

Shaken but not Stirred

A University's Resilience in the Face of Adversity — The 4th September 2010 Earthquake

UC Re-start website

UC is undergoing a phased re-opening
after the Christchurch Earthquake:

Staff returned on Monday 13 September
Students returned on Wednesday 15 September
Teaching will resume on Monday 20 September



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Contents

Forward	3
1 Introduction	4
2 The September 4th Earthquake	4
3 The University Context	7
3.1 About the University of Canterbury	7
3.2 Prior Understanding of the Earthquake Risk	7
3.3 The University’s Emergency Preparedness and Resilience	8
3.4 Timing of the Earthquake	10
4 The Initial Response	11
4.1 Availability of Key People.....	11
4.2 Having a Safe Place to Work	13
4.3 Initial Reconnaissance	15
4.4 Running the EOC.....	18
4.5 Having the right resources	22
4.6 Communicating with the Campus Community.....	24
5 Getting back to Business	27
5.1 The Decision to Close the University	28
5.2 Control of Access onto the Campus.....	29
5.3 Mucking In	32
5.4 Delaying the Start of Teaching for a Second Week	33
5.5 Appointing a Claims Preparer for Insurance.....	35
5.6 Repairs and Restoration	37
5.7 Researching the Earthquake.....	40
5.8 Managing Ongoing Risks and Seeking the Silver Lining	41
6 Final Thoughts	45
7 Postscript: The 22nd February 2011 Earthquake	46
8 Summary of Lessons Learnt	48
9 Contacting Us	51
10 Acknowledgements	51
11 References	51

Forward

Planning for an emergency might seem like make-believe. Many of us are not enthusiastic at “role playing” exercises. At times they might even seem childish. There are always competing claims on the time of senior management teams and carving out time to prepare for a low-probability event we would all hope never happens can be hard. The story of the University of Canterbury and the September 4th Earthquake stand as testimony to the real benefits even modest engagement by the senior team can have. It signals to those more directly responsible the priority and commitment by the organisation.

We did get lucky, however, and had a glimpse of what it might have been like if an earthquake as severe or more severe had struck while classes were in progress. I would encourage you to read this report and reflect on it. No two incidents will ever be the same, but how we plan and how we respond are inextricably linked. We are making the University of Canterbury better than ever, with strengthened shelving, safety glass and ceiling reinforcement for example. But in addition, from our experience we will build a better organisation, with better response systems that will help us when faced with other types of incidents.

I want to acknowledge and thank the many hundreds of people who directly and indirectly supported the University in its preparations and response. It was reassuring to note that there was no statistically significant difference between the grade point average of students in the second semester of 2009 and the second semester of 2010 which included the earthquake. Our staff and students responded calmly and professionally and got on with the job of research, teaching and learning in a way we can all be proud to say we were a part of – a world-class response. Well done.

Postscript: At 12.51pm on Tuesday 22 February 2011 luck ran out for the city of Christchurch when an earthquake measuring 6.3 caused significant damage to the Central Business District and Eastern suburbs of Christchurch. With the confirmed death toll standing at 181 and an estimate that over a quarter of all CBD buildings and thousands of homes have been destroyed, we are left with the question – was it just luck that there were no deaths or serious injuries on the University’s campus even although the quake struck in the middle of the day when full classes mustering over 4,000 students were in session? Within three weeks the university was open and classes were running, timetables reconstructed and courses redesigned, but it will take years to remediate buildings. Two months after the February quake, just under 95% of students enrolled at the University of Canterbury on 22 February are still enrolled today. Our priority was to ensure the safety of our students and staff, communicate with and support our staff and students, and maintain the student body. This report focuses on the September earthquake and no doubt a sequel will fully describe the subsequent event.



Rod Carr
University of Canterbury Vice-Chancellor

1 Introduction

On 4 September 2010, people in Canterbury were shaken from their beds by a major earthquake.

This report tells the story of the University of Canterbury (UC), its staff and its students, as they rose to the many challenges presented by the earthquake. This report however, is intended to do more than just acknowledge their hard work and determination; it also critically reflects on the things that worked well and the aspects of the response that, in hindsight, could have been done better.

Luckily major events such as this earthquake do not happen every day. UC has benefited from the many universities around the world that have shared their experiences of previous disasters. We hope that this report serves to pass forward the favour and enables others to benefit from the lessons that we have learnt from this event.

2 The September 4th Earthquake

At 4:35am on a Saturday morning in early spring, the Canterbury region of New Zealand was struck by a major earthquake measuring 7.1 on the Richter scale. The epicentre of the initial event was located approximately 37km west of the city of Christchurch and at a depth of only 11km (Quigley et al, 2010).

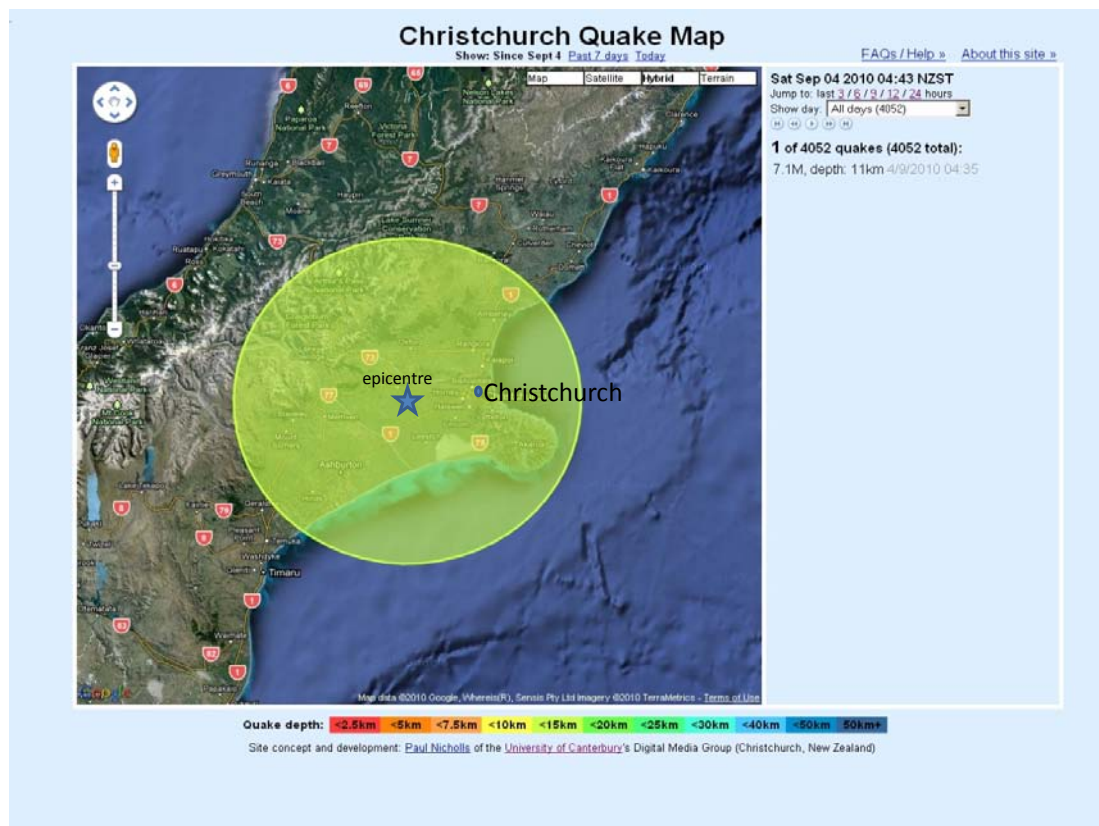


Figure 1: Map showing the location of the 7.1 magnitude earthquake in relation to Christchurch. The size of the circle represents the magnitude of the earthquake. (Adapted from Nicholls, 2010)

Remarkably, and largely due to the time and day the earthquake occurred, there were no deaths and only two serious injuries in the region (Gledhill, 2010), but these statistics mask the fact that there would have almost certainly been a substantial death toll had the earthquake occurred during the daytime and on a week day.

The earthquake caused significant structural damage to buildings and other infrastructure across a wide area, both in and surrounding the city. It restricted access to parts of the city and interrupted critical lifeline services. There was no electricity for the first day to many parts of the city; water and wastewater systems suffered severe damage, with some parts of the city still without these services three months after the earthquake.

Much of the serious damage to housing in Canterbury was caused by liquefaction and the formation of large cracks. Liquefaction is a localised phenomenon where underground water pressures are such that large quantities of silt and sand rise up through the ground surface.



Figure 2: Examples of lateral spreading causing large cracks (left) and liquefaction (right)

Hundreds of masonry chimneys collapsed due to shaking throughout the affected region. In total there were more than 157,000 insurance claims lodged for residential properties and contents damaged in the earthquake (EQC, 2010). Much of the repair and rebuilding work required is yet to commence, five months after the earthquake.

The central part of Christchurch city was also badly affected, particularly by older style unreinforced masonry buildings in central Christchurch collapsing or showing signs of cracking. In addition to the structural damage from the quake, many businesses were temporarily closed while non-structural damage was cleaned up and undamaged businesses were impacted by cordoned off areas while buildings at risk of collapse were assessed or demolished.

In addition to the damage to buildings, many organisations throughout Canterbury suffered business disruption because of non-structural damage; fallen equipment, broken glass, tipped shelving/storage units, etc (Dhakal, 2010). The University was no exception to this, with the vast majority of the damage found throughout campus buildings being non-structural in nature (Deam et al, 2010).



Figure 3: The Repertory Theatre - an example of damage to historic buildings in Central Christchurch (photo source: www.stuff.co.nz).

The shaking was felt throughout the South Island, causing four metres of lateral offset in some places, and was the most damaging earthquake in New Zealand since the 1931 Hawke’s Bay earthquake (GNS 2010a).

The effect on the region was compounded by the fact that following the initial 7.1 magnitude event, aftershocks occurred in rapid succession. Ninety eight events were recorded up until midnight on the first day alone, five of these being in excess of magnitude 5. Over the subsequent weeks

aftershocks became the “situation normal” for the people of Canterbury.

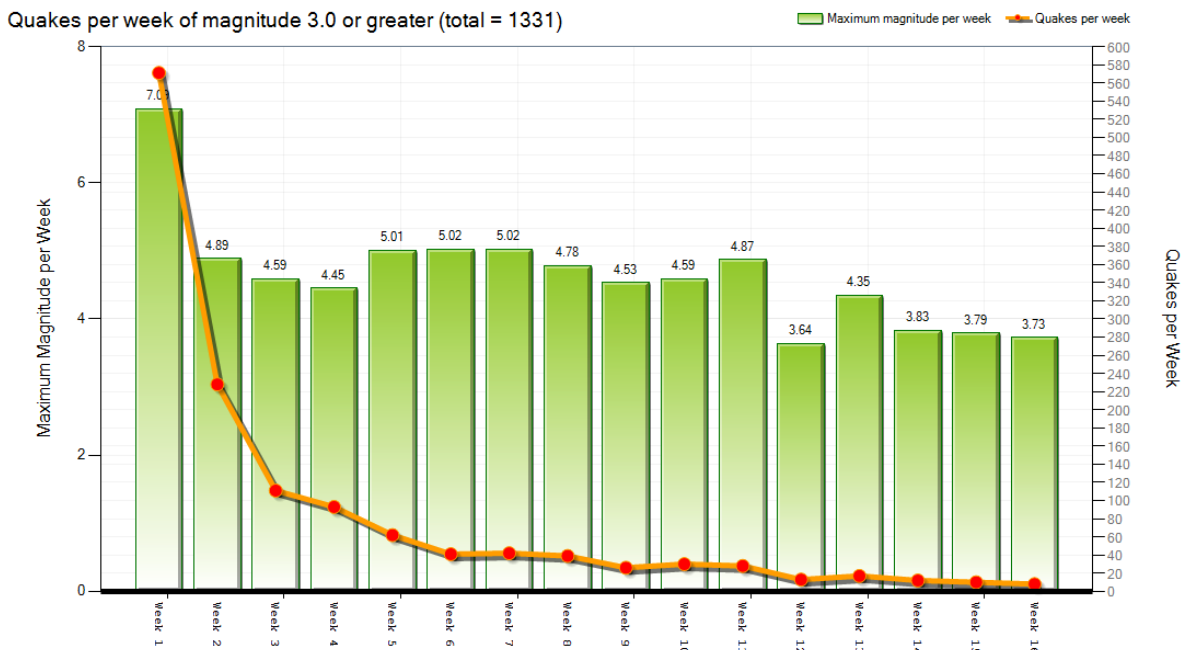


Figure 4: Number and magnitude of aftershocks in the weeks since the main shock (Crowe 2010).

At the time of writing this paper (three months after the earthquake) there have been in excess of 4000 aftershocks (Nicholls, 2010). From past research, the team at UC had learnt from California State University Northridge’s experience (Design Media Inc, 1995) that it is not just the main shake that is the problem. Ongoing aftershocks not only create further damage, they also scare an already unnerved population and keep setting recovery plans back to square one. This was certainly our

experience too as major aftershocks required all buildings and lifts etc to reassessed and many early repairs such as plastering were further damaged by subsequent shakes.

Lesson 1: An Earthquake is not a “one-hit” event. The number and severity of aftershocks, which continue for several months, are both surprising and demoralising. It is important to factor the ongoing reality of major aftershocks into your planning both for physical repairs and for the psychological effect on the community.

3 The University Context

3.1 About the University of Canterbury

The University of Canterbury (UC) was first established in 1873 as Canterbury College and located close to the centre of Christchurch city. During the late 1960s UC began moving to a suburban location in the west of the city and by 1975 it had completed its move to the purpose-built 76-hectare site. In January 2007 UC merged with the Christchurch College of Education and the land area of the University increased to 89ha. UC comprises 80 major buildings, with 249,000m² of built space. This includes six halls of residence, with space for 1937 students to be housed on campus.

