Providing continuity of service during 11,700 earthquakes in Christchurch, New Zealand

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Abstract:

This paper describes how 4 library services in Christchurch, New Zealand, continued to provide some services to their user communities through the devastating sequence of 11,700 earthquakes that occurred in 2010-2012. Senior managers from those libraries reflect upon what they learnt from their experiences, how well their business continuity plans served them, what adaptations were made to them and what opportunities arose through shifting organisational priorities.

There have been 2 large earthquakes, 450 significant earthquakes and thousands of aftershocks that resulted in 185 deaths in Christchurch, (New Zealand's second largest city) and much damage and destruction. Essential services such as power, water, sewage and telecommunications were damaged and disrupted across the city. In the immediate aftermath the city was in mourning for the dead, and focused on recovery of essential services.

Recovery of library services was a later priority. Christchurch is an interesting case study for business continuity because the sequence of earthquakes has been so long, that libraries have learnt from their experiences and refined their processes and procedures. Different earthquakes affected the 4 library services differently in their impact upon both their physical and digital channels. The earthquake of 4 September 2010 caused some libraries to close for restoration and had some impact on digital channels. The more damaging earthquake of

22 February 2011 caused considerably more damage for most libraries to the library buildings, shelving and collections. However, the changes that had been made to digital channels meant that most library's digital channels continued to operate with less disruption.

On the whole, digital channels were much less affected by the earthquakes than physical channels and were important in providing information about what services were available and from where. They allowed users to continue to have access to library services, provided the user was already using digital channels and had power and internet access at home.

The four Christchurch library services surveyed found that in a disaster of this scale, their own disaster plans were overtaken by organisational and community priorities. All of them commented that people issues such as contacting staff to confirm their welfare, pastoral care, direct assistance, communication and support to the user community, took much more time and energy than their plans allowed for.

Several of the library services took advantage of opportunities that arose through shifting priorities and resource allocation. This allowed two library systems to implement RFID in the months following the large February 2011 earthquake and the public library to implement free Wifi.

The libraries are working together collaboratively with national heritage institutions such as the National Library of New Zealand to collect and curate the documentary record of the impact of the earthquakes of 2010-2012 on Christchurch.

Continuity of service through 11,700 earthquakes in Christchurch

The impact of the Earthquakes

Christchurch is New Zealand's second largest city and has suffered a devastating series of earthquakes which began on 4th September 2010 and is ongoing. There have been 4 large earthquakes, 450 significant earthquakes and thousands of smaller aftershocks. The second large earthquake on 22nd February 2011 resulted in the deaths of 185 people, the loss of 1200 commercial buildings and 7000 homes. A state of national emergency was declared which lasted for 6 weeks. Basic services including the water supply, sewerage, electricity and phone networks, were all interrupted after the September and February earthquakes.

About 350 people were injured and over 100,000 homes were damaged and require repair or rebuilding. Twelve schools were wholly or partially relocated which meant that more than half of the secondary schools were sharing their school facility with another school. Forty percent of the heritage buildings in Christchurch have been demolished or severely damaged, which will markedly change the character of the city.

