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ABSTRACT

The Great Southern California ShakeOut involved the development of a realistic earthquake scenario, from which a series of earthquake related activities were initiated. The ShakeOut scenario was developed by the United States Geological Survey (USGS) and partners, and was based on a magnitude 7.8 earthquake on the San Andreas Fault. After its development, the scenario was workshopped with stakeholders to determine the impacts a 7.8 earthquake would have on society, and the potential emergency response that would be needed for such an event. An emergency management exercise – the Golden Guardian 2008 - was organised and run to reflect the scenario. This exercise began at 10:00 am on 13 November 2008 after the occurrence of a hypothetical earthquake event, and ran for several days. As part of the exercise, a ShakeOut earthquake drill was also arranged and held at 10:00 am the same day. For the ShakeOut drill, people were asked to 'drop cover and hold' as if a real earthquake was occurring.

Before the Golden Guardian exercise and ShakeOut drill were held, information about earthquakes, how you can practically prepare for an earthquake, what other people were doing and current earthquake-related community activities, was provided through multiple communication channels and repeated constantly. A website was also set up where people could sign up and indicate their participation in the drill. The comprehensive communication process and its associated activities prompted a large number of individuals, community groups, emergency management organisations, private businesses, schools and other educational facilities to become involved in participating in the Golden Guardian exercise and ShakeOut drill. In total, an astounding 5.2 million people signed up on the ShakeOut website to participate in the drill on 13 November 2008.

While the communication messages and community activities got people to think and talk about earthquakes and participate in the exercise and drill, it is difficult to say what influence the ShakeOut had in terms of getting people to undertake household preparedness activities (e.g., making emergency plans, storing food and water). A quantitative survey is required to accurately measure any changes, and this will be undertaken as part of future research. Preliminary data for hardware sales at Home Depot, a home improvement store in the U.S, did indicate that sales of preparedness items (e.g., furniture straps, earthquake putty, crank radios and other tools) rose in the weeks leading up to and immediately after the ShakeOut drill. Anecdotal discussions with community members also pointed to the importance of community-based participation in getting people involved in the ShakeOut exercise and drill, and in getting prepared for disasters.

KEYWORDS

Earthquake, drill, ShakeOut, southern California, preparedness, hazards, community

1.0 INTRODUCTION

There is an ongoing challenge to improve communities' understanding of the risks they face and to empower them to take action to reduce these risks and manage the consequences of disasters. The active involvement of formal and informal community networks in hazard education programmes and other mitigation activities has been shown to be a key predictor of preparedness (Paton and Johnston, 2006; Finnis et al., 2007). There are many opportunities to improve preparedness through community-based hazard education programmes. This report describes an initiative that involved all levels of the community in planning for earthquakes.

In November 2008 an earthquake exercise and drill event was held in southern California (<http://www.shakeout.org/>). The exercise and drill event was based on an earthquake scenario developed by the USGS and partners called the *Great Southern Californian ShakeOut*. The scenario was based on a magnitude 7.8 earthquake on the San Andreas Fault, typical of an event that may strike southern California in future. It was anticipated that the development of such a scenario would help people understand what an earthquake in southern California might be really like, and would assist them in planning for such an event, whether it be at emergency management, community or individual level.

The holding of the earthquake exercise and drill, based on the ShakeOut scenario presented a unique opportunity for research. In particular from a New Zealand perspective there was interest in the benefits of developing detailed earthquake scenarios, the application of such scenarios to exercises and drills, and the community education undertaken around these aspects. As a consequence, several New Zealand representatives visited California while the earthquake exercise and drill was taking place. One of those attendees, Julia Becker, represented the Earthquake Commission to explore the role of scenarios, drills and exercises and how they tie in with community education and community resilience.

Research was primarily conducted through a series of informal interviews and was focussed on the influence that the earthquake exercise, drill, and related educational activities had on awareness and preparation, including consideration of the following themes:

- who was involved in the exercise and drill itself (and related activities);
- the types of participation that occurred;
- how this participation was made possible;
- the effectiveness of the exercise and drill in raising awareness about the potential effects of an earthquake;
- the effectiveness of the exercise and drill in contributing to individuals and/or communities adopting actual hazard adjustments;
- what actual hazard adjustments were;
- potential drivers for those adjustments; and
- other key activities (which may be related or unrelated to the exercise and drill) that may have contributed to individuals and/or community groups adopting actual hazard adjustments.

The interviews were complemented by reading through literature related to the ShakeOut and other relevant reference material.

This report outlines observations from the reconnaissance trip and makes recommendations on whether a ShakeOut-type earthquake exercise and drill would be useful for New Zealand and how this could link with other functions such education and preparedness.

2.0 BEGINNINGS OF THE SHAKEOUT SCENARIO & ASSOCIATED ACTIVITIES

The ShakeOut scenario evolved gradually over a period of approximately two years from a seed planted at the San Francisco Centennial Event, a conference focussed around the 1906 San Francisco Earthquake. It was thought that it may be possible to have some kind of event that recognised the earthquake risk in southern California. This idea eventually evolved into the development of a specific earthquake scenario for southern California and use of that scenario in appropriate activities, such as an emergency management exercise and earthquake drill.