UC offers undergraduate and postgraduate courses in approximately 50 disciplines and supports a number of research centres and external field stations. The campus community numbers approximately 22,000 students in 2010 and 3000 staff.

3.2 Prior Understanding of the Earthquake Risk

Prior to 4 September, the Canterbury region had a well understood and documented risk from earthquakes; though it would be fair to say that many members of the public did not appreciate that this was the case.

The greatest seismic risk to the Canterbury region is considered to be the “Alpine Fault” which runs along the Southern Alps of New Zealand. This fault has the potential to generate very large earthquakes in excess of magnitude 8. An Alpine Fault earthquake would not only shake the Canterbury region, but would also cause major damage to the West Coast of New Zealand and have an impact throughout the South Island. The potential for an Alpine Fault earthquake had captured the imagination of many because it was considered “overdue” (though that term is a misnomer when talking about earthquake risk) and estimated to have about a 2 per cent chance of occurring in any given year (Yetton, 2000).

“We had been preparing to run an earthquake exercise for the University on September 17th (two weeks after the earthquake) and kept receiving meeting reminder alerts for earthquake planning meetings throughout the response! “

In contrast, the Greendale Fault which ruptured on 4 September was a previously “unknown” fault as it was overlain with alluvial gravels. There were no surface geographic features to indicate that the fault lay underneath. Much was made in the first weeks after the earthquake that this fault was unknown, but in fact such faults under the alluvial gravels of the Canterbury Plains were anticipated (Pettinga et al, 1998) and had been factored into the regional seismic models (Stirling et al 2008).

In 1997 a landmark report was published by the Centre for Advanced Engineering called “Risks and Realities” (CAE, 1997). This report outlined the nature and scale of Christchurch’s vulnerabilities to a range of hazard events, specifically focusing on the resilience of its critical infrastructure. That report clearly set out the liquefaction hazard for many parts of Christchurch as well as identifying critical vulnerabilities in the city’s infrastructure to major earthquake. Much work had been undertaken as a result of this work to address these vulnerabilities across the city; investments that paid dividends on the morning of 4 September 2010.

The timing of the UC campus move to the current Ilam site is significant from an earthquake vulnerability perspective, as many buildings were built in the late 1960s. On campus, as was the case with many older buildings around the city, structural reviews had identified some buildings as being vulnerable to damage during a major earthquake. Retrofit work had been done to seismically strengthen some of these buildings, but on the morning of 4 September there were some nervous people, just not sure what they might find when arriving on campus. As it turned out UC buildings performed well during this earthquake. This was thanks to a combination of factors including the initial construction codes, seismic strengthening work which had been carried out following a 1997 structural review, and because of the geology in the area of the campus which appeared to insulate some parts of the campus and not others.

3.3 The University’s Emergency Preparedness and Resilience

Prior to 2006 it would be fair to say that the preparedness of UC to deal with a major incident on campus was limited. However, in the past four years UC had embarked on a major initiative to develop its emergency response capabilities. To illustrate the extent and nature of this effort, it included:

- Development of a full Emergency Response Plan.
- A broad programme of exercises to practice and test response plans. These exercises included monthly tabletop discussion sessions, quarterly sessions with the Executive Team to explore strategic issues likely to emerge during emergency response, and an annual full-day exercise, including joint exercises with external agencies.
- Significant outreach and engagement with external agencies likely to have a role in managing an incident on campus, including the organisation of a joint emergency exercise with the NZ Police Armed Offenders Squad to practice response to an armed

The Senior Management Team had taken part in “Exercise Snow-Shoes” just a week before the earthquake, and had specifically debated the challenges, fish-hooks and options involved in closing a campus with “no gates”.

offender on campus and regular engagement with local Civil Defence agencies.

- A proactive approach taken to learning from others as well as sharing their own experiences with others. Examples include:
 - a three-week visit to US universities, including California State University Northridge, Louisiana State University and Virginia Tech by a member of the Incident Management Team to learn from their experiences;
 - taking a leadership role with other New Zealand universities to encourage a collaborative planning approach; and
 - hosting of the TEFMA/AURIMS conference and workshop, “Surviving the Impact” to showcase the UC emergency management programme and encourage other institutions to follow suit.
- Distribution of an “at-work personal emergency kit” to all staff and postgraduate students. These kits included a small backpack filled with a water bottle, information on what to do if there is an emergency on campus, plus instructions on additional preparations people should make (such as adding medications, comfortable shoes and other essentials in the backpack and having a family plan for dealing with emergencies).
- UC is also home to a number of active research programmes focusing on the risk from natural hazards and community resilience in the face of these hazards. Some examples that helped to shape the University’s preparedness prior to this event include:
 - The Resilient Organisations Research Programme which involves researchers from around New Zealand focusing on building the resilience of organisations to major crises. As host organisation, UC has taken the opportunity to be involved as a case study in several research initiatives undertaken by this programme and had actively engaged with researchers to assist in the development of the University’s own resilience and business continuity planning.
 - The University’s long history as an international leader in earthquake engineering research.
 - The multidisciplinary Natural Hazards Research Centre which brings together researchers from across the campus interested in natural hazards and their potential impacts on our communities.

In 2009, UC was awarded the Emergency Management Academy of New Zealand Organisation of the Year, which acknowledged the effectiveness of the work undertaken up to that time.

When the earthquake struck, the past planning and preparedness had a profound impact on the University’s ability to deal with the aftermath of the earthquake. We highlight this, not because we believe UC was the best prepared university, but to illustrate the extent to which preparedness can be improved over a short space of time. A major factor in UC’s success in driving this initiative forward was a few key champions from across the University, each able to pull different levers to make things happen.

Lesson 2: A bit of planning goes a long way. Even if your organisation is starting from a very low level, a lot can be achieved in just a few years to build capability for dealing with crisis events; but it does require the hard work and collaboration of a team of champions who believe in the cause, and who have the support from senior managers.

3.4 Timing of the Earthquake

The academic year is highly structured and the timing of an event has a significant influence on the impact it has on university life. The main university year in New Zealand is divided into two semesters; with each semester having two terms. In addition, UC runs a significant number of summer programmes, as well as ongoing year-round research.

“If you knew you were going to have an earthquake and were able to pick the time, 4:35am on a Saturday morning out of term-time would be pretty high on your list.”

Four thirty five a.m. on 4 September 2010 was a Saturday morning, with very few people on campus at the time. That Saturday was the final weekend of a mid-Semester break. Of the student population, 75 per cent of the student body were at a private flat or house in Christchurch at the time of the earthquake (Beaven et al, 2010). While the campus halls of residence still had students in them, they were relatively empty, with an influx of nearly 1600 additional students expected to arrive back at UC over that weekend.

The timing of the earthquake carries significant parallels with California State University Northridge (CSUN) which also suffered a major earthquake in 1994 during term break. Throughout the response, the team regularly referred to lessons shared by CSUN through its “Academic Aftershocks” video (Design Media Inc, 1995), and visits from UC staff. For example, during the first few days we were readying ourselves for the psychological impact of continual aftershocks and the impact on staff and students of not being allowed access onto campus.

Another point of context to UC life at the time of the earthquake is that it was already undergoing a period of significant change. The organisation was part-way through a major restructure of its non-academic departments, under the banner of Project STAR (Supporting Teaching And Research). Project STAR had been running for more than a year at the time of the earthquake. Being in the midst of such significant restructuring had the potential to create some difficulties. However, in almost all instances, staff responded with a high degree of goodwill and professionalism and our staff came through when they were most needed.

“The same things that make a University environment resistant to change also make it resilient in crisis. University staff have a strong sense of purpose and determination to keep doing the things that they are doing.”

4 The Initial Response

4.1 Availability of Key People

The timing of the earthquake had a significant influence on people's initial reactions. Few people were around; there were only three security staff on campus and, as far as we know, eight students studying in two different locations. Immediately after the earthquake several key staff "self activated" to the University, while others arrived as they were able to, later in the morning.

With the city in darkness due to electrical failures and several hours yet till daylight, people's perceptions of how bad the earthquake was, were highly dependent on what it felt like at their house and the effect on their surrounding neighbourhood. As damage was patchy across the region, for some people it was "just a bit of a shake", while for others they had just experienced a major disaster. It was only later in the day, as electricity was restored and people were able to see for themselves the television coverage that many people reported a growing sense of awareness of the magnitude of the event they had just experienced.

For a typical earthquake scenario we are trained to expect problems with communications systems. In this earthquake however, normal means of communications held up remarkably well. Landline telephones were mainly unaffected (though many people were caught out by having only telephones that required electricity to operate). Cellphones on the whole were working, but there were some dropped calls due to overloading and some parts of the city where coverage failed. At about 9am in the morning, warnings were released on the radio that the cellphone network may begin to fail as batteries on cell towers ran low, but major failures did not eventuate. Many people attempted to keep phone calls to a minimum to avoid overloading the network, as well as to conserve cellphone batteries.

Vice-Chancellor Rod Carr was at home at the time of the earthquake, only two blocks away from the University's Emergency Operations Centre (EOC) and was a visible presence for the response effort from the first few hours. Similarly, Chris Hawker, the UC's primary Incident Controller was also one of the first to arrive at the EOC. The availability of these two key people right from the very beginning meant that there was never any doubt about who was leading the UC response effort.

Chris Hawker, the University's Incident Controller, knew as soon as the earthquake started that this was a big one. After finding out that all of his family were safe and that his house had not been badly damaged, his mind immediately turned to what might have happened at the University. Within about 10 minutes of the shaking stopping, Chris was in his car and on his way to campus. Chris describes being so focused on thinking about the situation he might find at University that he wasn't thinking about hazards along the way. He hit his first "wake-up call" at speed and had luckily slowed down by the time he came across the major slumping in the road. He describes how he and other vehicles were inching their way towards the road bridge over the Waimakariri River in the dark, everyone determinedly heading into the city, even though they were unsure whether the bridge would be safe to cross.

Jacqui Lyttle, the University's Senior Policy and Risk Advisor was also thinking about the University and what might have happened there soon after the earthquake, but she also had other issues to contend with. Jacqui had played a key role in developing the University's emergency response capability and knew she would be needed to help in the EOC. She found herself however home alone with her five-year-old daughter (her husband was away for the weekend) and a badly damaged house in a very badly damaged suburb. Jacqui's daughter was so terrified that she was vomiting as the pair tried to find their way downstairs from their two-storey house in the dark. Remarkably, Jacqui made it into the University EOC by 10:30am. She managed to leave her daughter in the care of her parents until her husband returned later in the day — enabling her to get key elements of the University response under way.

Lesson 3: If a university wants its staff to be there for it in times of crisis, it also needs to be there supporting staff when they are in crisis. We found staff went to great lengths to support the University in its time of need. Some staff had very significant issues at home that they were dealing with, making their commitment to the University response quite remarkable.

As was mentioned earlier, many key staff self-activated to the EOC throughout the course of the first day following the earthquake. It is worth explaining a little more about the background to this, as although the process worked well, there are some lessons for the future. Over the past year, UC has been grappling with two major challenges on a distributed campus with more than 80 buildings:

- how to quickly notify key people and activate a full emergency response, and
- how to alert the campus community to an emerging situation on campus and to advise them of what actions they should take?

UC had been working to implement the use of mass communications technology for sending text and voicemail message alerts to student and staff cellphone numbers. This technology was trialled during the Active Shooter exercise (2008) and, though effective, some issues were identified with its use. These included:

- Treading the fine line between keeping people informed and having confidence that they would have definitely got the message (by providing repeated messages in multiple formats) and message fatigue from providing them with the same information repeatedly using different media/platforms
- Overloading of the cellphone network leading to “delays” in the delivery of text messages (up to several hours after they were first sent)
- For the specific case of an active shooter incident – the regular “beeping” or vibrating of phones potentially alerting an offender to someone’s hiding location
- Getting staff and students to regularly update their emergency contact details with the University.

None of these challenges were seen as insurmountable and the Emergency Management Team were working to develop the systems and protocols around the use of its new system, “Whispir”, at the time of the earthquake. In the minds of the Incident Management Team though, Whispir was not yet fully configured and ready for use (even though, in hindsight, the system could have been used in a limited capacity to activate the emergency response teams).

The team also fell into the trap of taking false comfort that key people were self-activating and using that as an indication that everyone would self-activate as and when they were able. A number of key staff were in direct contact with the Incident Controller immediately following the earthquake and in the subsequent hours, but in the heat of the moment, what the team failed to recognise was that some staff members were out of town (and in some cases were out of the country) at the time of the earthquake and so hadn’t been shaken out of their beds by the earthquake! This is an important lesson to learn for any event on campus and in future the EOC will have an activation checklist on the wall so that important steps such as formally activating the response team are not missed.

Lesson 4: Even though it may be hard to miss that an emergency is unfolding from where you are, never assume that everyone is aware of the incident. Have an activation checklist in the EOC so that little “thinking” is required for those first few steps in the response process.

Another aspect often discussed during planning is whether key people will be available at the time a disaster strikes. This event was characterised by a university crisis coupled with a community crisis. As expected there were some people who coped better than others. On the whole, there was a strong sense of people pulling together to deal with the event and gaining strength from being part of the response (more will be discussed later about the importance of the team). There were several examples of people who worked tirelessly throughout the whole of the first week, even though their homes were badly damaged. Several people commented that they were able to cope with the event better by coming into work and keeping busy. Often their partners who were at home looking after children during all of the aftershocks didn't cope as well and some people's partners ended up coming into the EOC and joining the response effort.

An interesting dimension that did come to the fore for many staff was the regionally declared closure of all schools and day-care centres for the whole of the first week following the earthquake. These blanket closures were announced due to concerns around getting school and day-care centre buildings structurally assessed and the availability of drinking water and sewage systems. The closures meant that some staff were unable to come to work as the campus had been declared off-limits to any children for the initial clean-up stages for safety reasons. Some children were also unsettled by the earthquake experience and wanted a parent nearby for comfort – an extra tug on the heartstrings of parents working long and stressful hours.