Cathedral Square. Photo by Andrew Panckhurst CC BY-NC-ND

Partially collapsed PGC building. Photo by Andrew Panckhurst CC BY-NC-ND

Crowd gathers in Latimer Square. Photo by Braden Warnock CC BY-NC-ND

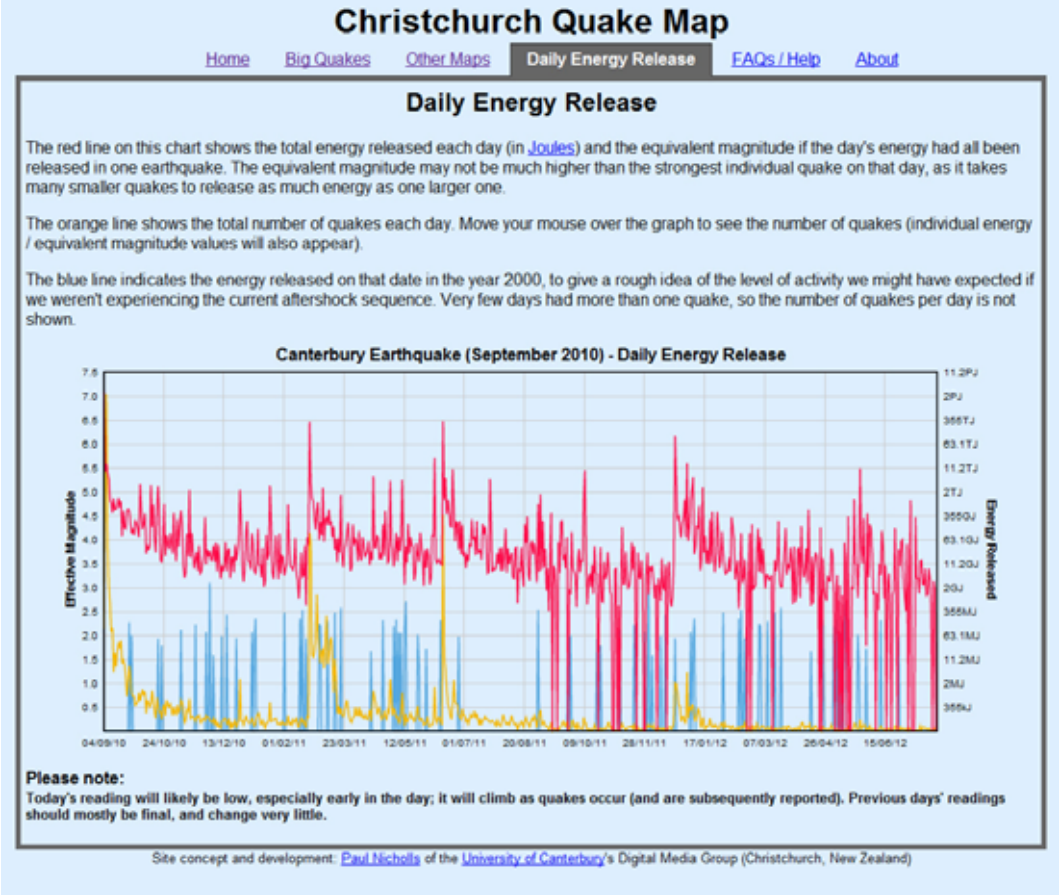
Car in a liquefaction sink hole, New Brighton.

More than 60% of the 5000 businesses in the central city and their 50,000 employees were displaced which has meant that 1/3 of central city businesses were unable to operate and another 1/3 had to operate from makeshift premises. [1] The total cost to insurers of rebuilding has been estimated at NZ$20-30 billion[2], making it one of the costliest natural disasters worldwide.[3]

This is a major natural disaster affecting the entire city and the surrounding regions. An unusual feature of Christchurch's earthquakes is the number of aftershocks and the timescale of the earthquake sequence. New Zealand is on the Pacific rim of fire and therefore earthquake-prone. New Zealand has stringent building codes which kept the loss of life relatively low in global terms. New Zealand also has high levels of disaster preparedness with most organisations having a business continuity plan which is kept updated and supported by training exercises.

This graphic shows the energy released by the earthquakes, the size of them and the number of earthquakes each day. [4]

[1] http://cera.govt.nz/recovery-strategy/overview/questions-and-answers#16
[2] http://www.parliament.nz/en-NZ/ParlSupport/ResearchPapers/b/5/4/00PlibCIP051-Economic-effects-of-the-Canterbury-earthquakes.htm
[3] http://www.munichreamerica.com/webinars/2011_07_natcatreview/MR_III_2011_HalfYear_NatCat_Review.pdf
[4] http://www.christchurchquakemap.co.nz/dailyEnergy



Context of library closures - September earthquake

The September 2010 earthquake which was a 7.1 on the Richter scale caused surprisingly little damage overall, partly because it happened at 4.36am when no-one was in the city where buildings collapsed. A state of national emergency was declared and many buildings were closed for engineering evaluations. Many buildings closed, including some library buildings. There was widespread disruption to services for a time, and ongoing disruption to roads, sewage and water in some neighbourhoods.