A number of factors helped the ShakeOut scenario and associated activities come to fruition, including:-

- a solid scientific research foundation, which allowed a better understanding of earthquake hazards in the region and the potential physical and social impacts;
- input from the United States Geological Survey (USGS) Multi-Hazards Demonstration Project as part of that foundation;
- demand from local authorities and emergency managers for scientific ‘products’ that were useful to them;
- the development of a specific earthquake scenario centred around evidence-based physical and social science;
- strong leadership from individuals and other stakeholders to get activities related to the ShakeOut happening (e.g., exercise, drill); and
- buy-in from the wider community who wanted to contribute to and participate in activities related to the ShakeOut.

The following sections of this report outline these aspects in more detail.

2.1 USGS Drivers

Lucy Jones and other staff from the USGS became involved in a local project that involved hazardous issues. For this project there was a desire to undertake construction works in an area where there were water, environmental and active fault issues. As a consequence of being part of this project Lucy and her team realised that there was potential to implement further studies where multi-hazard impacts were considered.

At the same time in the USGS policy sphere, the USGS were looking to work on a big project where they could make a difference. Eventually they decided to choose hazards as their theme. It was realised that after Hurricane Katrina this was a sphere that the USGS could have a big influence in, and where lives could be saved. This led to the initiation of the USGS Multi-hazards Demonstration Project.

2.2 USGS Multi-Hazards Demonstration Project (MHDP)

The USGS Multi-Hazards Demonstration Project was initiated in 2007, and had the aim of bringing together a variety of disciplines to work together to increase the resilience of communities to natural disasters. It was felt that only by working as part of a multidisciplinary approach could a comprehensive understanding be gained of the physical and social risks posed by hazards, and sustainable solutions. Relevant disciplines to the MHDP include geology, water resources, geography, biology, economics, engineering and social science, while the natural hazards in question include earthquakes, floods, wildfires, landslides, coastal erosion and tsunamis. As well as considering individual hazards, hazard interactions are also taken into account (e.g., the impact of earthquake induced landslides).

Specific requirements of the project include:

- Create a focal point to improve communication among scientists and disaster managers and community planners.
- Plan USGS science projects with community partners. Interaction with community partners will aid the USGS in understanding community needs, improve emergency-management decisions, and guide future USGS research.
- Initiate or expand real-time hazard monitoring and warning systems.
- Provide new and easy-to-access hazards data, information, assessments, and models for use by community decision makers and researchers.
- Develop and improve new research products, tools, risk maps, and assessments. Combine geologic, hydrologic, geographic, and biologic hazard products with economic, engineering and social science research to improve emergency-management decisions.
- Use the best of what is developed for the MHDP for southern California to build a robust urban hazards program for the nation (<http://pubs.usgs.gov/fs/2007/3037/>).

As part of the project, the aim is also to ensure that natural-hazard information is useful to community decision makers in preparing risk-reduction strategies. In order to achieve this, the USGS works with collaborators who help in setting the direction of future research and in applying the results of scientific research to loss reduction. Partners include state, county, city, and public lands government agencies, public and private utilities, companies with a significant impact and presence in southern California, academic researchers, Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), and local emergency response agencies (<http://ca.water.usgs.gov/projects/hazards.html>).

The ShakeOut scenario was produced as part of the USGS Multi-hazards Demonstration Project. The aim of the scenario was to identify the physical, social and economic consequences of a major earthquake in southern California, so that people could use the results to identify what they could change before an earthquake strikes a region to mitigate or lessen the impacts of such an event (Jones et al., 2008).

2.3 Development of the Scenario

The scenario was based on a potentially real event - a magnitude 7.8 earthquake located on the southern San Andreas Fault. The location for the scenario was selected based on the amount of strain accumulated on that part of the fault, and the risk of it rupturing (Perry et al., 2008).

Modelling of the potential earthquake was undertaken to determine the amount and nature of groundshaking that would occur across the region and liquefaction and landsliding in some focus areas of importance to infrastructure. This was then combined with information about building inventory, infrastructure and lifelines to determine the physical impact of the earthquake. Based on the physical impact it was then possible to estimate casualties, speculate lifeline service restoration, and model the impact of the earthquake on southern California's economy and society (Jones et al., 2008; Perry et al., 2008).

In keeping with the purpose of the Multi-Hazards Demonstration Project, the team developing the scenario were multi-disciplinary and consisted of scientists, social scientists, economists, engineers, lifelines specialists and emergency management officials. Organisations represented included the USGS, Governors Office of Emergency Services, California Seismic Safety Commission, University of Colorado, California Geological Survey, MMI Engineering and the University of California, Los Angeles.

2.4 Use of the Scenario

Once the physical and social dimensions of the ShakeOut scenario had been developed, it could then be used for planning for risk reduction, emergency response and recovery. The MHDP (led by Lucy Jones) conducted a series of meetings and workshops with emergency managers and other stakeholder groups to ask how the information that had been prepared about earthquakes could be of use to them. Emergency managers and other stakeholders responded by saying that they would like to see the information used to develop the scenario further so that it could be directly applied to emergency management. They could then use the emergency management aspects in an exercise. The USGS were happy to do this, as long as the end-users were committed to using and applying the scenario information.