4.2 Having a Safe Place to Work

A major coup for the Emergency Management Team at UC had been in securing a dedicated building for the Emergency Operations Centre (EOC). This was no mean feat. During the planning for the new EOC, it was acknowledged that although the centre's primary use would be to serve during an incident on campus, developing additional “compatible” uses for the centre helped to ensure cross-departmental support for the facility. The business case for the centre was championed by the two staff tasked with emergency preparedness responsibilities on campus and was strongly supported from within the Facilities Management (FM) department. This was critical for identifying suitable spaces and getting the EOC resourced on the back of other initiatives going on around the University. However, if it had been an “FM project” only, it may not have achieved the buy-in and profile needed from other parts of the University. One of the key additional uses for the facility is linking the operational functionality of the EOC with its use as a resource for a teaching and research. The following photograph shows the EOC being used by Hazard and Disaster Management students to explore response options to a volcanic eruption.



Figure 5: Hazard and Disaster Management Masters students taking part in a volcanic eruption emergency simulation run in the EOC.

Significant planning had been put into ensuring that the EOC was as robust and functional in an emergency as it could be. For example, key features that were specifically thought about during the selection and kit-out phase for the EOC included:

- selection of a single storey timber-frame building (likely to perform well in an earthquake)
- removal of existing brick chimneys (likely to perform badly in an earthquake)
- A dedicated backup generator
- Strengthening the IT network and installing multiple phone network links
- Break-out meeting space
- Lining the walls with campus maps and large whiteboards
- Satellite TV and radio
- Basic catering supplies
- Location (a low-profile location to reduce the likelihood of large numbers of people and media converging on the EOC; just on the edge of campus so likely to be outside of any campus cordons, but with direct access to both the campus and the street).

Lesson 5: Careful consideration around Emergency Operations Centre (EOC) location, design and resources pays dividends. Use the EOC regularly for training and meetings so that you know in advance how the space works and people become familiar with the environment.

Most importantly though, the team used the EOC for emergency response planning meetings and training – meaning that the people who needed to be were familiar with the site and knew where to go in the event of an emergency. On the morning of the earthquake, although there was no formal activation of the UC response, key staff were familiar enough to self-report to the University

Dave Lang, the University's Group Manager – Capital Projects was one of the first people to arrive at the campus after the earthquake. Dave lives at South Brighton, a beachside community that is highly vulnerable to tsunamis. Almost immediately after the earthquake the community started self-evacuating along damaged roads, straight into traffic jams. Dave describes how the sense of pandemonium and breakdown of social norms as people tried to leave the area was scarier than the earthquake itself. Being a Facilities Management (FM) staff member, Dave knew there might be a bit of damage at the University so that is where he and his wife went to.

Arriving to the campus, the whole place was dark and devoid of people except the security team. Together with security they started doing an initial reconnaissance of key buildings.

"I used to get frustrated sitting through Emergency Response training and think 'we are never going to use this and I could be doing some "real" work'; now I think I'll pay more attention!"

Dave recalls walking into the Rutherford Building (Physics and Chemistry) and being greeted by a waterfall of water pouring down the lift shafts and stairs (the sprinkler system had tripped and water tanks on the roof had broken). That was when he realised that this event was really big. He describes going down into the basement of that building with the plumbers, not knowing what dangers were down there to turn off the services to the building to make it safe.

When asked why he did something so scary and dangerous, he reflected that someone had to do it to reduce the hazard for others and protect the buildings from further damage. We made it as safe as possible, ensuring we had a buddy at all times, but ultimately the FM team were the most familiar with the building and therefore the most capable to do the job.

The University has a fully trained rescue team, but as Dave points out, the FM tradesmen are the only ones able to locate and isolate building services.

Lesson 8: Often Facilities Management staff are likely to be first responders to many events such as this, and so some basic rescue training should be provided for these staff.

Emergency Operations Centre. Their previous training and experience during exercises meant that they knew they needed to respond.

Lesson 6: Having a pre-identified Emergency Operations Centre (EOC) as a known gathering point meant there was no confusion for key people over where to go to join the response effort.

4.3 Initial Reconnaissance

As mentioned previously, at the time of the earthquake there were few people on campus and only three security staff on duty. The University has a large campus with 89ha and more than 80 buildings.

The challenge on an "open" campus (with no fences or gates) is how to confirm who is/is not on campus at any time, and how to "close" the campus and keep people out. Within the first hour, additional security staff were called in to help, and by 9am there were 15 security staff active in the response effort. Cleaning staff were also used extensively; they knew their way around the buildings and had their own sets of keys and radios.

By 6am (just 1½ hours after the earthquake) the Security Team were able to report with a reasonable level of confidence that there were no people injured or trapped on campus. A key point for reflection however is how much more difficult a task it would be to confirm that everyone was accounted for if the earthquake had occurred when the campus was busy with staff and students. A lesson for the future: with 80 buildings on campus we really need to develop a risk-based priority for the initial reconnaissance. In essence, this was done on the Saturday, but a fully populated campus would be a much more complex operation, and a well thought-out approach that has been practised many times is needed.

Lesson 7: On a large campus it is always going to take a long time to check each and every building. Develop a risk-based priority order (or several alternate priorities for particular times of day or types of event) that can be used to direct and co-ordinate initial reconnaissance efforts.

All buildings on campus have electronic card access, and although this provides some information about who is where, it is not a complete picture. People entering buildings together will often enter using just one person's card and many buildings do not record when people leave a building. Essentially, what the security staff had to do first was a visual check that each building was safe to enter. In pairs, they then went through every floor of the building to check it was cleared. They then physically locked the doors to the building once it was confirmed as empty. Doing this for 80 large buildings took a long time. Michael Oliver, UC's Security Services Team Leader, knew that although he had the hard lock down well under way early on that first morning, there were still some members of the campus community wandering through potentially hazardous areas. It was 5pm before Security could report that the campus was fully locked down.

What do we wish we had planned for? The swipe card system requires electricity, and when power fails the system remains active on battery backup but remains locked into the last instructed state it had been set to. With network connectivity lost, this meant that no new instructions could be issued. Once the batteries ran flat, the doors "failed safe", to an open status. With electricity out to much of the campus for several days, this meant that that physically locking doors was required. Some tips for others:

- 80 buildings does not mean 80 doors! There were many hundreds of doors that had to be physically locked across campus.
- Physically locking doors places a much greater requirement on confirming the building is fully evacuated (so that people are not locked inside).
- Once the buildings are locked down, you need multiple sets of master keys and a team of people assigned to providing assessment and cleanup teams with access to each building.
- Locks that haven't been used in several years have a tendency to jam locked, creating another whole issue!

Lesson 9: A large campus with more than 80 buildings and no electricity is challenging to physically "lock down". Pre-planning should include assumptions that access card systems are not working and the need to revert back to physical locks and keys (many of which may not have been used for some time). A regular scheduled check of all physical locks is necessary to ensure they are available when required.

Throughout the first day there were a number of people arriving on the campus. These included academic staff members and research students, many international students who used the University car parks as a safe meeting point, as well as several students who were too scared to remain at home. In all instances, when unauthorised people were found on campus they were instructed to leave immediately. However, requiring scared people to leave campus is not straight forward. In some cases, students were permitted to remain in their cars in safe areas of a car park until they were confident to leave. At about midday a decision was made to have a Human Resources (HR) person posted at the security front desk to support security staff dealing with people who arrived at the security office. With hindsight this was a really good decision and one we would implement immediately for any future event. Not only did the HR staff have the communication skills required for dealing with distressed people, they also assisted the security staff members, who

in some instances came under undue pressure from staff and students determined to access their buildings. To reinforce the need for compliance, the HR staff were given authority to threaten disciplinary action if necessary.

Lesson 10: Have an HR person posted at the security front desk – they have the communication skills required for dealing with distressed people, and also support the security staff who come under pressure from staff and students.

The preliminary damage assessment for buildings was done at the same time as the initial search of buildings for people, with security guards reporting major hazards as they identified them along the way. As more people started arriving into the EOC, various teams were dispatched to different parts of the campus to report back on damage observed. While these assessments were useful in building an overall picture of the damage across the campus, several people have since questioned how much value was really gained from these assessments. Potentially, we put people at risk by sending them into buildings that had not yet been cleared by a structural engineer, all this while major aftershocks were still rolling through. We also found that while laypeople were able to identify areas of damage, a structural engineer was needed to diagnose the significance of that damage. For example, some types of damage, which to a layperson looked extremely bad, was quickly dismissed by a structural engineer as cosmetic only.

“I sometimes wonder if a few more cups of tea weren’t needed in those first few days – we had such a sense of urgency but I suspect that we put ourselves under pressure and that things weren’t really as time critical as they felt at the time.”

Rob Oudshoorn, the University’s Group Manager Engineering, was the first person to arrive at the EOC and led the operations aspect of the incident response. When asked about the challenges he faced as the Operations Manager in those first few days, his thoughts were:

The challenges

- Transitioning from business as usual to “this is an event of a whole different scale”
- Needing to think differently – the situation required going back to first principles
- Keeping the big picture in mind and not getting lost in detail

Our most important assets:

- Having an in-house team who knew the site like the back of their hand
- Good relationships with suppliers and contractors so that they were willing to go the extra mile for us

Tips for others:

- Prior training in emergency management was absolutely vital
- Have a functional team *before* the crisis – our ops team came together regularly to plan and practise prior to the event. This enabled us to operate more flexibly during a crisis
- As the scale of the event grows, the Operations Manager needs to base themselves within the EOC, or else the temptation is to get hands-on, delve into details and miss the big picture
- We were too slow to get our heads around the ongoing risks posed by aftershocks
- Acknowledge the fact that your grounds-people, trades and cleaning staff have really dug deep and find a way of rewarding them.

Lesson 11: Putting on catering for staff not only helped people to feel valued, but also provided a hub for interaction, helping significantly as a default point for communications.

Lesson 12: Run an occupancy board so that you know at all times which buildings people are in – this is critical information in the event of a major aftershock.

Summary of Damage (as understood by midday following the earthquake)

- Ilam site worse off than Dovedale site
 - Ilam lost power and heating. Water OK (though boil water notice)
 - Dovedale site - boiler, heating, power, water all OK
 - Older and taller buildings structurally affected, particularly:
 - Linkways between buildings look to be collapse hazard,
 - James Hight Library (seismic joints popped, lots of broken glass and shelving fallen),
 - Erskine building (atrium has some fallen glass)
 - Modern Languages/History building (cracking but probably not structural)
 - Registry, levels 3, 5 and 6 badly shaken
 - Law building and Commerce (cracking and damage to tiles)
 - Okeover and the Staff Club (roof and chimney damage)
 - New Biology building and Zoology (the two buildings no longer join up)
 - Engineering library (ceilings)
 - Rutherford building (combination of flooding and chemical spills)
 - No major damage to Halls of Residence
 - Logie Collection of antiquities extensively damaged
 - Electron microscope damaged
 - UC main phone number not working
 - Data centre undamaged and IT working OK
-

Lesson 13: Although there is a sense of urgency to assess the level of damage, with hindsight we found that damage assessments undertaken by laypeople were of limited value and also potentially put people at risk from major aftershocks.

4.4 Running the EOC

With few people on campus at the time of the earthquake, people reported into the EOC throughout the first day as their personal circumstances allowed. This “drip-fed” nature of the activation created some challenges. For those arriving at the EOC there was a need to quickly get up to speed with the current situation coupled with a reluctance to disrupt or take up the valuable time of those already in the thick of the response. Several people commented afterwards about how it took them several hours to build a sense of the major issues and to start adding value. Upon reflection, most of the team recognise that two things were needed:

- 1) more frequent briefings during that first day so that everyone was working from the same basic operating picture.
- 2) appoint someone to give new arrivals a brief orientation of the situation and current priorities as the Incident Controller and key operational staff are unable to do this.

Lesson 14: With a drip-feed activation, the challenge of building up a common understanding of the situation becomes even more challenging. Have regular short briefings during the first few hours and nominate someone specifically to the task of briefing new arrivals.

Once the response effort settled into a rhythm, the Incident Controller held two formal briefings each day – the first at about 11am to review progress, and the second at the end of the day to again review progress and to set objectives for the start of the next day. The briefings were very effective in bringing together emerging issues and stress-testing response options and many key decisions were made during the briefing process. After several days of this however, it quickly became clear that this was about to break our Communications Team. The knock-on impacts of the end-of-day second briefing meant the Communications Team were often working late into the night, crafting and getting messages out to the campus community and beyond about the decisions made. The last briefing of the day was then brought forward to 3pm.

Lesson 15: Consider communications deadlines when setting briefing times. Remember that key decisions coming out of the briefings sets in train significant work to then communicate these decisions.

After a few days, as more and more people became involved in the response effort, the Emergency Operations Centre became a hive of activity. There were just too many people in a small space so the Incident Controller and the Vice-Chancellor agreed on a reduced number of people attending the briefings.

Lesson 16: In a large-scale incident it is important to manage access to the Emergency Operations Centre. A room full of people is noisy and less productive.

“Before the earthquake, a whole house had felt quite extravagant for an EOC. During the event, it felt very small...”

The EOC had been designed to have the Strategic Emergency Management Group (the leadership team for the University) and the Operational Incident Management teams both operating from the same building, but in different rooms. This arrangement worked very well for the initial stages of the response, with the Vice-Chancellor and Incident Controller regularly meeting to agree priorities and objectives. As time went on however, it became important to move the Strategic team to a different space. This served two purposes:

- It freed up valuable workspace for the Strategic Communications team within the EOC;
- It removed the Strategic Emergency Management Group from the buzz and activity of the EOC, which allowed them to fully focus on the longer-term strategic decision making.



Figure 6: The main operations room of the EOC full of people during a daily briefing.

