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Natural Hazards Inc Business Cluster

Moving through Covid-19 to a More Resilient Tomorrow

Members and associates of Natural Hazards Inc. Business Cluster as a New Zealand based partnership of industry leaders focused on delivering innovative practical solutions for earthquake and other natural hazards risk management internationally have relationships and links as part of the challenges and opportunities arising from the global initiatives underway as part of the process of the global recovery from the devastating global Covid-19 pandemic.

Covid-19 has clearly have made it difficult to readily operate to offer offshore services during a global pandemic with major travel restrictions. While most members have survived the downturn and are now growing again; the next step, and this is where Natural Hazards Inc comes in, is to begin renewing relationships and expanding back into offshore markets.

This month we have seen the first G7 Summit face to face meeting of world leaders in 2 years held in the UK signals a major increase in spending on Build Back Better “clean growth” infrastructure projects and the first since Covid-19 in person overseas trade mission from New Zealand led by Trade Minister Daimen O’Connor to Singapore the UK and Europe.

As progress is made with the roll out of vaccines and other recovery measures to overcome the current global Covid-19 pandemic there is also a massive increase underway in economic stimulus Build Back Better infrastructure and associated

climate change disaster risk mitigation type projects. New Zealand is positioned early in both adopting Covid-19 elimination and increased infrastructure spend as part of economic recovery strategies.

This includes the largest Climate Resilience Flood Protection works programme in over 30 years now underway. And the mobilising of a range of disaster risk management initiatives for Covid-19 by people with a background of working in other areas of natural hazards disaster risk management coupled with a rapid increase in the use of social media remote working digital web based communication and practice infrastructure tools.

Natural Hazards Inc Business Cluster
www.naturalhazards.co.nz

The Canterbury Earthquakes: Reflections on the Decade, and What Lies Ahead



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A series of presentations on this theme were given at the NIWA hosted 26 February Natural Hazards Inc meeting.

Dave Brunson and David Middleton, Kestrel Group

An important learning is that we need to get our readiness up to the level it needs to be at to deal with a future major event.

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The Canterbury earthquake response preparations had been vital coupled with the importance of access to earthquake insurance. In the decade since there has been a pendulum swing regarding risk perception.

High take-up of earthquake insurance underpinned both the commercial and residential recoveries. About 70% of the cost of damage and business interruption was paid by insurance, but there are questions around whether we really understand what life would look like in an environment where earthquake cover is now much scarcer or more expensive.

The EQC Levy has been raised from 5 cents per \$100 to 15 then 20 cents and the cover limit (cap) on residential property claims raised from \$100,000 to \$150,000 in 2019 but this should be \$500,000 to keep pace with inflation. EQC's original purpose of making insurance affordable is being eroded.

USAR (Urban Search And Rescue) efforts saved a number of people, in addition to those by first responders. Rapid building assessments enabled the running of a cohesive emergency response operation.

A large volume of valuable data and learning has flowed from the earthquakes. Researchers played a valuable role during the response and recovery, and there has been the wider value of the enduring databases that were created (eg National Geotechnical Database).

There has been growing recognition of the importance of relationships – particularly with having standing relationships with engineers to enable swift response. Seismic instrumentation is a key tool at the heart of these relationships.

Expectations however must be appropriately conveyed.

The experienced team at Kestrel Group have taken part in numerous conferences and project assignments. One of these in 2019 was the leading of USAR Training in Sicily.



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Infometrics – Natural Hazards Risk Investment Mitigation Real Options Analysis

Infometrics Chief Economist Adolf Stroombergen illustrated the use of real options analysis as a decision making tool when considering what natural hazards risk mitigation measures to take and the timing of making mitigation investment decisions.

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Delaying until more information about the risks of economic loss from an adverse event (eg sea level rise associated with climate change) is known, can be a good strategy as it enables flexibility.

Deferring an option can have a lower 'expected' discounted total cost than starting it immediately. But total expected discounted costs could still rise if conditions change - this is the price of more security.

Other associated research underway by Infometrics in collaboration with other partner researchers from TU Delft in the Netherlands, NIWA and VUW is on the development of adaptive tools for decisions on adapting to flood hazards arising from compounding climate change impacts on water infrastructure.

This involves testing the use of Robust Decision Making (RDM) tools within a Dynamic Adaptive Pathways Planning (DAPP) process. This aims to provide a framework for future infrastructure adaptation under uncertain climate futures.

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Global Seismic Data Systems Developments



Steven McLauchlan, director of Global Seismic Data (GSD) and Survive-it, outlined the latest system developments of this new seismic structural health

monitoring system. Global Seismic Data is a global, full-service Structural Monitoring Software-as-a-Service company, integrating innovation, technology and structural engineering into a single professional solution with industry partners.

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This advanced cost effective instrumentation of buildings system developed in Wellington is now being implemented in New Zealand as well as in off shore markets to enable rapid assessment of buildings from earthquake events.

