



Recovery after the Canterbury Earthquakes

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ABSTRACT

The 2010-2011 Canterbury Earthquakes caused significant damage, especially in the city of Christchurch. As a result much of the infrastructure – vertical and horizontal, is being replaced. This paper, supplements other papers dealing with technical aspects of the rebuild, and concentrates on the organizational aspects of the Canterbury recovery effort. In particular it describes the roles of different organizations during the recovery, the people, and some opinions about what could have been done better.

Keywords: Canterbury, Earthquake, Organizations, Recovery, Rebuild

INTRODUCTION

Recovery is the final step in the emergency management mantra “Prevention, Preparedness, Response & Recovery” (RSO, 2015). As the final step, it is dependent on the previous steps of “Prevention, Preparedness, Response”, and it in turn informs these same activities as they relate to possible subsequent events. A large amount has been written about the Canterbury earthquake sequence, its effects, and the rebuild by the author and others (e.g. NZSEE (2011), MacRae (2013), MacRae et al (2015), Clifton and MacRae (2018), MacRae et al. (2018), and Bruneau and MacRae (2017)). This paper, rather than repeating many of these things, focuses on some of the organisational and social aspects of the continuing recovery.

While recovery continues as the city is rebuilt, a formal meeting entitled the Canterbury Earthquake Symposium was held at the University of Canterbury from 29-30 November 2018 highlighting the social aspects of the recovery. This was attended by key figures from national and local government, support organisations, and other stakeholders. The meeting was a chance to “Give thanks we are here”, to review the journey, and the progress made. All information from this symposium is available online (CES, 2018). The author draws heavily from this symposium, from other published works, and personal experience.

One of the declared goals of the city recovery was to build “a city that will be stronger, smarter and more resilient to the physical, social, and economic challenges” (Christchurch City Council, 2016a; 2016b). This paper describes activities toward this goal, by discussing (i) the roles of different organisations in the recovery of infrastructure, (ii) some aspect of the recovery of people, (iii) some discussion of improvements that could have been made in the recovery process, and (iv) thoughts about recovery in general.

ORGANISATIONS

Organizations are important. Bas van Bavel stated that “The strength of a society resides in its institutions”. Also, Cornel West stated “There is no fundamental social change by being simply of individual and interpersonal actions. You have to have organizations and institutions that make a fundamental difference”. A number of organisations that existed before the earthquakes, as well as those developed after the earthquakes, and their effect on the recovery are described below.

Those organisations existing before the earthquakes include:

Christchurch City Council (CCC) - <https://www.ccc.govt.nz/>

The CCC had a full workload before the earthquakes, and was made even busier after them. Many new responsibilities were delegated to CERA, but the CCC also had roles associated with decisions relating to repairing and rebuilding houses affected by the Canterbury earthquakes, heritage buildings, earthquake-prone buildings (EPB), earthquake insurance claim settlements, renting earthquake damaged property, new/replacement housing, demolition waste, land with increased flooding/tsunami susceptibility, rockfall and cliff collapse risk, drinking water quality, effects of zone demolition on communities, to name a few. As a result the CCC was in constant communication with other agencies and groups. There was pressure on the council to grant building consents more rapidly. All this occurred when there was a lack of harmony within the management of the council

(Wiki, 2014) and huge pressure for things to be done fast. In particular, some politicians regarded the CCC review of new building permits as being excessively slow, and the interactions were often acrimonious (RNZ, 2017, Stuff, 2013).

The Earthquake Commission (EQC) - <https://www.eqc.govt.nz/>

This is a New Zealand Crown entity investing in natural disaster research, education and providing residential property insurance (contents, dwellings and some coverage of land) to residential property owners. EQC administers the Natural Disaster Fund (NDF). All homes with a bank mortgage, and many others voluntarily, purchased EQC residential insurance of \$100,000 after the Christchurch earthquakes. Additional private insurance was also generally purchased for both commercial and residential properties, as there was a culture of insurance (Marquis et al. 2015). EQC received more than 500,000 claims for more than 13 separate shaking events (EQC 2018).

After June 2011 aftershocks, land was classified in 4 zones according to their suitability for construction. In some particularly liquefiable zones, all houses were purchased by the government and demolished. This cost \$1.5b (Interest (2011), Stuff, 2015). No reconstruction is permitted there.

