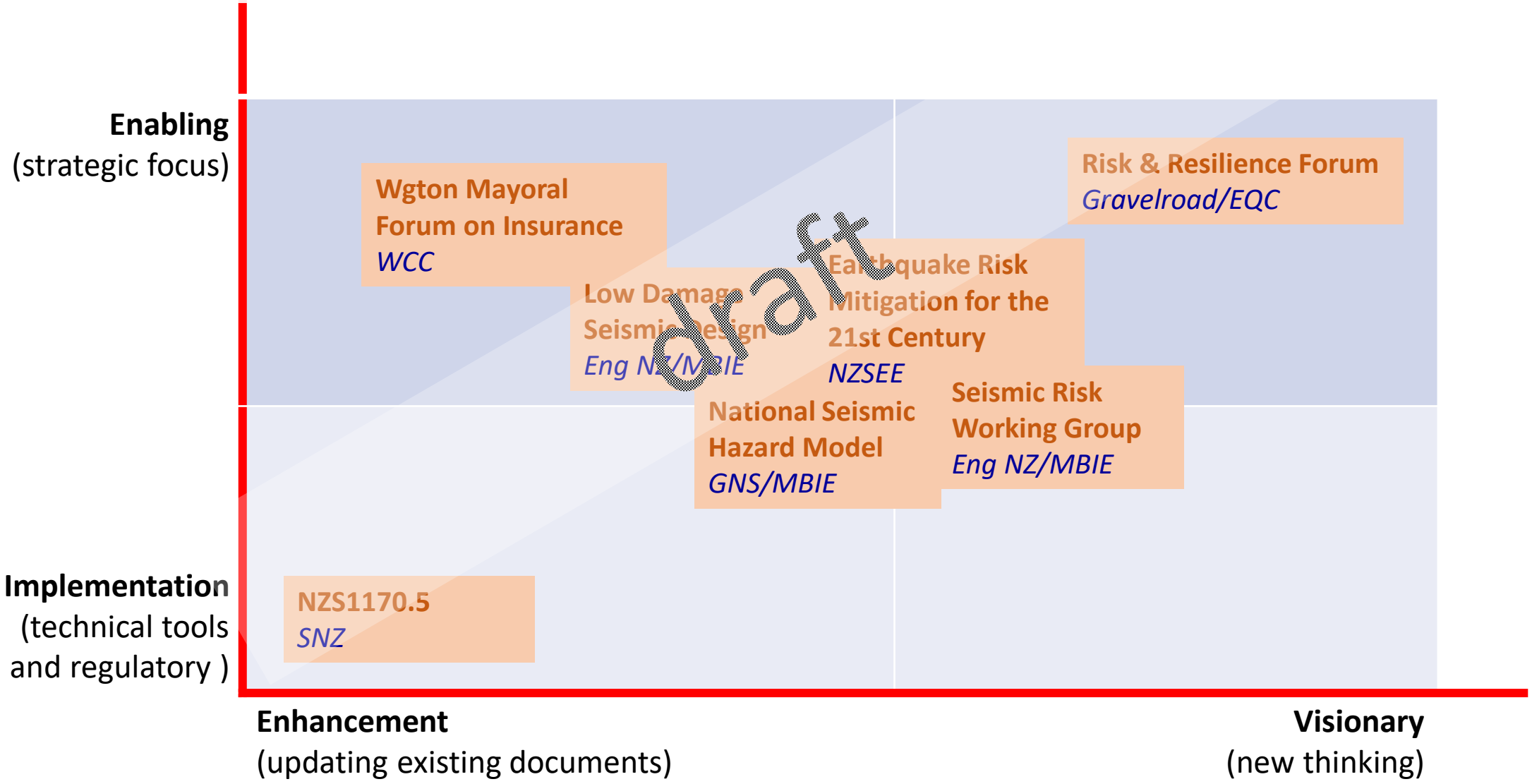
Map of Earthquake Resilience Projects



Listing of Key Earthquake Resilience Projects

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Project	Scope	Lead Organisation	Sponsoring Organisation
Risk & Resilience Forum	Demonstrating the return on investment in resilience, and developing a cross-agency action plan	Gravelroad	EQC
Wellington Mayoral Forum on Insurance	Understanding the insurance implications of the latest knowledge on hazards and vulnerabilities, and promoting more realistic expectations of the role of insurance	WCC	
Earthquake Risk Mitigation for the 21st Century	Rethinking NZ earthquake standards – establishing user expectations and objectives and reshaping standards	NZSEE	
Seismic Risk Working Group	Informing a possible new approach to representing seismic risk in the building system	Engineering NZ	MBIE
National Seismic Hazard Model	Updating the national seismic hazard model and introducing a new system of integration with design and ongoing management	GNS Science	MBIE
Low Damage Seismic Design	Establishing a common language to help building developers, owners and tenants understand the benefits of LDD, and technical information to assist designers with delivery	Engineering NZ	MBIE
NZS1170.5 Amendment	Adjusting some design provisions, including the introduction of basin edge effects for Wgton	Standards NZ	

Listing of Relevant Earthquake Design and Assessment Guidelines/ Projects

Project	Scope/ Objectives	Lead Organisation (s)	Status/ Date Completed	Future Plans
Engineering Assessment Guidelines	Guidelines for the seismic assessment of existing NZ buildings. Assessments can be for a range of purposes including both general property risk identification and to identify earthquake prone buildings.	NZSEE, SESOC, NZGS, MBIE, EQC	July 2017	Currently no arrangements in place for maintaining or enhancing the Guidelines
C5 evidence Project	Aim to understand the impacts of the new Yellow C5 guideline chapter on building assessments in comparision with the Red C5 chapter as originally published	Engineering NZ for MBIE as funder	Phase 2 underway - due for completion end of 2020	To inform MBIE's decision about its regulatory status - ie. incorporation within the Red Book
Seismic Isolation Guidelines	Guidelines for the design of seismically isolated buildings	NZSEE	Complete. Issued as draft June 2019	
Seismic Design of Storage Tanks	Guidelines for the seismic design of storage tanks that fulfilled the requirements as an approved code of practice by the Hazardous Substances and New Organisms (HSNO) Act 1996 (ERMA New Zealand, 1996), and associated regulations.	NZSEE	Complete. Issued Nov 2009	
Geotechnical Earthquake Engineering Practice Modules	Finalising the Earthquake Geotechnical Engineering Practice Series	Engineering NZ and NZGS for MBIE as funder	Due to be completed Nov 2021	
Design, Construction and Seismic Performance of Non-structural Elements	Project to recommend changes to the regulation and compliance pathway for non structural elements to enhance outcomes	QuakeCentre	Summary document completed Feb 2020	
Designing Buildings for higher seismic performance: economic and environmental costs	Project to quantify the lifecycle environmental and cost benefits associated with designing structures that are more seismically resilient than required by current design code requirements	BRANZ	Not yet funded	

Design Tools and Seismic Performance