It was decided that the Golden Guardian state-wide programme for emergency management exercising in California would use the scenario as their exercise for 2008. A time and date was set for when a fictional earthquake based on the ShakeOut scenario would occur. The Golden Guardian exercise and associated ShakeOut drill was set for 10.00 am on 13 November 2008 (Pacific Standard Time, PST).

To assist with emergency planning, time was spent translating the scenario reports into exercise formats. The Golden Guardian exercise planners hired consultants to help compose situational reports and extract "injects" from the materials. Members of the USGS team attended emergency response and recovery exercise planning meetings to present on the topic of the meeting and to help locate information in the report that was relevant for constructing an exercise. As well as the workshops being of benefit to the emergency managers in developing the exercise, it assisted USGS staff in understanding the planning process for an emergency exercise.

A narrative was constructed to guide those participating in the exercise (see Perry et al., 2008 for the narrative). It outlined the impacts of the earthquake at different points in time (minutes, hours, days, months and years) so that people could plan a response around those time points. In disseminating information about the exercise and drill, organisers made sure that they stressed that the earthquake was hypothetical but realistic, and was not a prediction of any sort.

2.5 Use of Social Science principles for ShakeOut

It was decided to ensure that every part of the ShakeOut scenario development, exercise and drill was based on 'evidence'. As a consequence, during scenario development, as well as there being a significant physical science research input which outlined the physical effects of an earthquake, there was also a strong social science research input to help understand what social impacts there might be.

In carrying out communication activities around the ShakeOut drill, social science principles were also adhered to. Social science research (e.g., Mileti, 1992; Paton, 2006) has found that 'critical awareness' or the degree to which people think and talk about hazards with each other is a predictor of people being involved in preparedness activities. Organisers wanted to (a) get people thinking and talking about earthquakes and preparedness; and (b) actually go and undertake preparedness actions.

To encourage this, communications were focussed on three key areas:

- Earthquake scenarios and preparedness messages were presented to communities, repeatedly and consistently. Messages came from multiple sources.
- Organisers provided visual images of people preparing for earthquakes to show what others were doing and the specific actions they were undertaking.
- Organisers encouraged the 'milling' principle whereby people talk about the drill and preparedness with the people they care about (e.g., families) and also with others who may have taken action.

There was a desire to shift the culture about earthquakes in southern California, so that people would see they were 'in this together' and take greater responsibility for earthquake preparedness (Benthien, 2008). Many of the messages that were broadcast about the drill emphasised this need to take responsibility, and look after one another.

2.6 Formation of a Steering Committee for the ShakeOut Drill

As more people became involved in discussions about the scenario, the exercise and the drill, interest grew and it was suggested that other potential activities could also be run. For example, the Art Center College of Design were interested in being involved in assisting with developing communication messages about preparedness; and the City of Los Angeles said that they wanted to organise and run an International Earthquake Conference alongside the exercise.

To cope with the suggestion of multiple activities, a steering committee was formed to assist with coordinating the activities associated with the ShakeOut drill (the scenario development and exercise was managed separately). This group was formed in February 2008. The steering committee consisted of a collaboration of non-profit, business, government and education partners sitting within the structure of the Earthquake Country Alliance. Partners included:

- United States Geological Survey
- State Farm Insurance
- California Office of Emergency Services
- Office of Homeland Security
- California Seismic Safety Commission
- Southern California Earthquake Center (SCEC)

- City of Los Angeles, Office of Councilman Greig Smith
- Art Center College of Design
- California Institute of Technology (Caltech)
- Providence Hospitals
- LA County Fire Department.

3.0 HOW THE SHAKEOUT SCENARIO & ASSOCIATED ACTIVITIES FINALLY LOOKED

As it evolved, ShakeOut eventually came to be known by multiple components:

1. The original ShakeOut scenario developed by USGS and partners (described in 2.3)
2. ShakeOut drill
3. Golden Guardian 2008 emergency management exercise
4. International Earthquake Conference
5. Los Angeles Earthquake: Get Ready Rally
6. After Shock Multi-player Simulation
7. Take one more step.

3.1 ShakeOut Drill, 13 November 2008

The ShakeOut drill was scheduled to take place on 13 November 2008. At 10.00 am on 13 November 2008, a hypothetical magnitude 7.8 earthquake located on the San Andreas Fault was to occur. At this exact time, those participating in the drill were to 'drop, cover and hold' to protect themselves as if a real earthquake was occurring. Following the drill itself, participants were encouraged to continue responding to the earthquake scenario (e.g., evacuate buildings, check utilities, apply first aid, etc). Some participants used the opportunity to hold a full scale earthquake exercise, either by joining the Golden Guardian response, or undertaking their own exercise.

The drill was intended to involve as many people from the community as possible (in addition to the Golden Guardian exercise) including organisations, community groups and individuals. A website was provided so that people could register to say they were taking part in the drill (www.shakeout.org). The website provided the ability to register both individuals and groups of people (e.g., schools, organisations, businesses, community groups).

Information resources were developed for the drill and made available to the public. Such resources included drill broadcasts (which could be run during the drill itself or before/after as required), the "Preparedness Now" video, and posters. Earthquake and preparedness resources which had previously been developed continued to be made accessible to the public through the ShakeOut website and other avenues (e.g., "Putting Down Roots in Earthquake Country", Jones and Benthien, 2007). Messages were provided about what the appropriate response was in an earthquake (i.e., 'drop, cover, hold'), and how to prepare for an earthquake (e.g., see www.earthquakecountry.info and www.daretoprepare.org from the Earthquake Country Alliance). Information was also provided in multiple languages so as to reach as many people as possible.