After the earthquakes EQC employed many staff members to process claims on buildings, land, contents and drainage. The benefits of EQC insurance were huge, and it contributed significantly to the recovery of Christchurch. However, there were some who took advantage of EQC, and others felt that EQC was unfairly harsh in its appraisals, or that there were large inconsistencies.

In 2011, EQC was required to perform repairs rather than just make payouts. This work was contracted to Fletcher construction who employed many staff, often from overseas, in order to complete this work. Some of the work was conducted poorly resulting in it having to be redone several times (RNZ 2017a, Stuff 2018).

EQC monitored its performance in terms of claims resolved and public satisfaction in monthly reports (EQC, 2018). A high level enquiry of the performance of EQC during the rebuild started in late 2018 under Dame Sylvia Cartwright. It seeks to determine (i) What worked, (ii) What didn't, (iii) What changed, and (iv) How can we make it better? (Inquiry, 2018)

Insurance Companies

Insurers are generally happy to provide residual insurance cover in NZ (whereas there is low penetration in many other earthquake countries in the world). The presence of EQC, and its covering of the first \$100k is a major incentive to reinsurers to be active there. Insurance cover is also provided to the majority of commercial and other structures in NZ. The insurers are in turn backed by reinsurers. NZ banks do not generally lend money on a structure without earthquake insurance.

One NZ insurance company, AMI, with more than 30% of the market share of residential insurance cover in Christchurch did not have sufficient reserves (directly or in reinsurance) to cover their claims. In this case, the government supported AMI to give citizens assurance that they would receive their payouts (AMI, 2011). The bail-out cost the government in the order of \$1 billion (STUFF 2015).

Restrictions on insurance availability (or very high insurance costs) effectively limit house purchasing and stalls the house sales market. Insurers/reinsurers stopped providing new insurance for purchases several times during the aftershock sequence while they reassessed their risk (Interest, 2017). However, in general, if an undamaged insured house was sold, the insurance was able to be transferred from the vendor to the purchaser.

While insurance costs initially went up after the earthquakes (Listener, 2011), they since came down, and even unreinforced masonry buildings in NZs capitol Wellington (a high seismic zone) were insured cheaply (before the Kaikoura events) as a result of the lack of major insured natural disasters affecting the reinsurers for several years after the Canterbury earthquakes.

The following organisations/groups were created as a result of the earthquakes:

Canterbury Earthquake Recovery Authority (CERA) - <https://ceraarchive.dpmc.govt.nz/>

CERA was established in June 2011 to coordinate the rebuild of Christchurch and the surrounding areas following the 22 February 2011 earthquake. CERA was responsible directly to the government through the Ministers for the Earthquake Recovery (Brownlee and Wagner). CERA was provided with powers above many of the existing laws. It managed property demolition and clearances, voluntary residential acquisition. CERA was commended for the successful production of the Christchurch Central Recovery Plan (CERA, 2011). Key aspects included Anchor Projects (e.g. the convention centre, sports arena), and Precincts (Innovation, Sports, Retail, Health, Justice and Emergency, etc.). The government spent \$400m on land acquisition for the anchor projects (Stuff, 2015). CERA stated:

“The vision is for central Christchurch to become the thriving heart of an international city. It will draw on its rich natural and cultural heritage, and the skills and passion of its people, to embrace opportunities for innovation and growth” (CERA, 2011).

CERA was responsible for the cordon which restricted access to parts of the CBD for up to 2.5 years. Some stated that cordon management was over the top, causing a huge stress on owners, with people sneaking through at night. It led to some leaving the city. The cordons pushed companies to move to the suburbs, and people to work from home. It became relatively unattractive for people to return to the city after the cordon was removed to high rental rates (in new structures), few people there, and limited/expensive parking. It was anticipated, based on similar events around the world, about 100 people would die in the CBD after such a disaster. Fortunately, no-one died, possibly because of the cordon.

CERA was criticized for implementation of the Christchurch Central Recovery Plan and tensions with the CCC were blamed for some of this. CERA was wound up in April 2016 as planned.