			
Westende Jewellers, central city. Photo by Geof Wilson, Lewis Bradford Consulting Engineers. CC BY-NC-ND	*The fault line rupture went right through this Darfield house. Photo by Helen Trappitt, Lewis Bradford Consulting Engineers CC BY-NC-ND*	*Brick facade fell on this unoccupied car, central city. BeckerFraserPhotos CC BY-NC*	*Operation Reassure - police and army personnel check on damaged houses. BeckerFraserPhotos CC BY-NC*

Context of library closures - February earthquake

The 22nd February earthquake was more damaging because it was close to the centre of the city, shallow, and had particularly high ground accelerations. Most buildings performed as well as or

better than they were designed to, and allowed people to evacuate them safely. The 185 people who died were mostly killed by buildings falling on them with a small number dying from rock falls.

Staff and patrons evacuated all the libraries safely. There were 190 aftershocks on the 22nd February which hampered rescue and recovery operations. There was considerable damage to essential services such as water, sewerage, power and telecommunications.

USAR[5] workers inspecting damage. Photo by Geof Wilson, Lewis Bradford Consulting Engineers. CC BY-NC-ND

Typical damage inside homes. Photo by Roz Wilmott-Dalton.

Damage to the Cathedral of the Blessed Sacrament. BeckerFraserPhotos CC BY-NC

How distressing to find a rock of this size in your front yard. Sumner house. BeckerFraserPhotos CC BY-NC

Impact of nearly 11,700[6] aftershocks

While the ongoing aftershocks are mostly smaller, they complicate the recovery effort which must be carried out in the environment of the possibility of another large earthquake. The high number of aftershocks have a psychological impact upon the people of Christchurch, keeping their nerves stretched, stress levels high and interrupting sleep. The city is enduring far more change than most people find comfortable with the demolition programme still underway and the major rebuild programme about to pick up speed.

The government agency created to take responsibility for the recovery from the earthquakes has required building owners to undertake detailed engineering evaluations to ensure that buildings meet the required standard. Recently another of the Christchurch City Libraries branches was found to be below the standard and was closed immediately.

The Libraries surveyed

With the extent of the damage caused by the series of earthquakes, most libraries in Christchurch suffered damage in at least one of the earthquakes that impacted their services in some way. The libraries which were surveyed for this paper included:

- Christchurch City Libraries - the public library which had a large central library and 19 branches. The Central Library was damaged in the February earthquake as well as 3 branch libraries. A further 3 branch libraries were taken over by the City Council for other purposes. As a result of ongoing engineering evaluations because of all the aftershocks a further branch was closed in July 2012. The Central Library was inaccessible within the cordon for over a year.

[5] USAR = Urban Search and Rescue

[6] http://www.canterburyquakelive.co.nz/ Accessed 31 July 2012 when number of quakes was recorded as 11,703.

- Canterbury University Library - served a student population of about 16,000 at the time of the earthquakes with 800 academics and 1200 support staff. The shelving in the Central Library building was damaged during the September earthquake and the building had just been reopened when the February earthquake struck and closed the building for a further period of time.
- Lincoln University is a smaller specialist university with a student population of about 3000 equivalent full time students and about 600 staff on the Lincoln Campus. The September earthquake had the greatest impact for Lincoln University Library when 200,000 collection items ended up on the floor. Re-shelving materials took a week once staff were permitted back into the Library. During the more generally damaging February earthquake Lincoln University suffered less damage and disruption as it was further away from the epicentre.
- Aotearoa People's Network Kaharoa (APNK) is a service run from the National Library's Christchurch Centre. It provides free internet access through New Zealand's public libraries. It was offline for only 29 minutes during the February earthquake although the National Library's Christchurch Centre was badly damaged and later demolished.