Lesson 17: Keeping the Strategic and Operational teams close together during the initial phases of response was invaluable, but as time went on, shifting the Strategic team into a less “busy” environment helped them to focus on the longer-term strategic issues.

After a few days, the hectic pace within the EOC began to take a toll. The EOC itself was abuzz with activity and there was very little space for taking a quiet moment away from the action to catch your breath or to have a nap if that was required. Key staff were also away from home from before dawn till well after dusk and saw very little of their families. A lesson for the future is that we should look at using an adjacent building as a “time-out” space for the EOC staff, where they could take some time for themselves or to meet there with their families during a break.

Lesson 18: Create a “time-out” space where EOC staff can take some time for themselves or to meet with their families during a break.



Figure 7: Where would we be without our ICT gadgets? The Strategic Emergency Management Group hard at work.

The Senior Management Team at UC were essentially a new team, with a lot of positions filled with people new to the University in the year prior to the earthquake. However, this team functioned very effectively, with people describing the following traits:

- We made decisions collectively with a high sense of trust – it was a supportive environment.
- Everyone had a role, there was no sense of the team fragmenting into an inner and outer circle as can so easily happen in one of these events
- The team owned the decisions – there was no friction created that might cause damage to the configuration or governance of the leadership team.
- We were all similarly impacted. The dynamics within the team may have been slightly different if one College or part of the campus was disproportionately affected.

“The tabletop exercises had emphasised for us that the important decisions for the Strategic Emergency Management Team were not about today, but on decisions for next week and next month – we needed to be future focused.”

Once the Strategic Emergency Management Team moved out of the EOC to Okeover House, there was a deliberate focus to think about the future. In many ways, the prior exercises and tabletop sessions that had been run for this group had emphasised for the team the importance of not

getting caught up in the operational aspects of the response. The major workload for the Strategic Team really ramped up in the second week, once the mechanisms of the re-start process started to work.

4.5 Having the right resources

While prior planning had ensured that many of the resources required were to hand, we still found ourselves short of key items that felt so obvious with hindsight. Below is a snapshot of key resources issues identified during debriefs run in the weeks after the earthquake.

Things we were really glad we had

- A functional EOC that people were familiar with
- IT staff who arrived in the EOC early on the first day and were there throughout the response to provide any IT support required
- A structural engineer (these were in short supply) who knew our buildings and was with the University for the whole of the first week
- Access to HR information systems from within the EOC (this was set up in the first few days of the event and was invaluable for accessing phone numbers)
- “Campus closed” signs ready to be deployed
- A “Fairy Godmother” to bounce ideas off and review how we were doing

Things we wish we had more of

- Additional radios, batteries, and radio channels (you never have enough)
- Multiple sets of master keys (you need one set of keys for each search/assessment team you will be sending out – we now have 10 sets)
- An incident management logging system. (We identified that in a 24/7 response, where shift handovers are required, that our current systems and processes would have been found lacking)
- A fully populated contacts list (held in the EOC) of key personnel for each and every building on campus as well as for each laboratory
- A “B” team of staff trained in EOC processes
- Spare laptops and USB data sticks in the EOC
- Pre-thought out ID tagging system
- More hazard tape, high visibility vests and torches
- Spare cellphones in the EOC ready to be deployed
- EOC activation flowchart on the wall of the EOC – because it is just too easy to miss things in the heat of the moment.

Every EOC should have a “Fairy Godmother”! We had heard how Australian energy company, Alinta, appoints an independent person who is not directly involved in the response effort, to act as their EOC Fairy Godmother. The Fairy Godmother’s role is to provide an impartial and confidential sounding board for the Incident Controller and any other member of the response team who needs it; to bounce ideas around and to help them to step back and reflect on what was working, what wasn’t, and to uncover blind-spots in the response. When Dr. Erica Seville, an Adjunct Senior Fellow with the University, and specialist in crisis management arrived at the EOC the morning of the earthquake, the Incident Controller immediately appointed her to this role.

Lesson 19: Every EOC needs a Fairy Godmother! The Fairy Godmother's role is to provide an impartial and confidential sounding board for the Incident Controller and any other member of the response team who needs it; to bounce ideas around and to help them to step back and reflect on what was working, what wasn't, and to uncover blind-spots in the response.

Following an earthquake, having an experienced structural engineer, familiar with the design of campus buildings, is a golden resource. UC was extremely lucky to be able to call on an engineering firm with which it has had a longstanding relationship – and their engineer was onsite by lunchtime. He then worked tirelessly right through the whole of the first week just on UC buildings.

Lesson 20: An experienced structural engineer who is familiar with the design of your buildings is a golden resource. If you can, have arrangements with an engineering firm to provide you with priority service – structural engineers are in very short supply following an earthquake!

A university environment is full of specialist labs, each with their own particular hazards, items of value and specific needs (Some have animals requiring regular feeding; others have constant temperature requirements etc). If we had our time again, high on our wish-list would be easily accessible, comprehensive and current contact lists in the EOC for every college, department and service group on campus.

Throughout the event the old adage “it is who you know that counts” came through time and time again. For some services, where we were a large customer but lacked the ability to call in personal favours, UC found itself lower down the priority list. Where people knew someone who knew someone it was amazing the things that could be delivered onto campus at short notice!

Lesson 21: Foster good relationships with key external agencies and suppliers. In the heat of the moment it is not the fine print of contract wording that counts, but good personal relationships.

Particularly in those first few days, many people have commented on how they did things, for very legitimate reasons, that on reflection were quite risky. People entered buildings that had not yet been inspected by a professional engineer, went into flooded basements to turn off services that could pose hazards for others, and generally took on personal risk to either reduce the risk to others or the institution. Although Sharon Butt, the UC Health and Safety Manager was in the EOC for all of the first week, she was not utilised as effectively as she might have been because of the drive to carry out assessments early and promptly, rather than evaluating risk prior to responses being implemented. There will always be a tension between wanting to recover as quickly as possible, but still ensuring the pace of activity does not compromise good health and safety practices. Having been through this event, we recognise the need to update our Emergency Response structure to

formally specify a “Health and Safety” role, providing independent advice directly to the Incident Controller on the safety of the operational response effort.

Lesson 22: Response structures need to have a specified “Health and Safety” role for providing independent advice to the Incident Controller on the health and safety aspects of a response effort.

The University of Canterbury Students Association (UCSA) President, Nick McDonnell had a good working relationship with the University leadership team. He had the Vice-Chancellor’s cellphone number on his phone and gave him a call soon after the earthquake. Although the UCSA had been involved in emergency response planning in the past, some subtleties emerged during this response that indicate a need for more detailed planning about exactly how the relationship works during emergency situations. For example, the UCSA manages its own facilities on campus and there was some confusion as to whether the campus curfews also applied to these areas. It was also unclear, if there had been major problems with these buildings, the extent to which the UCSA and wider University emergency response would work as a single entity. It was also identified that the UCSA has very good networks with the student body through clubs, Facebook and networks of friends. This is an important asset for the University to leverage during an emergency.

Lesson 23: Actively engage the Students Association in emergency response planning, clarifying areas of autonomy and collaboration and ways to leverage their strong links with the student community.

4.6 Communicating with the Campus Community

Communication with the campus community was felt to be a real strength of the UC response. Prior planning had identified ways for the UC Emergency website to replace the main University homepage; IT and web-design staff arrived at the EOC early in the response to support the implementation of this. The UC webpage became the primary source of information about the damage suffered by the University and how it was planning to recover.

Right from the start of the response, there was an emphasis placed on being very open and transparent about the situation at UC. For example, damage to the Logie Collection (248 Greek & Roman

Janelle Blyth, UC’s Internal Communications Officer, made contact with her manager on the Saturday night and suggested the need to set up a Facebook site for communicating with the student community.

Facebook is a forum for a conversation, quite a different media to the website, which is used for the provision of information. Janelle had the UC Facebook site up by 5pm on the Sunday and by the end of the second week the University Facebook site had 5370 “likes”.

Students commented that the Facebook site provided a useful way for them to feel a part of the UC recovery effort, even while they were not allowed onto campus. The “Penguin Scale” is one such example. One of the EOC members had a set of small penguins at home which continually fell over during aftershocks and one day commented that “only three penguins fell off the shelf this time”. Pretty soon these penguins found their way into the EOC and became the default measurement scale for each aftershock. Students were asked on Facebook to name each of the penguins and it became a fun way to make light of the ongoing situation. One posting on Facebook read:

“Save the Penguins, Stop the Aftershocks”.



Figure 8: Four of the ten penguins still standing after an aftershock

As well as Facebook, the University also ran twitter sites and also put up onto You-Tube daily video updates from the Vice-Chancellor (these were very popular).

antiquities) had the potential to be highly sensitive and yet a decision was made to be open with everyone, including the media, about the fact that this collection had been badly damaged. When the Minister for Education came to visit the campus, he along with his entourage of media were taken in to see first-hand the collapsed book shelves in the library. Adopting a stance of being open and transparent served two main purposes:

1. It helped communicate to staff and students so that they could understand the extent of damage at the University and therefore the reasons why they were not allowed access to the campus.
2. It set a tone with media so that if they wanted any information then they knew they could just ask, and it helped to create a sense that UC had the situation well under control.

“Once you go into a ‘command and control’ type mode of managing an emergency it is easy for communications messages to lose their sense of heart. To avoid this we consciously went through a process for each of the different message medium – trying to get into people’s shoes and anticipate what they might hear from our messages.”

In addition to being open and honest, there was also a conscious effort from the very beginning to ensure that communications also reflected an emotional message of empathy and concern for members of the campus community badly affected by the event. The Communications Team often spoke of “getting into different people’s shoes” to try to understand what information the various audiences needed from the University.

The way the Communications Team set themselves up may be of interest to teams at other universities. At its peak, the Communications team involved eight people. Lynn McClelland, the University’s Director of Communications and External Relations, and one other attended all strategic decision-making meetings. The reason for two people attending was because these meetings often ran back-to-back. Lynn attended all meetings so that she had a complete overview of all major decisions, while the other person was responsible for drafting the core messages requiring communication to come out of the meeting. The remainder of the team were then split into parallel streams for drafting the wording of communications, FAQs, and updates to the interactive communications environments (Facebook, Twitter etc).

Each of the communications media had a slightly different audience and therefore a different emphasis required on different bits of information, and a different language style used. Throughout this, consistency of message and quality assurance is critical. Clarity on what the core messages are is important.

Lesson 24: Communications messages need to be consistent and yet tailored to the particular audience. To achieve this, be sure to spend sufficient time planning what the core messages are before disseminating them to the teams drafting the various communications.

Although the University website was not the only source of information, it was important that the website was seen as the primary source of official information. For example, no staff or student messages were sent out or information put up onto the social media until it had been confirmed as already showing on the UC website. Another rule of thumb applied was to also be clear which site was the original source of information. For example, to draw attention to information on another site, provide a link to the original source rather than repeating the information.

By nightfall on the first day, 78 per cent of students (including those within the earthquake area) had access to the internet (Beaven et al, 2010). Students indicated that the website was their main way of receiving information, followed by email and then Facebook. Staff, were receiving regular all-staff emails, as well as regular updates from their Head of Department and the Pro-Vice-Chancellor (PVC) of their College. One PVC described how every night he sat down and wrote an email to all staff within his College, not only so they were up-to-date with the latest situation, but also as a cathartic process to help him to make sense of that day's happenings. A key learning from these experiences is the value in finding ways to keep the campus community engaged and feeling part of the response process. This is important to help counter the sense of helplessness and disengagement created by restricting access to the campus. Nearly 15 per cent of students left Christchurch for a period of time following the earthquake, most of them only for the period that the University was closed (Beaven et al, 2010).

Lesson 25: Keeping people away from campus can create a sense of disengagement, so it is important to counter this with more personal communications from Heads of Departments and other leaders so that people feel connected with the University recovery effort.

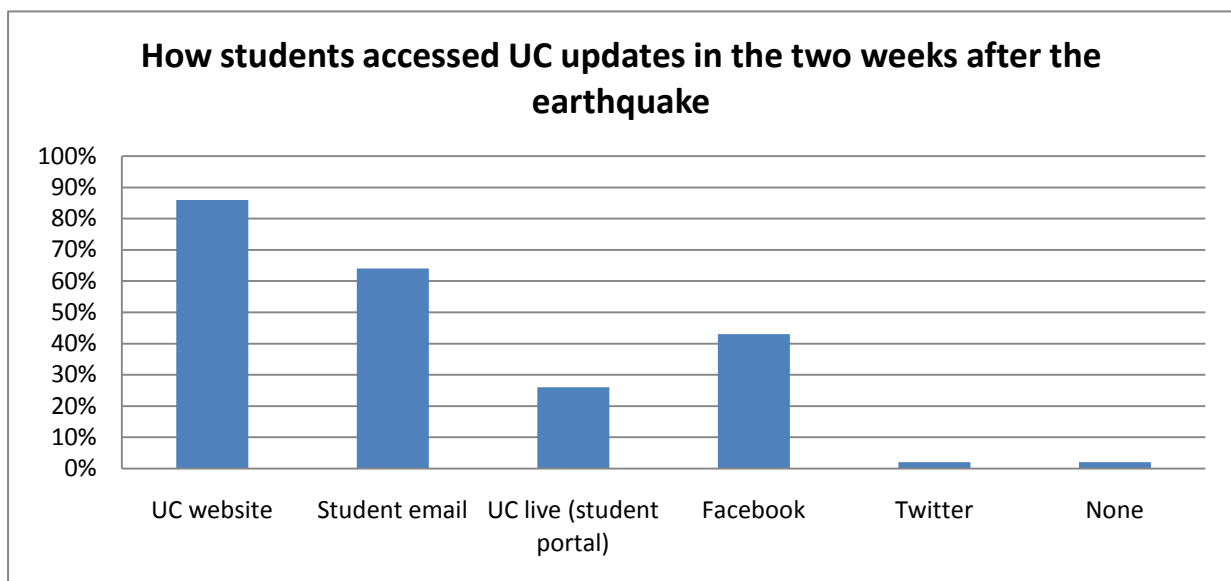


Figure 9: How students accessed UC updates in the two weeks after the earthquake (Beaven et al, 2010).