Recover Canterbury - <http://www.recovercanterbury.co.nz/rebuilding-after-the-christchurch-earthquake/>

Formed by Canterbury Development Corporation (CDC) and the Canterbury Employers' Chamber of Commerce (CECC) Recover Canterbury was supported by several government agencies. Its mandate was to help small and medium businesses survive, revive and thrive following the earthquakes by identifying what emergency help businesses needed and ensure they received it. In the first month following the February 2011 quake, it assisted more than 3000 businesses in gaining access to their premises. It existed for 26 months CDC conservatively estimates it saved 617 jobs, and kept \$39 million in the economy. Almost 400 businesses received funding of \$6.1 million.

Stronger Christchurch Infrastructure Rebuild Team (SCIRT) – <https://scirtlearninglegacy.org.nz/>

SCIRT was created in 2011 to rebuild Christchurch's earthquake damaged horizontal infrastructure. SCIRT's \$2.2 billion five-and-a-half year programme was supported by the New Zealand Transport Agency, CERA and CCC. It involved more than 700 individual projects across the city repairing and rebuilding underground sewage, storm water and fresh water pipes, and rebuilding wastewater pump stations as well as roads, bridges and retaining walls. SCIRT was generally regarded as successful and employees were fans of the mode of operation which was described in the SCIRT Learning Legacy website. The approach involved Competitive Collaboration in which there were incentives for the 5 major contractors to work together. Furthermore, the work was all conducted considering the end user, using local people where possible, and communicating about what was done. Lessons from SCIRT were applied after the Kaikoura earthquake. SCIRT was wound up in 2016. SCIRT's activities were funded 60%-40% by the government and council. Initially, the work involved replacing the pipes and betterment of the infrastructure, but the betterment aspect was later stopped to limit costs (Stuff, 2015)

Canterbury Earthquake Royal Commission - <https://canterbury.royalcommission.govt.nz/About-the-Terms-of-Reference>

The Royal Commission was established to determine (i) what caused some buildings to fail severely; and cause extensive injury and death (ii) the adequacy of current requirements for the design, construction and maintenance of buildings in central business districts in New Zealand. The Commission did not investigate any questions of liability, the earthquake search and rescue effort, or rebuild options for Christchurch city central business district. Many parties were called to testify about their actions before and immediately after the major shaking. A number of recommendations were made. For structures, there were a number related to the behaviour of concrete (including hollowcore slabs and floor diaphragm design considering beam elongation), as well as more general issues including those related to inelastic torsion of buildings, ratcheting due to unequal lateral force resistances in opposite horizontal directions, and estimation of displacements between stories and between adjacent structures.

Ngai Tahu, <https://ngaitahu.iwi.nz/>

This is a Maori tribe/iwi whose jurisdiction covers most of the South Island of NZ. It is the most organised/financially and successful tribe in NZ, and has 62,000 members who can trace their ancestry back to Ngai Tahu. Of these, about 40% live in their tribal area. Ngai Tahu was a statutory partner and was part of governance teams where it was involved with recovery of the city at many levels. This was a world first for indigenous people. It promoted, and was involved in, meeting the needs in responsive and culturally responsible manner.

The participation of Ngai Tahu seems to have been regarded highly by everyone involved. They looked after all people, not only those of their tribe (iwi). Examples include, immediately after the earthquakes distribution coupons so that vulnerable people could get petrol and leave the city. They got alongside many people and counselled them individually.

The Churches <https://rubbletoresurrection.org.nz/>

While many church buildings suffered significant damage, the churches provided support for those who were suffering. This has been documented in “Rubble to Resurrection”. Furthermore, church facilities were used as distribution centres, and for

activities of other groups. For example, Avonhead Baptist Church was used to for University of Canterbury civil engineering teaching.

Residential Advisory Service (RAS) <https://advisory.org.nz/about>

RAS was established as an independent organization to provide free impartial advice for the repair or rebuild of home. It was established by CERA with support from Christchurch City Council and other groups. It was established because there was a perceived holdup in claim settlement rates in 2011-2012, residents struggling with adversarial aspects of their claims, uncertainty in the claims settlement environment characterised by a very low level of trust. In fact, it was regarded as sector failure and the method of operations was not working. In this culture of blame/mistrust RAS was developed to empower citizens. RAS provided independent advice using a collaborative law approach. There were 167,000 /185,880 dwellings that made claims. RAS received phone calls from 12,463 calls from homeowners.