The drill itself occurred on 13 November 2008 as scheduled (Figure 1). During the drill individuals, schools, organisations and communities groups 'dropped, covered and held-on' and participated in various levels of exercising.

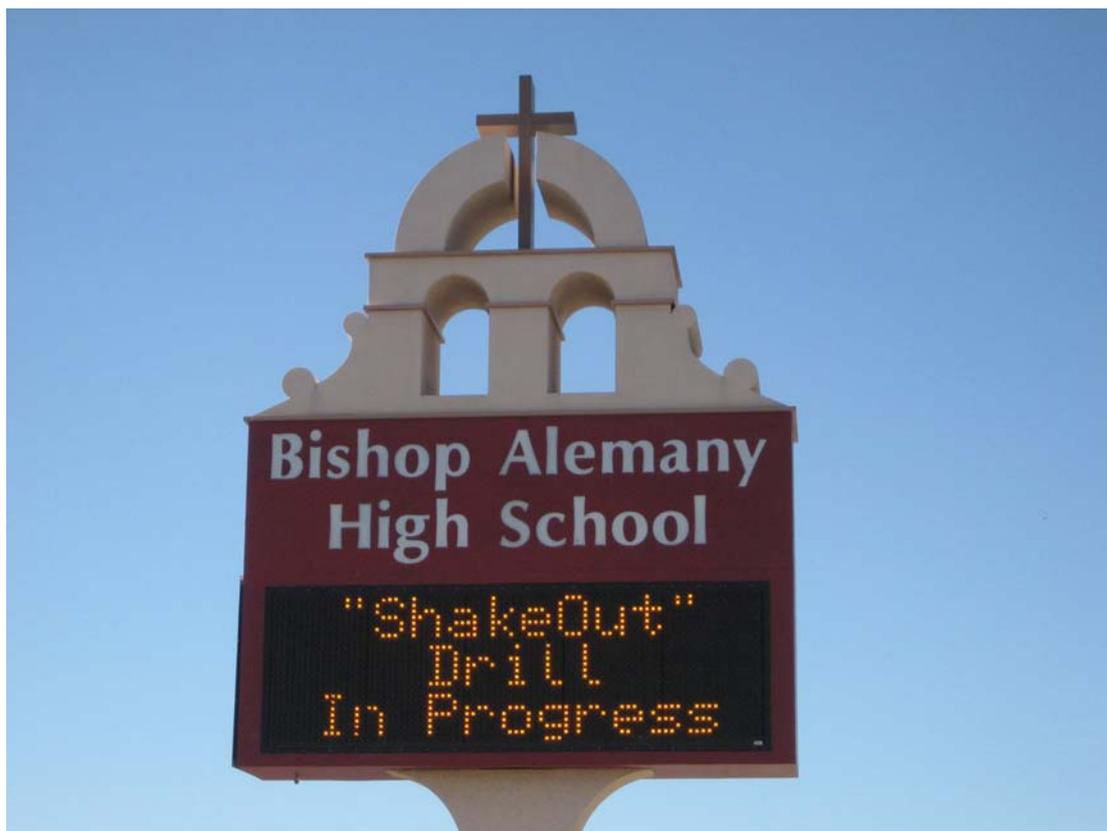


Figure 1 The ShakeOut drill, advertised on a high school information board during the exercise itself, 13 November, 2008.

3.2 Golden Guardian 2008 Emergency Management Exercise

13-18 November 2008

Golden Guardian is a state-wide programme for emergency management exercising in California. It began in 2004, and since then emergency management exercises have been carried out every year mainly focussed on terrorist attacks, earthquakes and mass gatherings. Sectors involved in the exercises include the city, county, State, federal, tribal, volunteers and the private sector. In addition to the exercises, Golden Guardian is also involved in training first responders and volunteers, holding other events such as seminars and workshops and in contributing to preparedness kits and other material.

Goals of the Golden Guardian exercise regime include:

- Coordination of federal, state and local response and recovery activities;
- Assessment of interagency communication;
- Evaluation of continuity of government operations;
- Assessment of mass care and shelter;
- Coordination of State support to emergency support functions and local jurisdictions;
- Examination of the decision-making process.

As discussed previously, Golden Guardian used the ShakeOut Scenario for its emergency management exercise in 2008. The exercise involved emergency managers, police, fire, sheriffs, emergency medical and public health departments from 16 cities and counties. It

also involved participants from the State level (e.g., 23 California State Agencies; California Coastal Region Emergency Operations; California Inland Region Counties and Cities), Federal level (FEMA, US Environmental Protection Agency, US Department of Defense; Small Business Administration) and non-government organisations (e.g., American Red Cross; Salvation Army; California Utilities Emergency Association; California Foundation for Independent Living Centers; Business Executives for National Security).

The response phase for the Golden Guardian exercise began just after the fictitious earthquake at 10.00 am on Thursday 13 November (PST) and carried on for the next two days (Figures 2 and 3).