This GSD presentation complemented other presenters who highlighted the value and need for more buildings to be installed with seismic instrumentation systems to assist with rapid earthquake event assessments of buildings to provide reliable occupancy information as part of integrated earthquake safety solutions.

The GSD system developments outlined that assist engineers to make rapid assessments of buildings include response spectra accelerations and inter-story drift displacements data. Along with new animations of displacement as a tool for assessing buildings post event as part of the process.



“With our backend system we have developed map layering and functionality. Simply click and show the layers to display monitored buildings, recent shakes, 3D buildings, active faults, tsunami zones and designated Earthquake-Prone buildings,” explained Steven McLauchlan. “We have undertaken BRANZ sensor data verification

and calibration, with this a first for such a system, providing additional assurance for any users.”

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Change in the Landscape for Structural Engineering

In a presentation prepared by Silvester Clark principal consulting engineer and director Scott Miller, he outlined the change in the landscape for structural engineering in the decade since the Christchurch earthquakes.

He summed these up as being:

- Client awareness - Tenant, insurance, banks, purchasers etc; Increased requirements for new build projects; Innovative and proven systems implemented.
- Greater knowledge of owners on the quality of their assets.
- Seismic monitoring, geotechnical testing increased.
- Insurance increase, harder to obtain and insurers having a better knowledge of risk.

Importance of USAR

Scott was part of the USAR (Urban Search And Rescue) teams that were quickly on the scene after the Christchurch earthquakes.

This followed him having been part of a New Zealand Earthquake Engineering Rapid Assessment Team that went to assist in Padang in Sumatra, Indonesia in late 2009 via the UNDP

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with NZ Government Aid funding, which was organised with the help from the Earthquake + Natural Hazards Business Cluster and Society for Earthquake Engineering.

Then he was part of the NZ USAR Team that went to assist in Japan after the major March 2011 earthquake and tsunami.



Then four years later to Nepal in 2015 after the massive earthquake there, with this as part of an MFAT Aid funded assessment team.

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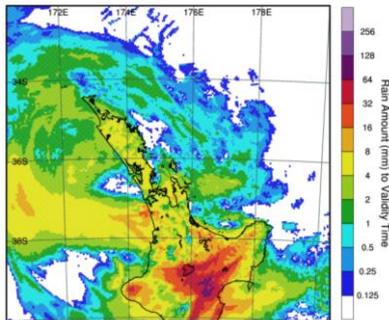
NIWA Reducing Flood Hazards and Risks

Sam Dean of NIWA gave a presentation of the latest NIWA led developments underway to reduce flood risks.

A centre piece being the start of a major 5 year MBIE Endeavour funded 5 year research project on reducing flood inundation hazard and risks, which is being undertaken as a major collaboration with a range of other research, central and local government, and consulting firms as partners.

This includes the development of a new national screen tool and national flood mapping with the creating of a semi-automated system and methodology for nationally consistent flood maps for a range of design storm events. This includes for climate change impacts and with validation against a database of historical floods.

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One of the tools being used as input is the NIWA HIRDS rainfall observations system that collects data from a network of rainfall gauges to create design storms for flood modelling.

This leading research work with the development of these flood modelling mapping tools has offshore applications as well as for use in New Zealand.



Photo: Warren Buckland via Hawkes Bay

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Impact on Raoul Island of the March East Cape and Kermadec Earthquakes

A team from GNS Science, NZDF, DOC and MetService arrived at Raoul Island shortly after the major early March East Cape and Kermadec earthquakes. This trip had already been planned before the earthquakes struck, but after a full risk assessment GNS Science deemed it safe for technicians to go onto certain areas of the island. This allowed them to repair GeoNet monitoring instruments damaged in the quakes.

“Luckily it ended up being quite straightforward to get the instruments back online,” says GNS Remote Infrastructure Operations Co-ordinator Kris O'Brien.

The team were able to fully restore power and communications to all GeoNet instruments but they found some data from the second earthquake had been lost.

“While it’s disappointing to have lost some data from the Raoul island instruments, we can still learn plenty about the Kermadec events from the wider GeoNet and regional monitoring network, including the DART buoys,” GNS Science operations & data team leader Jonathan Hanson says.

Three large earthquakes occurred offshore New Zealand beginning with a M7.3 East Cape earthquake felt widely across the country. This was then followed a few hours later by a M7.4 and M8.1 earthquake in the Kermadec Islands. All three quakes caused tsunamis.

In the early stages of GNS Science’s response, Earth Structure and Processes Manager Sally Dellow was the incident controller.

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“When an event like this happens, scientists will instantly see the opportunities for new information and new research,” she says.

“We’ll be thinking - does this confirm what we know, or change it? What’s caused this and what can we learn?”

After the event response – where scientists provide emergency managers and first responders with the information they need to make decisions – comes the science response.



View of Blue Lake on Raoul Island, showing the landslides on the crater wall with the DoC establishment and the RNZN Canterbury at anchor in the background.

From seismologists to geodetic specialists to social scientists, there is much research work to find out more about such an extraordinary series of major earthquakes.