Canterbury Communities Earthquake Recovery Network (CANCern) <http://www.rebuildchristchurch.co.nz/networks/cancern>

CANCern was developed after the events. It is a network of Resident's Association and Community Group representatives from earthquake affected neighbourhoods of Canterbury. It aimed for full community engagement in recovery processes and partnership with recovery agencies. It advocated for: strong strategic leadership; effective two way communication and information flow; healed and healthy communities; revitalised small and medium business; and a legacy to be proud of.

Project Lyttelton, <https://lyttelton.net.nz/about-project-lyttelton/earthquake>

Lyttelton is the port of Christchurch separated by some steep hills. Access to Christchurch is mostly via a tunnel. It was significantly damaged in the earthquakes, but already had a strong sense of connectedness. A time-banking system was developed in Lyttelton in 2005 and allowed the community to recover. It worked as "a Builder and Mobiliser of Resources during the Canterbury Earthquakes" (Ozanne and Ozanne, 2013, Cahn et al. 2015). A time bank is a bottom-up, grassroots exchange system in which members trade local services non-reciprocally. This exchange model assumes that everyone has tradable skills and all labour is equal in value. One hour of any labour earns a member one time-bank hour, which can be used to purchase another member's services. Internet was used to organize resources (e.g. food/water), accommodation, skilled work, and emotional support. It was considered that this approach was more effective and nuanced (acknowledging local strengths and weaknesses) than that provided by top-down bureaucratic processes that offer a one-size-fits-all approach.

Transitional City Programme – <http://volumeproject.org/the-transitional-city/>

This involved supporting over 100 low cost, high impact projects. The five key activities included (1) Funding grassroots movements (eg. Gap filler, Greening the rubble, Urban greenlab), (2) Reducing barriers to beneficial activities (e.g. rates incentives, life in vacant spaces initiatives), (3) Injecting vibrancy (with colour, sculptures, etc.), (4) Trialing and testing, and (5) Learning from what works and encouraging it more.

Canterbury Earthquake Digital Archive (CEISMIC) - <http://www.ceismic.org.nz/>

This provides narratives of individuals and groups regarding the earthquakes. It has been developed using to assist others. Already it contains 722 stories in 13 languages – 120 hours of video. CEISMIC is developed with the Linguistic department, NZ Institute of Language Brain and Behaviour.

Student Volunteer Army (SVA) - <https://sva.org.nz/>

The SVA was very active in the initial response, and activities continued also into the recovery.

Ministry of Business, Innovation and Employment (MBIE) - <https://www.mbie.govt.nz/>

According to Brunsdon and Stannard (CES, 2018), before the Canterbury earthquakes there was constrained engineering capacity. This followed from the 1980s-90s boom bust. There was developer driven commercial construction which included vulnerabilities, and a litigious environment following on from the leaky buildings (where a number of houses around NZ required significant repairs as a result of water ingress). There had been no precedent for repair/rebuild on liquefaction-prone land and the shaking was greater than anticipated. The 22 February 2011 event led to a public loss of confidence in building safety.

During the recovery, there was a need to balance speed against safety. There was also unprecedented scrutiny of the engineering profession with the Canterbury Earthquakes Royal Commission (189 recommendations), the Review of the Civil Defence response, the coroner's inquest into the deaths of foreign nationals in the CTV building, as well as constant media reports creating an highly-risk averse environment.

Furthermore, there was no legislative framework as the NZ Building Act does not address post-disaster aspects (including buildings with damage), and there was little technical leadership in central or local government.

An Engineering Advisory Group (EAG) was therefore established to

- (i) promote consistent approaches for assessing land and buildings, and for encouraging good engineering repair and reconstruction methods,
- (ii) ensure smooth communication and understandings were developed between engineers and Building Consent Authorities (councils), and to
- (iii) support of the Department of Building and Housing/ MBIE across a range of issues arising from the Canterbury earthquakes.

The EAG contained representatives from central and local government, some institutions and the sector. Guidance was then developed for residential structures (liquefaction/Slope stability, multi units), industrial structures (keeping businesses operating), foundations, and detailed damage evaluation (DDE). There was also a seismicity review (MBIE, 2018). Responses were made to the recommendations of the Canterbury Earthquakes Royal Commission (MBIE 2017). A number of opportunities to enhance future built environment recoveries were identified including:

- 1) enhancing the technical capability of key government institutions,
- 2) putting recovery technical leadership in place nationally and locally,
- 3) better sharing and coordinating of information,
- 4) reducing business as usual (BAU) constraints,
- 5) improving knowledge and its use. These systems should be established in peace time.