With respect to recovery, it was intended that the recovery phase for the exercise would begin on Monday 17 November and a regional recovery seminar would be held on 18 November. The recovery team were to look at issues around mass care and shelter, water and utilities restoration, debris removal, housing and long term recovery operations. However recovery activities related to the exercise were reduced, as wildfires in the state of California took precedence over the exercise. The state level recovery exercise was scaled back to a seminar in January, with expert panels addressing recovery issues related to utilities and debris removal. The time frame of the recovery exercise was recovery “as of day 30”, and a situation report was written for this purpose.

Other activities related to recovery included that the USGS also worked with a consultant to run a local level recovery exercise in Palm Springs in July 2008.



Figure 2 California Governor, Arnold Schwarzenegger, speaking at Holy Cross Hospital during the Golden Guardian exercise held for the ShakeOut, 13 November 2008.



Figure 3 Holy Cross field hospital, as seen during the Golden Guardian exercise held for the ShakeOut, 13 November 2008.

3.3 International Earthquake Conference, City of Los Angeles

12-14 November 2008

The aim of the International Earthquake Conference was to bring together academics, policy-makers, emergency managers and responders to discuss aspects of preparing for, responding to and recovering from earthquakes. The conference provided educational opportunities to learn more about preparing for and responding to earthquakes, and to make connections with other practitioners and researchers.

The first and third days of the conference consisted of presentations related to earthquake issues. The second day included presentations, field trips to observe the Golden Guardian exercise and ShakeOut drill in progress, and a “Share Fair” (Figure 4), where conference participants could interact with people from earthquake cities around the world and discuss their respective programmes. The conference programme is outlined briefly below:

Wednesday, November 12, 2008

- Megacities and Earthquakes: an L.A. Story
- Life Line Security
- Methods of Preparedness
- Land Use Planning in a Seismic City
- Legislative Process
- How to Deal with What You Have
- Earthquake Technology in Disaster Management
- Creating the Great ShakeOut

Thursday, November 13, 2008

- Science of the ShakeOut
- Field trips to various locations to experience the Great Southern California ShakeOut
- “Share Fair” to exchange information with the various cities present (Figure 4)
- Earthquake Technology: Early Warning & Prediction

Friday, November 14, 2008

- Communicating Messages of Preparedness
- Economic & Business Recovery
- Community Resiliency
- Medical Response & Recovery
- Disaster Risk Financing.

Presentations have been posted on the ShakeOut website (<http://www.shakeout.org>) or can be obtained by directly contacting the presenters.



Figure 4 Les Pester (left, middle) from Waimakariri District Council and Canterbury Civil Defence Emergency Management Group, New Zealand, discussing preparedness with people from the Los Angeles City stall at the “Share Fair”.

3.4 Los Angeles Earthquake: Get Ready Rally

4.00 - 9.00 pm (PST), 14 November 2008

The Get Ready Rally was organised by the Art Center College of Design and was held at the Nokia Plaza, LA Live, in downtown Los Angeles City. The objective of the event was to disseminate earthquake preparedness information and allow the public to interact with people providing the information (Figures 5 and 6). At the event there were also presentations by state and regional leaders (Figure 7). Vendors, food and live entertainment were also provided.



Figure 5 Stall at the Get Ready Rally, showing food items that could be stored in case of an emergency.



Figure 6 Volunteers from the City of Los Angeles who work with communities to try and help them become more prepared for emergencies.



Figure 7 Presentations from officials at the Get Ready Rally.

In addition to the Get Ready Rally event, staff and students at the Art Center College of Design also were involved in a number of other preparedness related activities including:-

- Developing resources for use before, during and after the drill (e.g., the Art Center College of Design developed video recordings such as the “Preparedness Now” short film in partnership with the USGS multi-hazard demonstration project);
- Developing the “LA Earthquake Sourcebook” in collaboration with experts who provided technical input. The “LA Earthquake Sourcebook” is a book on earthquakes and preparedness with visual information on how to prepare (Lewis and Ulin, 2009);
- Designing and installing artworks as a way of communicating about earthquakes and preparedness and interacting with the community;
- Undertaking research from a design perspective about methods of communicating preparedness messages; and
- Developing the “Aftershock” computer game, as a medium to get people to actively engage in an earthquake event.

3.5 After Shock Multi-player Simulation

Commenced 13 November 2008

As part of the ShakeOut activities, the Art Center College of Design developed an online computer game called “Aftershock”. The game was based around the ShakeOut drill scenario, and allowed players to respond to the impacts that an earthquake could cause. The game was intended to serve as a prompt for getting people to think about what might happen after a big earthquake and what they might need to do to prepare. People could register to play the game before the drill occurred and play it in real time from 10:02 am 13 November onwards, after the drill had taken place.

3.6 Take One More Step, Prior to the Drill and 14-16 November 2008

As part of the ShakeOut drill, undertaking preparedness activities was actively promoted, and participants were encouraged to 'take one more step' to become prepared for earthquakes. Information was given on what the following groups of people could do:

- Individuals
- Families
- Neighborhood Groups
- Community Emergency Response Teams (CERT)
- Schools
- Scouting Groups
- Colleges and Universities
- Businesses
- Non-Profit Organizations
- Faith-Based Groups
- Medical Centres
- Local Governments
- Museums.

