Canterbury Earthquake Disaster

- Phases of Response and Recovery
  - Response period – Sept 4th 2010, but especially following Feb 22nd 2011 M6.2
  - Transition to Recovery – Approximately August 2011 to present
  - Recovery period – Should be more apparent from 2nd quarter of 2012
Research and Response

- Immediate
- Rapid damage assessment
- Working closely with Ministry of Civil Defence & Emergency Management
- Forecasting further earthquake activity
- Social well-being, relief centres, evacuation?
- Geological/geophysical context of rare/surprising events
- International collaboration and needs assessment
- Diversion of research effort as appropriate (c. NZD 3-4M pa) and retrospective additional NZD 1M

Research during the Transition to Recovery

- Earthquake likelihood and revision to building code
- Rockfall & slope stability assessment in Port Hill suburbs
- Liquefaction & Infrastructure
- Foundation damage in the CBD
- Performance to engineered structures
- Impacts on business, tourism, education
- Psycho-social impacts, migration, economic impacts, health
- Diversion of research effort as appropriate (c. NZD 3-4M pa) and additional NZD 2M immediately available
- Extensive international collaboration (US & Japan especially, including NSF RAPID)
- Development of a Canterbury Earthquakes Research Strategy (NHRP)
Research and Recovery

- A partnership between researchers, government agencies (CERA in particular) and international collaborators
- Integration of lessons learned in engineering, seismology, risk, social well-being and economics
- Research strategy in place
- New research funding to “learn lessons in Canterbury and apply them to New Zealand” – 4 years @ NZD 3M pa
- The recommendations of the Royal Commission are expected to provide impetus to applying lessons for national benefit

On-going challenges

- Providing accurate advice on likelihood further earthquakes - a rapidly evolving, time-varying, situation
- Developing suitable adjustments to building code provisions in a time-varying hazard situation
- Providing confident advice to allow insurers and other agencies to make the correct decisions on where, when, and how to begin the rebuild of Christchurch
- Finding the societally acceptable balance between current risk aversion and appropriate building standards for the nominal 50 year design life of reconstruction – acceptable risk and tolerable impacts
- Developing an accurate assessment of socio-economic impact of the earthquake sequence and evaluate vulnerabilities with respect to city reconstruction
# Uptake of Research knowledge – what & how??

- Science liaison in Emergency Operation Centres – both NCMC & Christchurch
- Frequent and persistent discussion with stakeholders

## Research Participants vs. Research Users (stakeholders)

<table>
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<th>Research Participants</th>
<th>Research Users (stakeholders)</th>
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<td>CERA</td>
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<td>(coordination)</td>
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<td>GNS Science/GeoNet</td>
<td>Recovery Minister</td>
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<td>NIWA</td>
<td>Dept &amp; Ministries of: Social Development</td>
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<tr>
<td>University of Canterbury</td>
<td>Tourism, Education, Health, Building &amp;</td>
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<td>University of Auckland</td>
<td>Housing, The Treasury, SCIRT</td>
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<td>Resilient Organisations</td>
<td>ECAN, CCC &amp; other TA's</td>
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<td>Massey University</td>
<td>Insurers &amp; Re-insurers</td>
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<td>Joint Centre for Disaster Research</td>
<td>Technical Societies – Earthquake</td>
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<tr>
<td>Victoria University</td>
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<td>Opus International</td>
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<td>Consultant engineers</td>
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NSF-RAPID Workshop, Washington DC, 9-10 Feb 2012

Natural Hazards Research Platform