This latter point includes providing contracts setting examples, better application of current science (including the need to use latest knowledge including hazard models), greater investment in research to understand earthquake residual capacity, and preventing building on unsuitable land. It was also mentioned that placards should be *white*, orange and red, rather than *green*, orange and red, as this gives the wrong message. Furthermore, there is no distinction between “dangerous” and “earthquake prone” buildings. For example, over half of the people were killed by falling unreinforced masonry.

Mike Mendoza (Wellington City Council) indicated that the key things he wanted advice on from a council perspective as part of the recovery were on 1) low damage structures, 2) hollowcore floors, 3) valuing heritage vs safety, and 4) district plans based on soils.

THE POPULATION

Recovery is not only about infrastructure. It is also about people. The population of Christchurch dropped by about 3.5% as people moved away from Christchurch (Bellamy, 2014) over a period of about 2 years from near the beginning of the first (Darfield) earthquake. However, it started increasing as tradesmen came to the city. In 2019, for the first time since the earthquakes, Vice Chancellor Carr indicated that student numbers returned to normal.

Blundell (2018) indicated that one in five Christchurch primary school children born between 2007 and 2010 have symptoms of post-traumatic stress disorder. Demand for child and youth services has doubled since 2010; mental-health assessments undertaken at Christchurch Hospital’s Emergency Department have jumped 150%; the number of adults seeking community support has grown by a third. Symptoms include bed wetting, anger, and self-harm. The level of post-quake PTSD was similar to that of children in homes with domestic violence, or unexpected death of a parent (Checkpoint, 2017).

For adults, it was stated that 10% of the stress came from the earthquakes, and 90% from the insurance issues. Stuff (2018a,b).

WHAT COULD HAVE BEEN DONE BETTER?

Some opinions on the answer to this question are given by the following at the CES (2018).

Margaret Meade, indicated that she thought CERA should have been made a crown agency with a board. It should have been led by best people from around the world. CERA viewed expertise poorly and had a status quo thinking in management. There was also a consistent misunderstanding of its role with the public. She considered that permanent legislation, with appropriate tools, should be used for disasters, and that well-being rather than efficiency should be the measure of recovery successfulness.

Gerard Smyth, an independent filmmaker who made the movie: “when a city falls” (Smyth 2011) indicated that in his opinion, the recovery was limited by the lack of good media coverage. When the stories were provided they were about the people of Christchurch, rather than for them. This is a result of the lack of good journalists. He indicated that CERA’s aim was to stop publication of a number of issues. While the effect of Ngai Tahu helped with decisions, there was still a lack of diversity and vision. He stated that with people power we get better decisions, the process is the goal, and connection is more important. He acknowledged that The Press (newspaper) did an excellent job during the events.

Barnaby Bennett, a publisher and activist who have been involved in the transitional movement, where 170 temporary projects were developed in affected areas, said that there was not enough discourse in the city. He thought that the good things included

the Ngai Tahu involvement, the transitional movement (Transitional 2018), and the willingness of some funding agencies to be involved with a range of projects. However, he also considered that it was wrong

- (i) to demolish 80% of heritage structures,
- (ii) to have a group like CERA that 80% of people distrust,
- (iii) that poor/wasteful planning was involved with the stadium and convention centre (where cost estimates had escalated from \$280m building to \$480m building). There was no case for the centre discussed in the media. It was meant to be an early win, now 8 years later it still has not been started.
- (iv) there was failure to sort out public transport, and
- (v) a failure to fund mental health.

Also, he considered that we would have been better with a minister with a collegial leadership style and that things were too politically focused with control of the message rather than public discussion. He also considered that there was too much focus on efficiency. It is better to focus on the process. He considered that some other public service people were the wrong ones, and that there was consistent placement of authority going to people with no knowledge or experience. The “share and idea campaign” (which had attracted 10,000 ideas seemed to have got lost with no-one to care for it in the future. For Cathedral Square, there is no funding. Also, since the story of the recovery is about competing narratives, the disappearance of the media is of concern. Democracy is messy, and we need to celebrate inefficiency.