The information was tailored so that each group-type was given guidance on the specific things *they* could do. So for example, individuals were encouraged to make up a preparedness kit, while it was suggested that schools check their emergency supplies. In achieving preparedness for earthquakes three main activities were promoted to community members and groups:

1. Participate in the ShakeOut, by 'drop, cover and holding' at 10.00 am on 13 November 2008 and practicing what needs to be done after the shaking stops.
2. Promote the ShakeOut (e.g., encourage people to join in the drill; host a ShakeOut party to share preparedness information; encourage people to sign up on the ShakeOut website).
3. Prepare for earthquakes (e.g., secure items; created a disaster preparedness/emergency plan; organise an emergency supply kit; check and fix any structural problems in your building; talk to your children about earthquakes; enrol in a local Community Emergency Response Team).

In addition to being involved in the ShakeOut drill itself, groups also set up complementary ShakeOut activities in their own local area. Examples include:-

- presentations to church and community groups;
- exhibits, presentations and fairs at local schools;
- "Earthquake Day" presentations at the Buena Vista Museum of Natural History;
- presentation and participation in the ShakeOut exercise at San Bernadino County Museum;
- Victoria Gardens and City of Rancho Preparedness Fair;
- North Valley Disaster Preparedness Event;
- multi-hazard Emergency Management Planning for Schools course at the Riverside County Office of Education;
- "Ready or Not" disaster survival workshop at Joan MacQueen Middle School; and
- numerous other activities.

4.0 TIME LINE OF EVENTS LEADING UP TO THE SHAKEOUT

What follows is the eventual timeline of some of the events that lead up to the day of the ShakeOut drill and associated activities (Table 1):

Table 1 Timeline of events that lead up to the ShakeOut drill and associated activities (adapted from Jones, 2008)

Date	Event
April 2006	San Francisco Centennial Event – 100 years since the 1906 earthquake. Attended the event and thought that maybe they could hold an event in southern California.
November 2006	ShakeOut scenario envisioned
January 2007	So-SAFE Conference
March 2007	Started scenario
February 2008	Steering committee formed
March 2008	ShakeOut website goes live
April 2008	School safety seminar
May 2008	ShakeOut scenario released
June 2008	ShakeOut kick-off
July 2008	Launch of regional associates
6 November 2008	5 million participants registered for ShakeOut
12-14 November 2008	International Earthquake Conference, City of Los Angeles
13 November 2008	ShakeOut drill (5.4 million participants registered)
13 November 2008,	After Shock Multi-player Simulation
13 - 18 November 2008	Golden Guardian Emergency Management exercise as part of ShakeOut
14 November 2008	Los Angeles Earthquake: Get Ready Rally
Prior to the drill and 14-16 November 2008	Take one more step – get prepared

5.0 FINANCING THE SHAKEOUT DRILL

No official budget was available for the ShakeOut drill, however in-kind donations and sponsorships from organisations helped to fund the various activities. These included:-

- USGS funded development of the earthquake scenario through its Multi-Hazards Demonstration Project.
- The Southern California Earthquake Center provided in-kind funding.
- Donation of time from individuals and agencies to help with practical organisation of the ShakeOut events.
- Additional sponsors, providing funding for key activities.

6.0 NUMBERS PARTICIPATING IN THE SHAKEOUT DRILL

At the time of the drill over 5.2 million people had registered on the website to take part. About 3.6 million of those were school attendees or graduate students. In comparison, in Japan where earthquake drills are also run, only several hundred-thousand people participate in any given event, with nearly 600,000 participating in the 2008 drill (EfluxMedia, 2008). Figure 8 shows the municipal areas in southern California that were primarily participating in the drill, along with percentages of people who had signed up.