5 Getting back to Business

In this section we discuss some of the major decision points during the response and recovery process, but first it is worth providing some background context for the engagement of senior staff in emergency response planning. In 2008, the University ran a major emergency response exercise called “Active Shooter”. This exercise simulated three armed offenders on campus, roaming through the Halls of Residence, taking shots at staff and students. This full-day exercise was run in conjunction with the Armed Offenders Squad from the New Zealand Police, who also tested their abilities to respond to an incident in a university environment. To prime the Senior Management Team for this exercise, the week before, we ran a workshop involving both a staff member and past student of Virginia Tech who talked with the group about their experiences during the Virginia Tech shootings and how they felt that the University had managed the response and recovery effort. This presentation proved a powerful vehicle for getting the attention of senior management. On the day of the exercise itself, with the Vice-Chancellor and Deputy-Vice-Chancellor away, it fell to the Jeff Field, the Registrar, to lead the University response. He was put under real pressure, using an ex-editor from the Political Sciences department to simulate media enquiries and asking the tough questions. The next year, when Jeff took on joint responsibility for oversight of Emergency Response Planning for the University, he ensured the Senior Management Team signed up to regular tabletop exercises.

Some thoughts from Rod Carr, the University Vice-Chancellor, for others who find themselves leading a university at the time of a crisis:

- Being present is very important, but that doesn’t mean making all of the decisions. As a Vice-Chancellor you are NOT the best person to be leading the emergency response operation.
- Don’t use up all of your leadership capital on the emergency – a Vice-Chancellor should be focusing on the longer term health of the institution.
- Recognise that an emergency is different from the day-to-day. Empower those managing the emergency with the authority to make decisions, but be ready to take that authority back if needed.
- Watch your team – tired people start making poor decisions – and that includes you.
- Take strength from your leadership team and utilise their skills and diversity to stress-test decisions.
- Take all of the luck you can get!

“There can be a level of complacency within a university environment. People think that they will be able to manage an emergency in just the same way that they deal with the day-to-day. Emergency management can be seen as an operational task, rather than recognising the significant strategic and leadership issues that emergencies present”

Lesson 26: Key learnings from previous exercises that served us well in this event were, the need to:

- 1. act decisively, and***
- 2. communicate quickly.***

5.1 The Decision to Close the University

Within just a few hours of the earthquake, the Incident Controller raised the issue of closure of the University with the Vice-Chancellor. The Vice-Chancellor was already thinking about what major decisions he and his team needed to make to provide a sense of certainty to the University community. By about 9am it was clear that the University had sustained sufficient damage and would not be ready for teaching that Monday morning (the first morning of a new term). The question was then one of how long to close the campus for: a few days, one week, two weeks? What emerged was a very sound decision to close the University for an initial period of one week, with a decision to be made by 5pm Wednesday as to whether the University would reopen on the following Monday. The background to this decision was:

- While the University's Halls of Residence were largely undamaged, managers were keen to delay the arrival of nearly 1600 additional students. "Boil water" notices were still in place for the community, there was uncertainty over the use of sewage system, and during the first day the aftershocks were almost continuous.
- With the term due to start on the Monday, a clear directive was needed to encourage students to modify their travel plans and stay away from campus for the following week. Since many students were likely to commence their journeys over the next 24 hours, unambiguous decisions were needed sooner rather than later.
- A university semester works in one week cycles for lecture schedules, test timings etc. In many ways, it was felt it would be easier to close for a full week than to be closed for three or four days.

"The exercises reinforced for me that preparedness involves more than just response plans and emergency contacts lists and we really needed to take it more seriously."

Lesson 27: In a university environment where the timetable is scheduled around weekly blocks, closure for a full week can, in some ways, be easier than closure for just three or four days.

- An initial announcement of "we will be closed for one week" gives the potential to create an impression that the University would definitely be open the following week. In fact, on that first morning the University was in no position to make that sort of judgement; initial damage assessment information was still rolling in. To counter the implicit message that the

University would be open the following Monday, a day and time was specified for when such a decision would be made.

Lesson 28: Staged decision-making works well. To provide people with at least some level of certainty in an uncertain situation, make early decisive decisions that still leave you with options open and provide defined timelines for when subsequent decisions will be made.

The initial announcement to close the campus for (at least) a week, with all assessment due dates deferred by one week but no change to the exam timetable, resulted in concern from the student community. They had obviously done some quick calculations about what this would most likely mean for their study week (which is a free week prior to the start of exams) and made it clear that the loss of study week was not their preferred option. This rapid feedback served to quickly reinforce the need to involve the University of Canterbury Students Association (UCSA) in making decisions about how to restructure the remaining academic year. Once this partnership was put in place, the relationship with the student body became a real strength of this response and significantly helped to secure student buy-in to the changes proposed.

Lesson 29: Actively partner and involve the Students Association in any decisions around how to restructure the academic year. This is important for getting student buy-in for any changes.

5.2 Control of Access onto the Campus

From a Health and Safety perspective, the ongoing pattern of major aftershocks created a real headache. There was a tension between getting the community back to some sense of normality, and keeping away until the risk had reduced.

The Wednesday following the main earthquake was a significant moment in the response phase, when a magnitude 5.0 aftershock centred in the nearby town of Lyttelton rocked the city and caused electricity to fail and some additional damage and liquefaction around Christchurch. The impacts of that aftershock were not just physical; psychologically it set people back and made us all face the reality that this event was not over yet. This was underlined by Wednesday being the day when the greatest number of aftershocks occurred.

While the initial focus of the response effort had been to lock down the campus, there was a need to start bringing more and more people onto campus to help with the clean-up effort. A real emphasis was placed on bringing these people onto campus in a very controlled manner to manage the health and safety risks. The NZi3 building, which is located on the edge of the campus, was set up as a staging area. All staff had to sign in and out through this building, and attend a safety briefing before going on to campus.

Website Announcement, posted 1pm on Saturday 4th September 2010

University of Canterbury Closure

Following the earthquake on Saturday 4th September, the University of Canterbury is able to report no injuries have been reported on campus and that its emergency management plan has been activated.

We are committed to supporting our staff and students at this time.

The University of Canterbury including its campus is closed (including the College of Education at Dovedale) while the campus is assessed for health and safety issues. The University will not open before 6:00am on Monday 13th September.

At this time UC expects to open for Term 4 on 13th September. Confirmation of re-opening will be made no later than 5pm on Wednesday 8th September. All students including post graduate students should stay away from campus. The one exception is in consideration of Ramadan the Moslem prayer centre will remain accessible from Creyke Road. Opening hours for the Health Centre will be confirmed.

There will be no change to the final exam timetable. Any assignments, assessments or tests due during term 4 will be required one week after the previously published due date. Students in halls of residence should not plan to return to their hall any sooner than Sunday 12th September and should check the website before leaving home.

Staff should stay at home and may work from home to the extent they can. The Senior Management Team will determine whether or not staff need to come in sooner to help clean up. They will be contacted directly. No staff member should come to campus without the express permission of the relevant Senior Management Team member.

All on-campus University events currently scheduled for the week of 6th September are cancelled. All non-campus Christchurch based University events are postponed pending confirmation.

All messages and confirmations will be posted on the UC website
www.canterbury.ac.nz

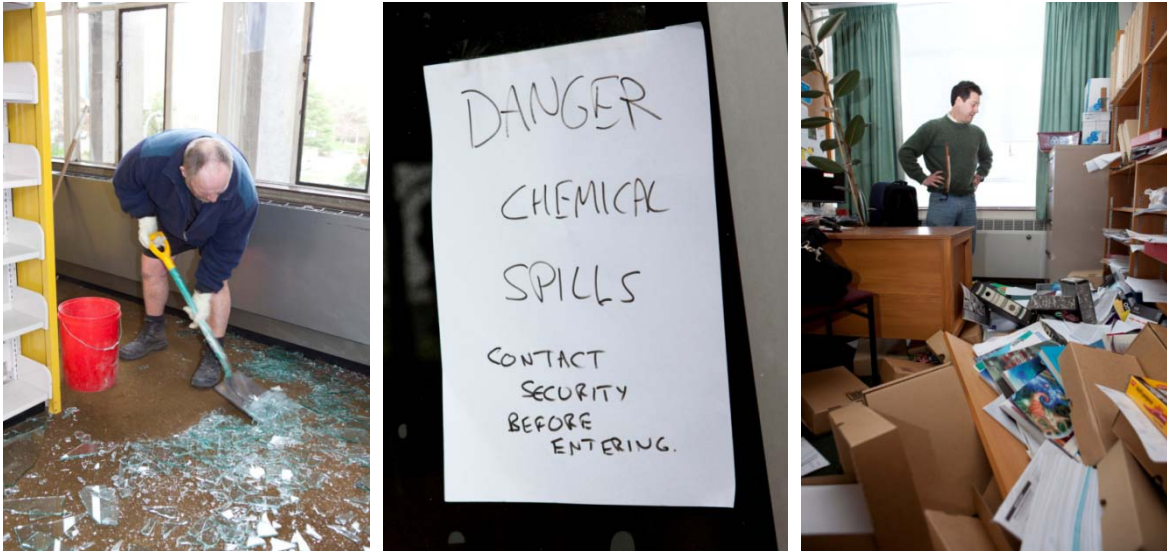


Figure 10: Hazards and general mess on campus requiring clean-up during the first week

Lesson 30: Have a designated staging area (separate to the EOC) for controlling access on to campus, where staff sign in and out and attend safety briefings.

Rather than bringing all staff onto campus at one time, initial reconnaissance teams were formed, of approximately five people per department, to go right through their facilities and identify any major hazards. If the area was deemed to be reasonably safe, all staff from that department were then invited to come in at a particular time to attend a briefing and to go into their facilities to clean up. Throughout the first two weeks, a curfew was in place, so that the only people on campus at night were security guards. With the ongoing aftershocks it was felt too dangerous to have people on-campus at night. The curfew was well publicised, with a notice posted at every building entrance on campus.



Figure 11: Safety briefing under way for staff about to enter the campus.

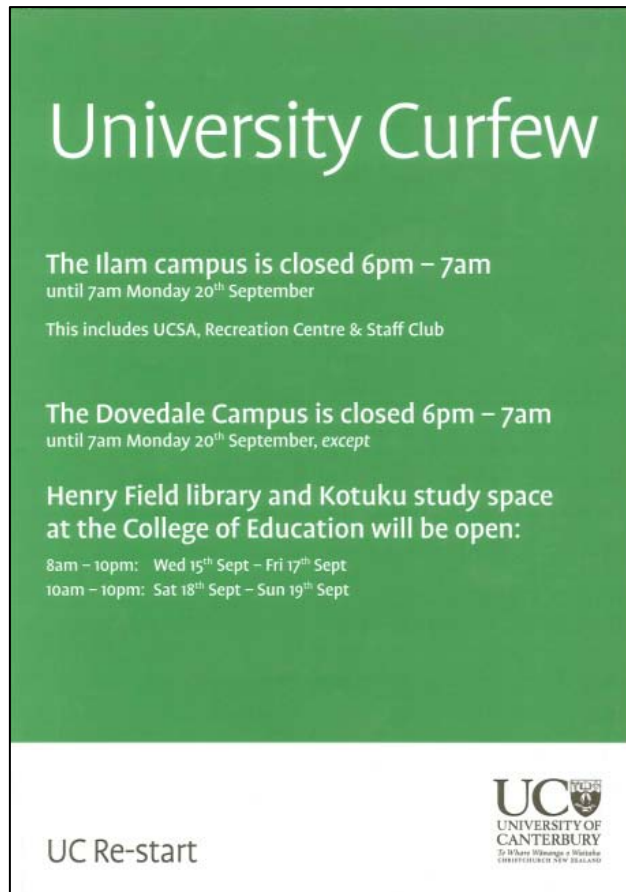


Figure 12: Signs regarding campus curfews were posted at every building entry point.

Over the course of the first week, except for the most heavily damaged areas, most parts of the campus were cleaned up during staff working bees and, if required, the campus would have been in a fit state to commence teaching again the following Monday.

5.3 Mucking In

Two initiatives that demonstrated the strong sense of community spirit that emerged in the weeks following the earthquake were the staff working bees and the student volunteer effort.

A clear demonstration of the goodwill and commitment of the campus community during this event was the excellent turnout at staff working bees held towards the end of the first week after the earthquake. These working bees were advertised as completely voluntary, and staff were warned to be prepared for some heavy-duty and dirty work. This did not deter large numbers of staff who contributed to the clean-up.

The student body also demonstrated its willingness to actively contribute to the earthquake response. Within a day of the earthquake, with the University closed for at least a week, Facebook pages popped up within the UC student community for ideas on how to fill in the time. Sam Johnson's site, to mobilise volunteers to help clean up affected parts of the community, clearly captured the imagination of the student community. About one thousand students participated in the "Student Siltworm" initiative, using spades and wheelbarrows to manually clear silt and sand in

people’s gardens that had been caused by the liquefaction. The enormous contribution the students made to the community was recognised by both the Prime Minister and Mayor at a function put on to thank the students for all of their efforts.

“At the worst of times you see the best of New Zealand. You are the best of New Zealand.” (John Key, Prime Minister)



Figure 13: Student Siltworms working hard to clear silt and sand from the worst affected communities.

5.4 Delaying the Start of Teaching for a Second Week

The Wednesday morning following the earthquake was significant for several reasons. The Vice-Chancellor had committed to making a decision by 5pm that day as to whether or not the University would reopen the following Monday. Wednesday was also the first day of the staged re-entry of staff onto campus to help with the clean-up process.