Others wondered why Christchurch still has a broken Cathedral in its centre even 8 years after the main events, while in China after the 2008 earthquake, the rebuild was completed in approximately a year with a top-down approach (Huang et al. 2011)

SOME THOUGHTS ABOUT RECOVERY...

A number of the thoughts below came from people involved in CES (2018). However, as one person indicated, these really come from the department of the bleeding obvious (for those familiar with Monty Python, 2012)). Nevertheless, a number of these are stated below:

- 1) Recovery is complex, non-linear, has multiple aspects, and occurs within a dynamic environment. It is an opportunity to:
 - put things right in ways we never considered possible.
 - join in and work together,
 - restore and co-create.There is a new world of possibility that allows us better to consider what may and prepare ourselves for the future.
- 2) Resilience begins and ends with connected communities
- 3) The wisdom of the community, when combined with the knowledge of the experts always exceeds what one can offer without the other.
- 4) Resilience does not mean strong. Instead it means community flexibility resilience creativity adaption diversity and many other things.
- 5) From the office of the Auditor General (<https://www.oag.govt.nz/>):
 - The rebuild cost \$40b, of which about 50% came from the government
 - People must be at the centre of the recovery
 - Good systems and controls are important
 - Frivolous and fraudulent activity destroys trust
 - People are building the plane while flying it.
 - CERA was too slow – risk systems not put in place
 - Governance arrangements need to be reviewed regularly
 - Clarity, coordination, and cooperation are essential
 - We don't know the cost of complexity and uncertainty
- 6) Organizational Leadership and Governance (from John Vargo of Resilient Organisations - <https://www.resorgs.org.nz/>)

Lessons of organizations that survive/thrive. They have: 1. Operational preparedness (cash flow planning, focus on staff wellbeing), 2. Relational resilience – effective leadership (leaders: wise, just, listening to others), 3. A collaborative ecosystem (building trust, schools sharing space, Recover Canterbury – local and central government working together, support subsidy), 4. An adaptive culture (embracing emergent leaders in a caring and trusting approach), 5. Awareness of insurance paradox (where with the 80% insurance cover, compared with much lower values over much of the rest of the world, the great rebuild funding was available, but recovery was slowed 2-4 years with processes, and buildings were pulled down that would not if

insurance were not available, and there will be long term energy efficient buildings from which benefits will be reaped for the next 100 years. 6. The attitude to choose to bounce forward. 7. Putting people and customers first and look at the horizon some of the time. 8. Understanding that there is no such thing as too much communication. (“The Single Biggest Problem in Communication is the Illusion that it has Taken Place - George Bernard Shaw). 9. The need to innovate.

The economic development agency (EDA), Chamber, and Christchurch City Council had worked well before earthquakes and had built trust in peace time. This is very important for companies staying in Christchurch.

7) A disaster is the beginning of a very long process....

8) From Sutton (former CERA CEO)

We will have a fantastic new town, but there has been a cost to this.

Slowing down to deliberate can result in increased speed later.

9) Recovery is a marathon – not a sprint

10) The rebuild is still on-going, but we already have a fantastic new city

11) While some people have left, we now have a better city.

12) Maori saying “He aha te mea nui o te ao. He tāngata, he tāngata, he tāngata”. “What is the most important thing in the world? It is people, it is people, it is people”.

CONCLUSIONS

This paper describes the response to the Canterbury earthquakes over a period of several years. It describes how organisations/institutions/groups contributed to the response. It was shown that:

- 1) A number of different organizations were instrumental in the recovery. Some of these existed before the earthquake sequence, and others were created in response to it. The role of the organization, as well as the characteristics or the personnel involved, affected their contribution to the recovery.
- 2) As well as infrastructure, people suffered. Others benefitted from the opportunities resulting from the disaster. The recovery is about people.
- 3) There was concerns about the recovery about some of the decisions made, and that it was too slow, or too fast. Such frank dialogue is useful in considering what could be done better in future events.
- 4) A number of quotations/thoughts about recovery from a disaster were listed. They indicate that it is a long drawn and messy process. However, as a result of undergoing such a process, Christchurch is a more pleasant city and the central city is coming back to life.

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