Lincoln University Library, impact of 4 September 2010.

Christchurch City Libraries, Central Library. Impact of 22nd February, 2011.

School library, Impact of 13 June 2011.

Branch Library closed on 23 July 2012.

The first weeks after the 22 February earthquake

All the libraries surveyed had digital channels which continued to operate largely unaffected through the earthquakes. After the February earthquake, during the period of the national emergency, many organisations were closed as the focus of the city was upon rescue and recovery of bodies in the damaged heart of the city and the restoration of essential services. During this period, the citizens of Christchurch were focused upon their families and their homes, mourning those who died and connecting with loved ones. Many people left the city temporarily while the essential services were restored. Some library staff volunteered or were called upon to assist in the efforts of their parent organisations in pastoral care or more active restoration of services if they had appropriate skills.

Christchurch City Library staff assisted in a variety of ways. Photos supplied by Christchurch City Libraries.

Who's in charge?

No disaster plans predicted the extent to which the recovery effort was controlled from outside of the Library because of the scale of the disaster. Civil Defence controlled the response because a state of national emergency had been declared and made binding decisions about which buildings were safe to enter and who and when they could be entered.

There was a lot of collaboration between business units and organisations across the city. The first priority was rescue and recovery of the injured and those who had died. The second priority was restoration of essential services with a lot of the damage occurring underground to water, sewerage, power and telecommunications. Restoration of library services was a later priority.

Are our people safe?

The other area which was underestimated in the disaster plans, was the major focus on contacting everyone and checking their welfare and the state of their families and homes. Although telecommunication services were available through the earthquakes the networks were so overloaded by people contacting loved ones that communications were restricted to text messages wherever possible. The priority for everyone was to know their families were safe. For many people their homes were either damaged or uninhabitable, so they went to stay with family or friends. Getting hold of staff to ascertain their welfare was important and challenging in the circumstances. Some libraries found their contact details were not up-to-date enough or that they did not have enough alternative contact details or the contact details were not readily accessible. One service, APNK, had up-to-date contacts on all cellphones which made it much easier for them to contact staff. Lincoln had an up-to-date telephone contact tree as part of their disaster plan which meant members of their Disaster Salvage Team were able to contact all staff in a coordinated manner but they were not able to contact all their student helpers.

Not everyone was available to contribute to recovery operations. Some people had pressing home priorities that needed their attention, some were affected directly by the earthquakes (injured or distressed), and some were diverted to other more important priorities. Flexibility was needed to deal with the recovery operation with the people who were available. There were also volunteers wishing to assist and some libraries had to say no to some of them.

Impact on digital services

The four library services surveyed all had an array of digital services delivered through their websites to their communities. In the case of APNK the entire service is a digital service and they are accustomed to working remotely. For APNK's digital services to continue to operate there were four things necessary:

- functioning data centre
- internet available
- voice service available to allow customer contact
- staff available for the help desk service

In all four library services surveyed the data centre withstood the earthquakes well and was able to continue to function. Data centres are usually outsourced to the parent organisation or an external supplier. All the data centres had alternative sources of power and were strong enough to allow them to keep functioning. In some cases, the data centre was not in Christchurch but in another New Zealand city that was not in the earthquake area.

Impact on usage

All four libraries surveyed indicated no significant change in usage of the digital channels despite the fact that digital services were available and functioning and some of the physical library facilities were not. In a disaster of this scale there is a period when people are more focused upon shelter and safety before there is a desire to use library services. Lincoln noted that in terms of "shelter and safety", the Library building became a central hub with the University administration setting up a temporary desk to provide support, pastoral care and information to both students and staff. Many Lincoln students, both domestic and international, felt safer at Lincoln than in their city flats and houses.