At 07:59 on the Wednesday morning, a major aftershock occurred. As previously described, this aftershock cut electricity supply to many parts of Christchurch city, caused additional damage to some buildings, and caused new

“The Wednesday morning aftershock felt like a kick in the stomach for the whole incident management team.

Everything paused in the incident room until the shaking stopped and then we all headed for the phones to check if our families were ok.”

instances of liquefaction in some parts of the city.

At the start of the day, the Incident Controller had been expecting to report to the Strategic Emergency Management Group that, although there was a lot of work to do, facilities would be ready for teaching again by Monday. Physically, the aftershock had not really changed that position, but it was the emotional setback that caused the Strategic Emergency Management Group to reconsider.

Ultimately, the Strategic Emergency Management Group decided that although the facilities would be physically ready for teaching the following Monday, they did not feel that staff would necessarily be mentally ready to work, or the students ready to learn. There was also significant on-going risk of major aftershocks. On Wednesday 8 September alone there were 140 aftershocks. With this in mind it was felt judicious to allow another week to pass before filling lecture theatres with students and enabling research students to recommence their experiments. While the additional weeks delay reduced the available semester time even more, it also brought the team time to consult with the student, academic and administration communities to find the best ways to redesign the semester timetable.



Figure 14: The change of the University homepage on the website from an “Emergency” page to a “Re-start” page signalled a deliberate change in focus for the University.

In the end, the redesigned semester involved shortening the teaching time by one week (i.e. the term was reduced from six weeks to five weeks), study week was reduced from five days down to three days, and the examinations timetable was reshuffled, shortening the examinations period by two days.

Most people agreed that deferring the start of teaching by another week was a good decision. Even though it reduced available teaching time, people were ready to restart teaching activities the following week and there was a lot more buy-in to the revised semester than might otherwise have been achieved.

Lesson 31: Although there can be a lot of pressure to get back to normal as quickly as possible, sometimes taking a bit more time to allow people to be mentally ready to go back to business-as-usual helps in the long term.

Although it didn't seem so important at the time, a key decision made early in the second week was to define a point in time when the University would attempt to transition back to its usual timetable. This line in the sand provided a context from which to work backwards to design the revised teaching term. It also reduced the temptation to just keep shifting everything back by two weeks forever. The target date set was to still be in a position to release examination results by 3 December. Release of exam results is a significant event, and important for students who are applying for scholarships, jobs, or entry into restricted courses and so maintaining this release date was felt to be an important milestone for UC to achieve.

The change in exam dates created issues for some students in having to alter travel arrangements, but travel agents and airlines were very obliging and there were few problems getting arrangements changed. Some academics did find it challenging to restructure their teaching and assessment to fit the new term dates, but in the end everyone was able to make the shortened semester work.

Planning for the 2009 "Swine Flu" pandemic had involved a review of aegrotat and other relevant University regulations. These arrangements were found to work well in this event also. Approximately 50 students applied to withdraw from their second semester courses (because of stress and anxiety) and the University approved all these applications even though the withdrawals deadline had long since passed. There was a small number of additional aegrotat applications, but not many more than would be received in a normal year.

5.5 Appointing a Claims Preparer for Insurance

Early on the first morning of the earthquake, the University was in contact with its insurance broker, providing updates on the situation on campus. The University is a member of a collective insurance policy, involving eight tertiary institutions from around New Zealand. This was the first claim of this magnitude to be made against this policy.

Over the past 10 years the University had built up a very good relationship with its insurance broker, and this good working relationship proved to be a strong asset for the University. From early in the response there was an emphasis placed on keeping

Impacts on Research

Lucy Johnston, the Dean of Postgraduate Research, describes the first week after the earthquake as highly organised despite the chaos of the situation. The University's priority early in the response was to resume undergraduate teaching. Postgraduate students fell into a sort of no-man's land. Their concerns and issues were far more individual than those of the undergraduate students, and so the general communications to students didn't really meet their needs. During the first week, no students were allowed back on campus, a ruling that many postgraduates found difficult to accept. In many cases, supervisors were in close contact with their students and were able to go in and check that their equipment, experiment setup or animals were OK; but this did not happen for all students. Towards the end of the first week Lucy recognised she needed to ensure these students did not feel that they had fallen off the radar, and to get the students together to identify their individual concerns.

All postgraduate students were given the opportunity to apply for extensions to their thesis submission date. Of approximately 800 postgraduate students, nearly 40 per cent applied for an extension of one month or more due to the disruption to their research caused by the earthquake. We found that students experiencing personal issues as a result of the earthquake (for example where their house was badly damaged) were more likely to suspend rather than extend their studies.

Sarah Coxon is a PhD student in the Biology Department. Her research involves putting fish through a series of exercise regimes and testing their physiological responses to various environmental stimuli. Sarah found that she had to suspend her experiments to give the fish time to "de-stress" following the earthquake. A large number of them were sick in their tanks on the 4th as a direct result of the stress associated with the movement, noise and vibrations of the earthquake, and this necessitated their move to a new, and incomplete aquarium. Four weeks R&R for the fish was needed before she could restart her work with them. Sarah also lost several specimens stored in freezers which defrosted due to the power cuts, requiring her to repeat significant portion of her work.

the insurers well informed of not only the extent and nature of damage, but also how the University was managing the response.

When it came time to think about appointing a Claims Preparer, the insurance broker nominated one of their subsidiaries. However this immediately raised concerns about a potential conflict of interest – the broker has strong links to the Insurer, and yet the Claims Preparer is meant to be “on the side of the claimant”. To allay these concerns, the University started looking around to see what other options were available, and asked two companies (the broker’s subsidiary plus another) to present their case as to why they were the right people for the job. Taking this stance, as opposed to simply accepting the default Claims Preparer offered, significantly improved the quality of services offered. The University did end up going with the Claims Preparer recommended by the broker and has been very happy with the service received. However, the whole process took a significant amount of time and energy during the first week, and it would have been so much better if the University had had these discussions about the appointment of a Claims Preparer prior to an event.

Lesson 32: Give careful consideration to appointing a Claims Preparer so that you are confident you have the very best team supporting you as possible – even better if you can do this before an event rather than after...

From the second day following the earthquake, the University sent its professional photographer around the campus capturing photographic records of major types of damage. A very rigorous process was also put in place to ensure that staff photographed and recorded any damage to their areas of work and equipment. An ICT team was also formed to do initial assessments of damage to computers, audio visual systems etc, and a process was put in place to manage equipment restarts.

Another key feature of the University insurance claims process was the setting up of an Insurance Steering Committee involving both senior staff and external advisors to provide a strategic focus to the claims process. Given the size of potential claim, putting the right sort of governance in place to oversee this process was very important.

The University had both material damage and business disruption claims from this event. Our experience was that the material damage side of things was quite easy to process. Even where improvements are made at the same time as repairs, it is generally quite a simple task for a quantity surveyor to separate out the two. One slight fishhook to be aware of is that many insurance policies state that any aftershock more than 72 hours after the main earthquake is considered to be a new event (with a new deductible). This has been a problematic issue not just for UC, but for many commercial entities, given that there have been more than 4000 aftershocks to date, more than 12 of magnitude 5.0 or greater.

Business disruption cover can be slightly trickier. There was a need to very quickly communicate to the campus community the distinctions between what is and what is not covered, and also to combat an “insurance will pay” mentality. The policy only covers business disruption caused as a direct result of *material damage*. For example, it will cover the loss of a postgraduate student enrolment because the equipment they need to complete their research has been damaged, but

does not cover loss of enrolments due to perceptions that Christchurch has been “flattened” by the event (an impression it would have been easy to get from the initial media reports following the earthquake). Under the terms of the policy, it is also easier to claim for additional staff employed rather than to seek reimbursement for an existing staff member’s time that has been taken up with the response and recovery from the earthquake.

The University negotiated with the insurer for an initial payment to be made soon after the earthquake and expects 90 per cent of the full claim from the 4 September event to be settled by mid-2011.

5.6 Repairs and Restoration

There was a lot of non-structural damage across the campus. The most common issues were:

- Ceiling tiles dropped
- Shelving units toppled
- Windows broken
- Expansion joints moving (as they were designed to – but the cosmetic damage looked quite alarming to a layperson)
- Ceramic tiles shattered
- Damage to water systems
- Damage to lifts and elevator infrastructure
- Substantial damage and disruption from overturned furniture and more than one million books off library shelving.

For the most part, the priority in the first week was on removing hazards (such as remaining ceiling tiles) and urgent repairs (such as fixing glazing to keep the weather out) to enable spaces to be re-occupied.

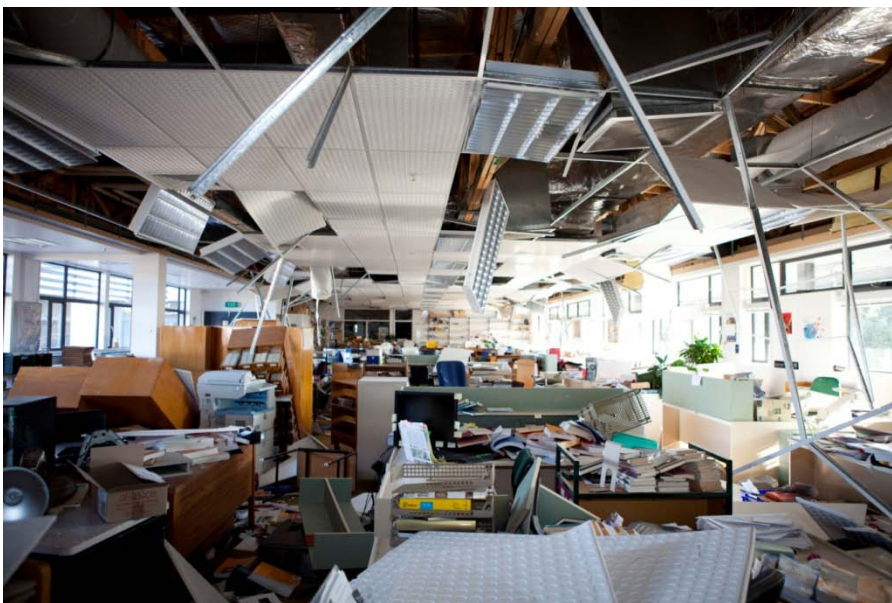


Figure 15: An example of "non-structural" damage.

Within the libraries, there was an estimated one million books on the ground. In some cases, whole shelving systems collapsed creating significant life-safety hazards. The University was very lucky that these parts of the library were unoccupied at the time of the earthquake as there could have been fatalities. The James Hight (Central) Library in particular suffered significant damage to shelving systems and the library will remain closed to enable repairs until February 2011.



Figure 16: Collapsed library shelving created a real life-safety hazard.

Lesson 33: There is no current Standard for seismic design of shelving and racking systems. During the Canterbury earthquake many older style shelves and racking systems collapsed, despite having been lightly braced in the past, creating significant life safety hazards.

Another significant injury (or possibly life-safety) hazard was from fallen ceiling tiles. Particularly in large, high-ceiling lecture theatres, it doesn't bear thinking about the injuries and panic that would have been caused if the earthquake had occurred during class-time.

Lesson 34: Many old-style heavy plaster ceiling tiles are not adequately fixed and create a major hazard during an earthquake.



Figure 17: Glaziers repairing windows broken by the earthquake.

In one building, a large set of precast stairs with expansion joints moved and damaged the concrete surrounds. With this set of stairs being critical for fire evacuation, temporary fixes were urgently needed or else the building would have had restricted numbers of people allowed on upper floors.

For the most part, the priority in the first week was on removing hazards (such as remaining ceiling tiles) and urgent repairs (such as fixing glazing to keep the weather out) to enable spaces to be reoccupied.

In the early response and repair phase, the University had no difficulty securing contractors to undertake repair work, mainly due to good, long-established relationships with these contractors. Being a serial client that spends significant dollars on construction on a consistent basis has its upside.

The University has appointed a project management company and main contractor for undertaking all of the ongoing repair work on campus. With hindsight, the University should probably have also appointed a dedicated Recovery Manager to co-ordinate the complex web of business-as-usual, as well as recovery issues affecting the sequencing of restoration activities.

The longer term repairs and restoration works will take several years. Three months after the earthquake, dedicated inspection teams were still reviewing buildings in detail, cataloguing damage and identifying repair options. As wall coverings are removed and the detailed inspections undertaken, damage requiring remediation is still being identified. While urgent repairs are being made where necessary, with the ongoing aftershocks there is little point in finalising cosmetic finishes at this stage that might be damaged again in further shakes.

Lesson 35: Factor into planning that building repairs will not commence immediately. Three months after the earthquake, damage is still being discovered and ongoing aftershocks means there is little point in even starting repairs to plastering etc.

Within the University laboratories there was some damage to equipment, but a general observation made was that laboratories that were “tidy” generally performed better than those that were less ordered. The discipline of always returning equipment or samples back to their place of storage helped to limit the extent of damage. For example, within the Chemistry Department they found that simple measures such as perspex guards around chemical shelving and laboratory bench dividers were extremely effective at preventing chemicals from spilling on to the floor or bench tops, and lips on storage shelves of a little as 2cm in height seem to have entirely prevented equipment falls (Williamson, 2010).

There was some damage to sensitive equipment that did not appreciate a sudden shutdown when power supplies were lost (a brand new mass spectrometer was damaged beyond repair), but on the whole, with careful start-up procedures put in place, IT equipment was found to have relatively low rates of damage.

During the earthquake, the Logie Collection of antiquities was badly damaged. The Logie Collection is not only a treasured cultural resource, it is also an integral part of the teaching and research programme for the Classics Department.