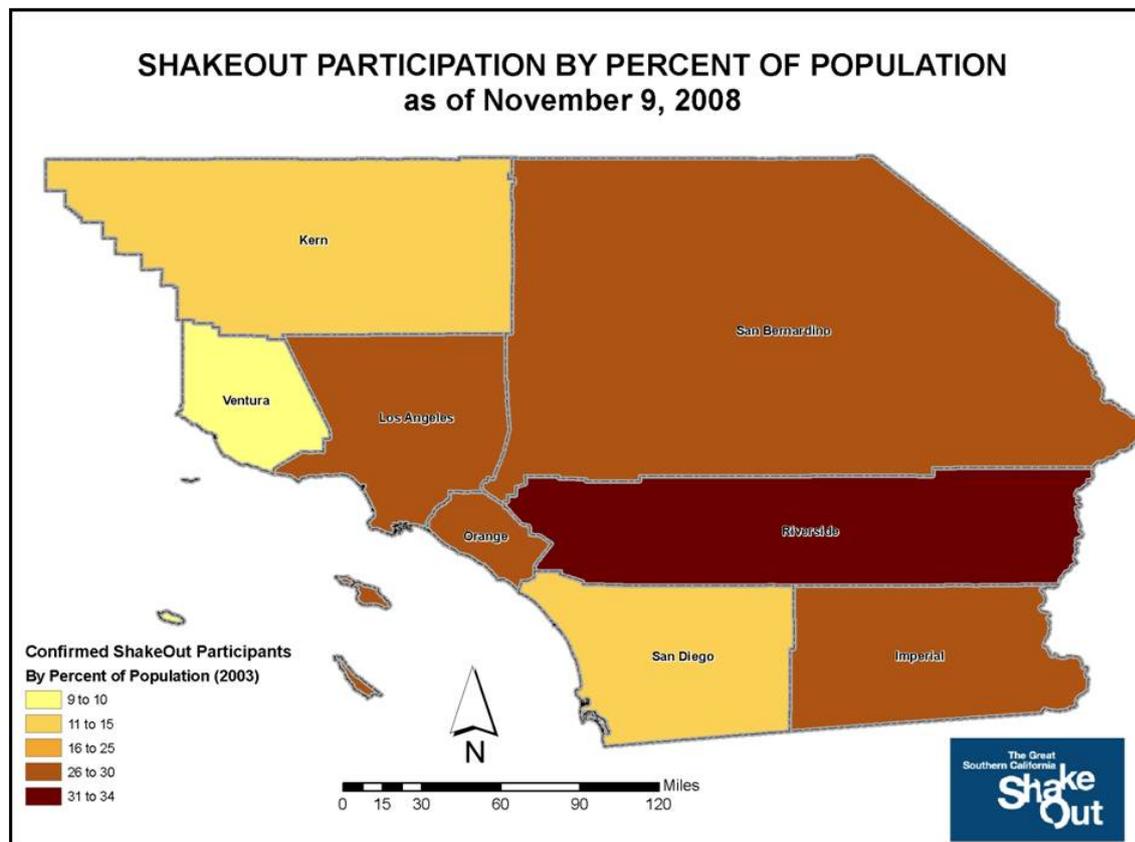


Figure 8 ShakeOut participation in southern California by percent of population, as of 9 November 2008 (Jones, 2008).

7.0 LUCY JONES' (USGS) TOP REASONS FOR SUCCESS IN ATTRACTING PARTICIPANTS

One of the primary organisers of the ShakeOut was Lucy Jones from the USGS. At the International Earthquake Conference, she put together a list of the top reasons of why she thought that the exercise was successful in attracting so many participants. The reasons included (Jones, 2008):

- The exercise was based on a realistic earthquake scenario.
- Real events locally and around the world got people's attention focussed on earthquake-related matters, e.g., The Sichuan Earthquake in China (12 May 2008); the Chino Hills magnitude 5.4 earthquake felt by southern Californians (29 July 2008); the Universal Studios fire (June 2008).
- Practitioners and operators in southern California assisted in creating the earthquake scenario.
- Science was delivered in an accessible format and in a way that people that people could see how they could be impacted by a disaster.
- Consideration was given to how messages would be delivered to and received by the public, and what would work best to motivate action for preparedness and response. Messaging was straightforward and delivered in easily accessible formats (e.g., online). Information was provided on what activities could be undertaken by different sectors of society (e.g., families, business, schools, and even museums). People's questions and anxieties were anticipated, and information provided to address them. The earthquake scenario was not presented as 'bad news' to the public, but presented as something realistic - something that people could take action over to prepare for and survive.
- As well as drawing upon physical scientific research, ShakeOut was also based on social science. In particular, during the public media campaign, messages were used based on what was known from previous social science research to be effective in getting people thinking, talking and undertaking activities for earthquake.
- There was a period of time between the release of the scenario and the drill occurring (5 months). This allowed people time to think about earthquakes, plan the Golden Guardian exercise and ShakeOut drill, and get involved in related activities. While it was good to have some lead-in time, it has been suggested by others that possibly more lead-in would have been beneficial with respect to developing a full exercise such as the Golden Guardian.
- Having a date for the drill (November 13) gave people a goal to work towards in terms of preparing.
- By combining the ShakeOut drill with the Golden Guardian exercise, all the people who would respond to a real disaster were working together (i.e., government, emergency managers, emergency services, educational facilities, non-government organisations the public, etc). The whole of society was working together in ways that they would actually be working in during a real disaster.
- A steering committee was formed to oversee the ShakeOut drill. This committee comprised a mix of experts (e.g., emergency managers, scientists, communication experts, community workers, business people) whose focus was to oversee activities related to the ShakeOut drill and engage the general public to become involved. The wide range of people involved in the steering committee opened the ShakeOut up and allowed participation that was wider than emergency responders only.

- It was felt that southern California was ready for the message. A quote from Lucy's presentation stated that, "We've all been training on terrorist attacks, pandemic flu, but everyone in southern California has known all along that what we really need to worry about here is The Big One." – *Emergency services, 2008*.

8.0 PLANS FOLLOWING THE SHAKEOUT

A few informal plans had been made for the future following the ShakeOut. These included:-

- See how the exercise goes.
- Have meetings to analyse the exercise and make plans for taking it forward.
- ShakeOut material can be used as a resource for future exercises (e.g., material from the southern California ShakeOut has been used for the Southern California Catastrophic Earthquake Response Plan; and by the New Zealand West Coast ShakeOut in 2009).
- There was the possibility of creating an annual "Earthquake Day" for the State of California. This has been realised in the form of another ShakeOut drill being organised for 15 October 2009, and encouraging people to participate as they did previously.
- Consideration of how recovery planning fits within the ShakeOut drill. To date the exercise has primarily focussed on preparedness and response (pers. comm. Anne Wein, November 2008).
- Creation of a long-term plan for evidence-based planning.
- Further encouragement of the public and organisations to continue conversations about earthquakes and undertake preparedness activities.