For further information:

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UNDRR United Nations Office for Disaster Risk Reduction – a source of resource information

[Review of COVID-19 Disaster Risk Governance in Asia-Pacific: Towards Multi-Hazard and Multi-Sectoral Disaster Risk Reduction](#)

The COVID-19 pandemic, with its cascading impacts on social and economic development, has highlighted the need for countries to improve their disaster risk governance mechanisms to become multi-hazard in their scope and multi-sectoral in their reach. Based on a review of policy documents in 28 countries, this publication provides recommendations on how disaster risk governance can be strengthened in Asia-Pacific.

<https://www.undrr.org/about-undrr-where-we-work/asia-pacific>

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Remembrance – John Berrill and Dick Beetham

The last several months has seen the sad passing of John Berrill and Dick Beetham two highly regarded cluster friends who were particularly active in the earlier days of the Earthquake + Natural Hazards NZ Business Cluster.

John Berrill was the founder technical director of Canterbury Seismic Instruments, which was started while he was at Canterbury University. John's role at Canterbury Seismic Instruments began over a decade before incorporation with a spark of an idea to predict the levels of damage that Christchurch could expect from a rupture on the alpine fault. Lacking the funds to build the network of seismographs this project needed, John collaborated with the electrical engineering school at Canterbury University to develop his own instruments.



John drew up his vision for a new type of instrument, and with then-student Hamish Avery, developed the world's first new-generation internet-native seismograph. With people keen to buy them, and a vision to transfer the network into the fledgling GeoNet network, CSI (Canterbury Seismic Instruments) was formed along with long standing board members, David Stock and Bruce Rickard. On the back of this, John's vision was realised as CanNet, New Zealand's first dense seismic network that later became part of GeoNet.

It was John's determination to put dense instrumentation across Canterbury and within Christchurch that delivered the invaluable dataset from the tragic earthquake sequence in Canterbury from 2010-2011. Data captured by the original CanNet network has been widely used and cited and has directly improved our understanding of earthquake risk and best-practice engineering. John's vision has led to better outcomes for the future, not just for Christchurch or New Zealand, but internationally.

<http://www.csi.net.nz/index.php/news/rememering-our-founder-john-berrill/>

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Dick Beetham passed away recently while still actively working as a principal geotech engineer and engineering geologist for Coffey NZ. Prior to this he was with GHD.

Before that he spent many years working for GNS Science, which was when he spent considerable time involved in disaster risk management work in Indonesia, including time with UNDP.



In particular following the massive Dec 2004 Boxing Day earthquake and tsunami and subsequent major earthquake events in 2005 on Nias Island and in 2009 on Padang in Sumatra.



Padang NZ Earthquake Engineering Team – Dick Beetham bottom right

Natural Hazards Inc. Members' Expertise

- Strategies for disaster risk reduction, readiness, response and recovery.
- Development of organisational frameworks for emergency management.
- Emergency management education.
- Community preparedness for natural disasters.
- Multi-hazard land use planning.
- Improvement of building controls, standards and codes.
- Seismic retrofit strengthening of buildings, including simple houses.
- Seismic isolation of important buildings such as hospitals, schools, emergency management centres, government buildings, apartment buildings and heritage buildings.
- Tsunami and flood risk assessment, modelling and mitigation strategies.
- Disaster risk insurance strategies and systems.

For More Information, please visit www.naturalhazards.co.nz

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New Members Always Welcome!

If you are interested in joining Natural Hazards Inc. we have a range of membership options available. For more information on how to join or to find out more about Natural Hazards Inc. please visit our website www.naturalhazards.co.nz/join-us/ to complete an application form.

You can also contact Co-chairs **Greg Szakats**, **David Johnston** or Facilitator **Graeme Carroll** for more details!

Natural Hazards Inc. Key Contacts

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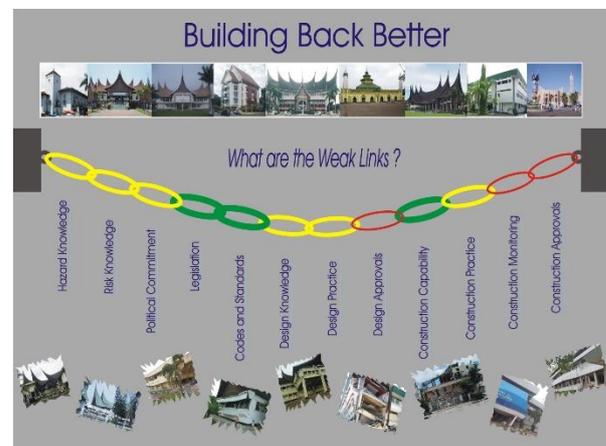
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Next Natural Hazards Inc. Business Cluster Meetings:

Thursday 17 June 4pm to 6pm at Beca
Aorangi House, 85 Molesworth Street, Wellington

Thursday 12 August 3pm to 6pm AGM
Silvester Clark with Robinson Seismic

Thursday 23 September 4pm to 6pm
Tonkin+Taylor



Credit: David Hopkins