In the first days, the imperative for the University was to protect the collection from further damage during aftershocks. As the University moves into the recovery phase, the Logie Collection not only represents an insurance and repair issue, but also an emotional journey for staff. Staff are grieving for what to them is a “living and breathing” collection. They also have concerns about how changes to the future housing of the collection will alter the nature of their programmes and access to the works. Restoration of damaged cultural items also raises some interesting questions. For example, should the items be repaired so that they “look their best” (i.e. so that repairs are not visible), or to

Ed Adelson was only two months into the job of Pro Vice-Chancellor of the College of Arts at the time of the earthquake. Being both new to the role and also new to the country, Ed found himself regularly questioning the most sensitive way to approach particular situations. Kiwis have an optimistic outlook on life and tend to downplay issues they are struggling with. As a leader it required delving beyond the 'I'm OK' response to discover the full scope of issues people were facing.

For the College of Arts, being unable to access the Central Library for six months was a major blow. Many humanities academics felt lost without the library – a visceral unhappiness that could not be assuaged by saying “we will get you the books that you need”. For many of these academics, the way they use the library environment is a fundamental element of their intellectual approach. Saying to them that they should be able to continue working without entering the library building is a bit like telling a passionate cook that they are no longer allowed to taste the food. The ingredients are there but the essence of how they bring those ingredients together is somehow lost.

Key lessons for Ed include:

- Leaders have to pace themselves; there is a penchant to tend towards the heroic and work 20 hours a day but this is not in anyone's interest.
- Letting go and recognising that there are aspects that you can neither oversee nor control. As the issues become so numerous it is important to allow experts and others to take things on.
- The camaraderie, humility and co-operation that emerges.
- Sending nightly emails to all staff in the College was not only therapeutic as a way of making sense of a situation with so many unknowns, it also helped staff to feel connected to the University response effort, even when they could not be on campus.

retain their integrity to the expert eye (i.e. so that it is easy to distinguish between restored and original parts)?



Figure 18: A damaged item from the Logie Collection.

The earthquake also caused many other types of disruptions to ongoing university life. To give just one example, at the time of the earthquake the University was preparing to host a major international exhibition of art works: the Pacific Rim Print Exhibition at the Sofa Gallery. The Sofa Gallery is a leased space in the Arts Centre in central Christchurch, which UC staff were unable to access for much of the first week. Other leased spaces throughout the city were damaged in the earthquake, creating ongoing impacts for the performing and visual arts.

5.7 Researching the Earthquake

The occurrence of a major event such as this earthquake presents a unique research opportunity that has the potential to make young research careers and attract the focus of internationally renowned research teams. With the University campus closed, there were some frustrations in being unable to access research equipment and usual university support systems being occupied with other

priorities, but this did not prevent the academic community playing an important role in both contributing to the direct response effort, as well as capturing valuable perishable research data.

Lesson 36: In the heat of the response effort it can be easy to miss issues that, while not mission critical for the response, are important to particular stakeholder groups. Because they can see you are busy, they may not feel able to come and talk with you about it. If possible, identify beforehand who those stakeholder groups are and what their issues might be.

Academics from the Geology Department in particular had a high profile in the media, helping the community to understand and make sense of the event that had just occurred. A public presentation by Dr Mark Quigley on the Canterbury Earthquake was so popular that the 400-seat auditorium was quickly filled and people had to be turned away. The public's appetite for knowledge was such that additional lectures were scheduled for a large venue in the city.

“Bad times have a scientific value. These are occasions a good learner would not miss.”

*Ralph Waldo Emerson
(1803 – 1882)*

Structural and Geotechnical Engineering academics and postgraduate students were heavily involved in the initial assessment phases for buildings and land damage throughout the affected region, and the social science community also contributed significantly by providing advice to those leading the recovery effort.

The University of Canterbury acted as host to the Canterbury Disaster Recovery Technical Clearinghouse, run by the New Zealand Society for Earthquake Engineering for those involved in researching the Canterbury Earthquake.

UC is an institutional member of the recently founded Natural Hazards Platform. The Platform is a new government research funding arrangement which encourages greater collaboration between research institutions, and provides stable funding to enable long-term research strategies to be developed. It is anticipated that this event will generate a significant ongoing collaborative effort with both local and international research teams in which UC academics and research students are anticipated to play a key role.

5.8 Managing Ongoing Risks and Seeking the Silver Lining

Re-starting University activities, teaching to full lecture theatres, running chemistry laboratories and having thousands of students living in halls of residence, all within an environment of ongoing aftershocks carries with it some risks that needed to be managed.

A key priority identified by the Health and Safety Manager early in the response was to develop a robust aftershocks response plan. This, as it turned out, was a more challenging task than we first thought.

Unfortunately, the reality with aftershocks is that although they taper off in frequency as the months pass, the chance of major aftershocks still remains. A feature of this event has been that the aftershocks have tended to migrate, to be located much closer (and in some cases, right underneath) Christchurch city.

Five weeks after the main earthquake for example, a magnitude 5.1 aftershock occurred which, because of its location very close to the city, was felt by many to be just as strong as the original shake. Earthquake magnitude, depth, location and direction of shaking all influence the severity of felt shaking, and this complexity made it especially difficult to develop response plans for dealing with the many aftershocks. What should be the triggers for evacuating buildings and requiring them all to be re-checked for structural damage? With no hard and fast rules able to be identified, the response plan instead focused on establishing clear lines of communication and authorities for making key decisions.

A particular area of concern for the University was the possibility of a major aftershock during the examinations period and the ability to make and communicate decisions to exam invigilators as to what advice to give to students. With some large exams spread over several rooms across campus there was a strong potential for one room to self-evacuate, compromising the exam, while others continued to work through. Many exam invigilators are quite elderly, and some felt nervous about being put in a position of having to make judgement calls about the need to evacuate. Some were also unfamiliar with cellphones, complicating the task of getting messages/advice to them at short notice. In the end, the University went for quite a pragmatic approach, recognising that if students felt the need to self-evacuate from a building, (which had happened during some previous aftershocks), that academics would just need to come up with a fair way to mark the different exam completions. Increased numbers of security guards were put on duty during the exams period to assist should there be a problem. There were 110 aftershocks during the examinations period, but luckily, none strong enough to cause any problems.

Prior to the start of the 2011 first semester, the University is developing a revised aftershocks response plan in preparation for the return of our student body. A 5.1 magnitude earthquake on 20 January 2011 highlights the importance of ongoing planning and preparedness.

Just prior to Christmas, the University ran a risk session to identify significant and emerging risks facing the University as it recovers from the earthquake. A whole range of issues were identified, including there being no "B" Incident Management Team to relieve those already feeling overworked, ongoing challenges for keeping emergency contacts lists fully up to date, additional hazards created by the significant construction activity going on around campus, and concern over our capacity to deal with a mass casualty event. The session highlighted the dynamic nature of the risk landscape facing the University and the need to continually reassess the risks faced and the effectiveness of how those risks are being managed.

Lesson 37: The risk profile for the organisation will have changed as a result of the event. It is important for the organisation to reassess the risks that it now faces and to continually evaluate whether those risks are being managed effectively.

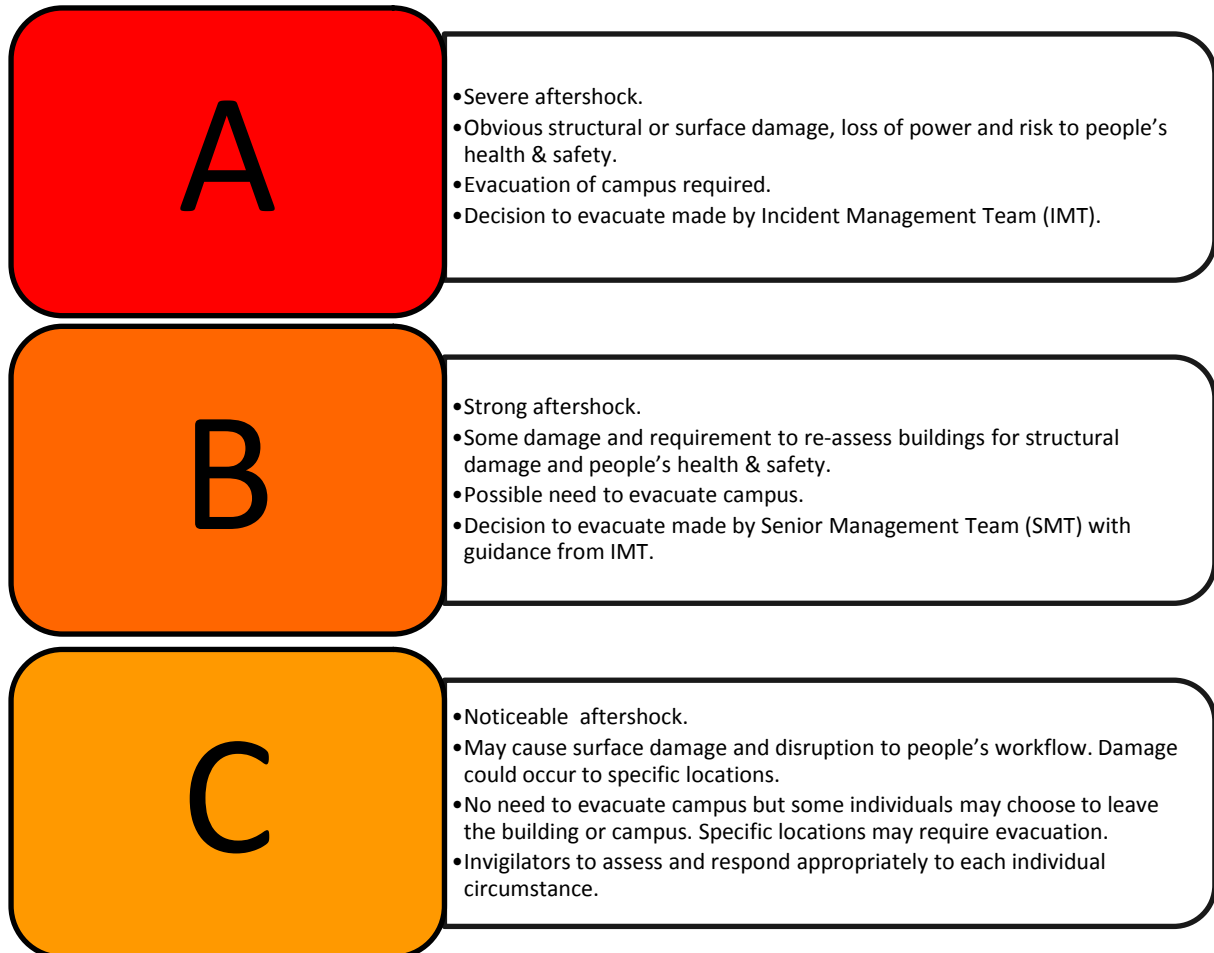


Figure 19: Overview of the aftershocks response plan developed for the examinations period.

It was identified that everyone badly needed a good holiday over the Christmas break. The Incident Management Team as well as other key people across the University were tired, stressed, and generally sick of the earthquake. Unfortunately nature has no mercy and a major aftershock shook the city on Boxing Day morning, causing significant additional damage in the city centre. Staff were called in from their holidays and had to work several days, but luckily there was no major damage sustained on campus.

Every cloud, as they say, has a silver lining. The crisis presented by this earthquake was no exception. The true test of the resilience of an organisation is its ability to seek out opportunity, even in times of adversity. It was heartening to see the University leadership team already turning their minds to how to find this silver lining within the first days of the response.

Perhaps the most significant opportunities that were taken related to damage within the libraries. Sue McKnight, the Pro-Vice-Chancellor of Learning Resources, was overseas at the time of the earthquake. Flying back to Christchurch immediately, she used her time on the plane to think

Peter Molony, the University's Facilities Management Director, clearly recalls the severity of shaking which badly damaged his home and smashed a large amount of crockery and glassware.

Finding a (normally readily available) torch in the pitch darkness was his first priority, followed quickly by a check on his family's safety. As he and his wife made their way out of their home, the severity of the event was very apparent, with obvious damage to the road and a burst water main close by.

Heading into the University, Peter's first impression of arriving on campus was a surreal experience. There was the uninterrupted wailing of alarms and being greeted by students from the Halls of Residence, some in their dressing gowns, wandering around not knowing what to do. *"It was obvious we were going to have to close the campus as soon as practical"* he said.

Once he had checked in with the security staff, he headed to the EOC to join the team which was gradually arriving. By 10:30 that morning, Peter felt things were under control enough for him to take a break and head home to assess the damage in daylight.

With cracked foundations, chimneys badly damaged and balancing precariously, his home was unsafe to live in. Peter and his family spent the first night in a neighbour's house (which was subsequently condemned) and then moved into a university house, which was fortunately available.

Although Peter was focused on the emergency response throughout, thoughts of home and family were never far away, as they were for nearly all of the Incident Management Team. Each time an aftershock occurred, every team member needed to know that personal concerns were addressed.

As Director of Facilities Management, Peter was a key person in obtaining approval to create a dedicated Emergency Operations Centre and a strong supporter of improving the University's emergency preparedness. When reflecting on these efforts he said that *"it had not only been proven to be a sound investment, but that continual review and on-going enhancement is an essential part of ensuring we are ready to respond to any future event"*.

strategically about the full spectrum of options available for getting library services back up and operating. Within a day of the earthquake, Sue had made contact with many of the online journal publishers and advised them about the situation faced by the University. These publishers made the extremely generous offer to provide the University with free access to many of their online resources (books and journals) with some offering their full online catalogues until the libraries could be reopened. To illustrate the generosity of these offers, the value of the resources was many millions of dollars and it could be claimed that the University had access to the largest online collection of any university around the world at that time. This meant that UC was able to continue to support teaching and research activities, even though physical access to the libraries and books was severely restricted.