Furthermore, many people reported difficulties in concentrating because of all the aftershocks and the resultant stress and disrupted sleep. A large scale disaster is not a good time for people to learn to use the digital services if they are not already familiar with them. In many homes, students and citizens were still experiencing some disruptions to power and internet access from the aftershocks.

When the public library branches did re-open there was warm feedback from the community about how grateful they were to be back.

Bishopdale Branch Library thronged with people.

Lincoln University Library - students using PCs in the Library.

Staff and volunteers reshelving books at Lincoln University Library.

Temporary lecture theatres in tents.

Vendors assisted

All three libraries reported that the vendors of electronic resources, both e-books and e-journals offered them free access to extra resources for a limited period of time to help to compensate for the reduced access to their physical collections.

Disaster plans

All the library services had current disaster response plans. In a large earthquake there may not be time to take the disaster response plan off the shelf as you evacuate the library once the shaking stops. As part of disaster planning at Lincoln, all members of the Disaster Salvage Team had copies of the disaster plan at home and having an electronic copy of the plan available remotely is also

valuable. However, all the services reported that the disaster plan was useful and used. The fact that most of them have not made major revisions to their disaster plans shows that the plans were useful as they were. Everyone has improved the way they make contact with staff mostly by ensuring that managers have the lists on their cellphones. In Canterbury University's case their procedure is for staff to contact the manager, so that the manager's task is made manageable by only having to follow up on those who have not made contact. Lincoln commented that as well as having an up-to date plan, having a well-trained disaster team had been invaluable in helping with an efficient and effective recovery.

Making the most of opportunities

Both Canterbury University Library and Christchurch City Libraries have implemented RFID projects during the months following the earthquakes. For Canterbury University funding became available because another project was unable to progress, provided they could complete the project in 4 months. Christchurch City Libraries also found their project delivery was different from the original plan. Christchurch City Libraries also suggested libraries as a suitable community space when Telecom New Zealand offered free Wi-Fi to Christchurch for a period after the earthquakes and has continued with the Wi-Fi service.

Capturing the record of the disaster

A number of culture and heritage organisations are working together to collect a record of the earthquakes and their impact upon Christchurch. Christchurch institutions and national institutions such as the National Library of New Zealand and Te Papa, the National Museum of New Zealand, have collaborated. As well as their ordinary collecting of the documentary heritage, the National Library commissioned a photographic record (about 15,000 photos so far) an oral history study and increased their harvesting of Christchurch websites, especially those set up to respond to the emergency.

Canterbury University led a collaborative project to build a research repository, UC CEISMIC, which is building federated access to a broad range of earthquake-related research material, gathered by leading New Zealand cultural and educational organizations. .[7] Many of those resources will be contributed to the National Library's National Digital Heritage Archive where they will be made available to future generations to help them understand how Christchurch has changed as a result of the earthquakes. [8]

Conclusion

This major natural disaster in Christchurch has demonstrated both the usefulness of business continuity planning and the importance of digital channels to providing continuity of service. However it also demonstrated that business continuity plans generally underestimated the focus on people that was required. Digital channels were used by customers at about the same level as before the earthquakes.

[7] www.ceismic.org.nz
[8] http://ndha-wiki.natlib.govt.nz/ndha

Compiled by Moira Fraser, BeckerFraserPhotos from interviews with:

- Andrew Adams, Digital Library Services Manager at Christchurch City Libraries;
- Anne Scott, Acting University Librarian, and Joan Simpson, Resource Discovery Team Leader, University of Canterbury
- Graham Penwell, Group Leader - Access / Records Manager, Library, Teaching and Learning, Lincoln University
- Chris McClement and his team from Aotearoa People's Network, Kaharoa, a unit of the National Library of New Zealand.

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