There were other major opportunities taken. With many bookshelves needing to be replaced and many books already thrown into chaos on the floors, it seemed crazy just to reinstate them back to the way they were. The shelving layout was changed to provide exits at each end of the rows of shelves, rather than one in many instances; the collection was re-shelved in a logical order to make browsing easier, with A on the 11th floor, moving to Z on the 4th floor; Radio Frequency Identification (RFID) tags were added to all books, which will mean faster and more efficient borrowing of items for staff and students. This RFID project had been bounced around by library staff for some time, but had not yet been progressed to preparing a business case. The project, which during business as usual would have taken approximately two years to implement, will now be completed in four months, with the Central Library due to reopen in February 2011.

Lesson 38: There are always opportunities that emerge from times of crisis. However these opportunities are only recognised by those who take the time to pause, reflect, and actively look for them. The test of an organisation's resilience is in its ability to seek out opportunities, even in the midst of adversity.

As time progresses, it is important to be cognisant of the fact that people are at different stages of the recovery process. Some members of the University community will have their lives disrupted for several years as they wait for their homes and local communities to be repaired or rebuilt. For others, the Monday that

the University reopened for business, signalled for them a return to life as normal. There will also be some parts of the University whose workload has ballooned as a direct result of the earthquake. For them, the ongoing demands from other parts of the University to continue with business as usual as if nothing has happened, has the potential to push them to breaking point. We will need to keep taking stock and reminding ourselves that this recovery is a long-term effort.

Lesson 39: As life for the majority gets back to normal, paradoxically, it gets harder for those who cannot yet get back to normal.

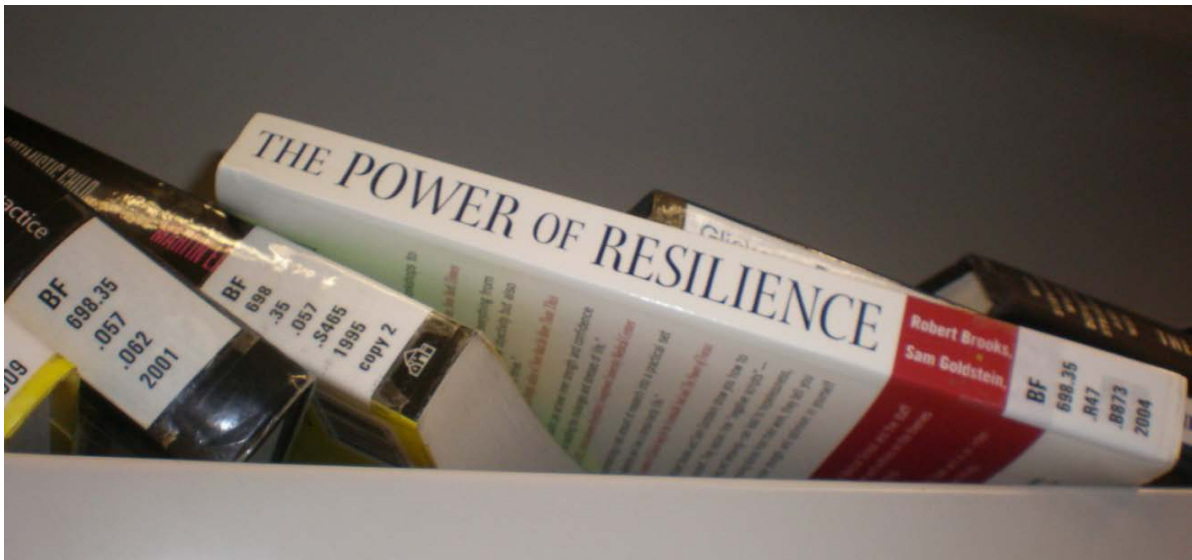


Figure 20: When looking at the damage to the James Hight Library, the title of one book still on its shelf jumped out.

6 Final Thoughts

On 4 September 2010 at 4:35am on an early spring morning, a seismic fault 11km underground and only 37km from New Zealand's second largest city, released tension which had been building for what our scientists estimate was more than 16,000 years (GNS, 2010b). The 7.1 magnitude earthquake ruptured the ground along a length of nearly 30km, displacing the ground above it by up to five metres in places (Quigley et al, 2010). The energy wave produced travelled outwards across the Canterbury Plains in all directions, including straight into the heart of Christchurch city.

No one knew this particular seismic fault existed, but the possibility of hidden faults under the Canterbury Plains had been previously identified. However, even if the existence of this fault had had been known, earth science cannot yet accurately predict what the earth will do at any given time. All science can do is to warn that seismic events are the natural processes of our planet, that

events such as this will occur, and that we should be prepared for them to occur either sooner or later.

The University had made significant efforts to prepare for an event such as this. We have learnt many things from this earthquake, but our most valuable lesson is that there will be other events in the future which we need to be ready to respond to.

Our preparedness programme must continue to be seen as a journey of continuous improvement and not a destination.

Lesson 40: A resilient organisation is one not only able to survive, but capable of thriving through times of adversity. Our preparedness programme must continue to be seen as a journey and not a destination.

7 Postscript: The 22nd February 2011 Earthquake

Just three weeks after this report was written, and 5½ months after the September 4th Earthquake, Christchurch was again hit by a major earthquake. This event, which occurred on 22 February 2011, was of a smaller magnitude (M6.3) than the September 4th Earthquake, but it caused much more severe damage to Christchurch city. The proximity of the epicentre just 10km from the city centre, and at a depth of only 5km, meant the shaking caused many buildings to collapse. The effects outside the city centre were also substantial with large areas of the city affected by extensive liquefaction and considerable damage to residential areas, city infrastructure and numerous retail precincts. The death toll from this earthquake is currently estimated to be 181 people with many more injured.

The 22nd February Earthquake saw the immediate activation of the University's Emergency Operations Centre, which stayed in full operation for six weeks after the earthquake. The earthquake occurred at 12:51pm on the first Tuesday of the new semester. With a fully populated campus, the University instigated an immediate evacuation and search of buildings, and by 5pm was able to report no serious injuries or fatalities had occurred on campus. Given the severity of the shaking experienced, a thorough five-step building evaluation process was implemented to carefully assess each and every building and confirm not only its structural integrity following the earthquake, but also its likely performance in future large earthquakes. The University's Vice Chancellor confirmed that these assessments had to be completed and acceptable results achieved prior to any building being reoccupied.

The University restarted teaching activities on 14 March, three weeks after the earthquake, in large marquees (tents) erected on campus car-parks, in numerous off-campus venues, and through online learning. Over the following weeks, additional precincts within the campus were gradually opened up as building safety assessments were completed and all but four of the marquees were decommissioned by 22 April, with the remaining marquees programmed for decommissioning before the end of May.

The 22nd February Earthquake was an event on a whole different scale to the 4 September event. Although it did not feel like it at the time, in many ways the earthquake on 4 September was our practice run for any future critical incident. On 22 February our experience gained during the response in September, and our continued focus on preparedness, contributed to an immediate and effective response when the earthquake struck.

We have learnt many more lessons from this most recent event, but rather than delaying the release of this report, these will be captured in a subsequent document.

8 Summary of Lessons Learnt

1. An earthquake is not a “one-hit” event. The number and severity of aftershocks, which continue for several months, are both surprising and demoralising. It is important to factor the ongoing reality of major aftershocks into your planning both for physical repairs and for the psychological effect on the community.
2. A bit of planning goes a long way. Even if your organisation is starting from a very low level, a lot can be achieved in just a few years to build capability for dealing with crisis events; but it does require the hard work and collaboration of a “team of champions” who believe in the cause, including support from senior managers.
3. If a university wants its staff to be there for it in times of crisis, it also needs to be there supporting staff when they are in crisis. We found staff went to great lengths to support the University in its time of need. Some staff had very significant issues at home that they were dealing with, making their commitment to the University response quite remarkable.
4. Even though it may be hard to miss that an emergency is unfolding from where you are, never assume that everyone is aware of the incident. Have an activation checklist in the EOC so that little “thinking” is required for those first few steps in the response process.
5. Careful consideration of Emergency Operations Centre (EOC) location, design and resources pays dividends. Use the EOC regularly for training and meetings so that you know in advance how the space works and people become familiar with the environment.
6. Having a pre-identified Emergency Operations Centre (EOC) as a known gathering point meant there was no confusion for key people over where to go to join the response effort.
7. On a large campus it is always going to take a long time to check each and every building. Develop a risk-based priority order (or several alternate priorities for particular times of day or types of event) that can be used to direct and co-ordinate initial reconnaissance efforts.
8. Often Facilities Management staff are likely to be first responders for many events such as this, and so provide them with some basic rescue training.
9. A large campus with more than 80 buildings and no electricity is challenging to physically “lock down”. Pre-planning should include assumptions that access card systems are not working and the need to revert to physical locks and keys (many of which may not have been used for some time). A regular schedule to check all physical locks is necessary to ensure they are available when required.
10. Have an HR person posted at the Security Front Desk – they have the communication skills required for dealing with distressed people, and also support the Security staff who come under pressure from staff and students.
11. Putting on catering for staff not only helped people to feel valued, but also provided a hub for interaction, helping significantly as a default point for communications.
12. Run an occupancy board so that you know at all times which buildings people are in – this is critical information in the event of a major aftershock.

13. Although there is a sense of urgency to assess the level of damage, with hindsight we found that damage assessments undertaken by laypeople were of limited value and also potentially put people at risk from major aftershocks.
14. With a “drip-feed” activation, the challenge of building up a common understanding of the situation becomes more challenging. Have regular short briefings during the first few hours and nominate someone specifically to the task of briefing new arrivals.
15. Consider communications deadlines when setting briefing times. Remember that key decisions coming out of the briefings set in train significant work to then communicate these decisions.
16. In a large-scale incident it is important to manage access into the Emergency Operations Centre. A room full of people is noisy and less productive.
17. Keeping the Strategic and Operational teams close together during the initial phases of response was invaluable, but as time went on, shifting the Strategic team into a less “busy” environment helped them to focus on the longer-term strategic issues.
18. Create a “time-out” space where EOC staff can take some time for themselves or to meet with their families during a break.
19. Every EOC needs a Fairy Godmother! The Fairy Godmother’s role is to provide an impartial and confidential sounding board for the Incident Controller and any other member of the response team who needs it, to bounce ideas around and to help them to step back and reflect on what was working, what wasn’t, and to uncover blind-spots in the response.
20. An experienced structural engineer who is familiar with the design of your buildings is a golden resource. If you can, have arrangements with an engineering firm to provide you with priority service – structural engineers are in very short supply following an earthquake!
21. Foster good relationships with key external agencies and suppliers. In the heat of the moment it is not the fine-print of contract wording that counts, but good personal relationships.
22. Response structures need to have a specified “Health and Safety” role for providing independent advice to the Incident Controller on the health and safety aspects of a response effort.
23. Actively engage the Students Association in emergency response planning, clarifying areas of autonomy and collaboration and ways to leverage their strong links with the student community.
24. Communications messages need to be consistent and yet tailored to the particular audience. To achieve this, be sure to spend sufficient time planning what the core messages are, before disseminating them to the teams drafting the various communications.
25. Keeping people away from campus can create a sense of disengagement, so it is important to counter this with more personal communications from Heads of Departments and other leaders so that people feel connected into the University recovery effort.
26. Key learnings from previous exercises that served us well in this event were, the need to:
 - act decisively, and
 - communicate quickly.

27. In a University environment, where the timetable is scheduled around weekly blocks, closure for a full week can in some ways be easier than closure for just three or four days.
28. Staged decision making works well. To provide people with at least some level of certainty in an uncertain situation, make early decisive decisions that still leave you with options open and provide defined timelines for when subsequent decisions will be made.
29. Actively partner and involve the Students Association in any decisions about how to restructure the academic year. This is important for getting student buy-in for any changes.
30. Have a designated staging area (separate to the EOC) for controlling access onto campus, where staff sign in and out and attend safety briefings.
31. Although there can be a lot of pressure to get back to normal as quickly as possible, sometimes taking a bit more time to allow people to be mentally ready to get back to business-as-usual helps in the long term.
32. Give careful consideration to appointing a Claims Preparer so that you are confident you have the very best team supporting you as possible – even better if you can do this before an event rather than after...
33. There is no current Standard for seismic design of shelving and racking systems. During the Canterbury earthquake many older style shelves and racking systems collapsed, despite having been lightly braced in the past, creating significant life-safety hazards.
34. Many old-style heavy plaster ceiling tiles are not adequately fixed and create a major hazard during an earthquake.
35. Factor into planning that building repairs will not commence immediately. Three months after the earthquake, damage is still being discovered and ongoing aftershocks means there is little point in even starting repairs to plastering etc.
36. In the heat of the response effort it can be easy to miss issues that, while not mission critical for the response, are important to particular stakeholder groups. Because they can see you are busy, they may not feel able to come and talk with you about it. If possible, pre-identify who those stakeholder groups are and what their issues might be.
37. The risk profile for the organisation will have changed as a result of the event. It is important for the organisation to reassess the risks that it now faces and to continually evaluate whether those risks are being managed effectively.
38. There are always opportunities that emerge from times of crisis. However these opportunities are only recognised by those who take the time to pause, reflect, and actively look for them. The test of an organisation's resilience is in its ability to seek out opportunities, even in the midst of adversity.
39. As life for the majority gets back to normal, paradoxically, it gets harder for those who cannot yet get back to normal.
40. A resilient organisation is one not only able to survive, but capable of thriving through times of adversity. Our preparedness programme must continue to be seen as a journey and not a destination.

9 Contacting Us

We have learnt so much from other universities and other types of organisations which have willingly shared their experiences with us, that we would be happy to pay the favour forward. If you have any questions about the University of Canterbury response and recovery effort to this earthquake, or about our ongoing programme for emergency preparedness, please contact either:

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Our emergency management website also has information and resources available that may be of some interest: www.canterbury.ac.nz/emergency.

10 Acknowledgements

It is difficult to specifically record the names of all those people who responded to the University's need when it was most required because there were so many of them. We will simply say that the University of Canterbury is fortunate to have a substantial number of dedicated people supporting it, who are prepared to respond, even when their own circumstances are difficult.

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