9.0 OBSERVATIONS AND COMMENTS

The following are observations of relevance to New Zealand. These observations are based on attending and watching the event, and on informal interviews with several of the organisers. The interviews were complemented by reading through literature related to the ShakeOut and other relevant reference material.

A date to prepare around was useful

Getting people to prepare for high impact–low frequency events such as earthquakes can be difficult as it is not known exactly when the next one will occur. Thus people tend to put off preparing, thinking it might not happen within their lifetime. Having a set-date to participate in a drill is useful as it provides a target around which planning and preparedness can be undertaken. While New Zealand has had emergency exercises around specific dates before (e.g., Project Phoenix, Exercise Ruaumoko), we have rarely had full participation from all sectors of community, which was the strength of the combined ShakeOut drill and Golden Guardian exercise. From a New Zealand perspective, Y2K may be the closest example of planning around a set-date. In this instance both the emergency management sector and the general public were encouraged to plan and prepare for a potential event on 1 January 2000. There is potential to further utilise exercising and planning around set dates, with involvement of all sectors of the community.

ShakeOut was evidence-based

The organisers decided that every part of the ShakeOut scenario and drill should be based on 'evidence' (Jones, 2008). As a result, there were significant inputs from researchers involved in both physical and social science research.

In terms of the physical science, people found a scientific-based scenario easier to work with as they could determine with more accuracy what the impacts might be, and what they might need to do to mitigate those impacts. It made the scenario more realistic, and thus believable and credible.

With respect to social science, research has found that people thinking and talking about hazards, interacting with each other, and seeing what others have done, will stimulate preparedness activities (e.g., Mileti et al., 1992; Paton and Johnston, 2006). Therefore the organisers' focussed their communication and education strategies on such aspects, so that they would have some success in motivating people to get prepared for an earthquake. Additionally, the ShakeOut scenario was presented not as 'bad news', but as the type of event that that people could take action over, and have a successful outcome.

Good practice communication and community activities worked well

The communication strategy and associated activities (e.g., talks, workshops, preparedness fairs, community activities) had a big influence on getting people to think and talk about the drill, and sign up to participate on 13 November. At the ShakeOut conference, Benthien (2008) from the Southern California Earthquake Commission stated that, "People are talking about this in a whole new way. People are seeing things that other people are doing and doing it themselves".

Financing an exercise such as the ShakeOut

The success of the ShakeOut exercise, drill and associated outreach shows that it is not necessary to have a large budget to drive certain activities. While some funding may be required to investigate the physical and social impacts of an earthquake scenario, other activities can be funded based on in-kind donations and sponsorships. However, the formation of partnerships and agreements between agencies is essential for this to be successful. Additionally having one or several dedicated staff members available to work on the ShakeOut is important. The ShakeOut drill steering group had a 'hired' person to help with the day to day organisation and realisation of the event. This person's time was sponsored by a local emergency management agency.

With respect to funding issues in the development of earthquake scenarios, it may be possible to draw upon scenarios that have already had some thought given to them. So for example, thought has already been given to what a Wellington earthquake might be like, e.g., the Wellington "*It's Our Fault*" project (Van Dissen et al., 2009); or "*Wellington After the Quake: The Challenge of Rebuilding Cities*" (Earthquake Commission, 1995). Such scenarios could be built upon to get a more detailed picture of what an event might be like in a physical and social sense, and exercises and drills formulated around these scenarios.

Use of volunteers

ShakeOut organisers noted that there were a number of volunteers in the community who were interested in preparing for or responding to emergencies but with no conduit for them to do so (e.g., ham radio operators, etc). The ShakeOut exercise gave these volunteers a purpose and a way to be involved in emergency management. They then were able to go out into their own communities and spread the word about ShakeOut and encourage others to participate in the exercise (pers. Comm. Dale Cox, 2008).

Community-based activities essential for preparedness

While the communication and associated activities got people to think and talk about earthquakes, it is currently difficult to quantify the influence the ShakeOut had in terms of getting people to undertake household preparedness activities (e.g., making emergency plans, storing food and water). Data for hardware sales at Home Depot, a home improvement store in the U.S, indicate that sales of preparedness items (e.g., furniture straps, earthquake putty, crank radios and other tools) rose in the weeks leading up to and immediately after the ShakeOut drill. Overall, Home Depot calculated a 260% increase in sales of these types of products during that time (pers. comm. Lucy Jones, 2009). Despite positive sales indications, a full quantitative survey is still required to accurately measure changes, and this will be undertaken as part of future research.

Anecdotal evidence suggests that the number of people undertaking actual preparedness activities seemed to be greatest when supported by community-based activities (e.g., neighbourhood group activity in Hermosa Beach had raised preparedness levels in that community, with the ShakeOut being one of the complementary activities that the community could get involved in). Other research work also supports this, and notes the importance of community-based programmes in influencing adjustment adoption (e.g., Finnis, 2007a,b; Finnis et al., 2007; Paton and Johnston, 2006; Ronan and Johnston, 2005).

10.0 RECOMMENDATIONS FOR NEW ZEALAND

There is high potential for an event such as ShakeOut to be run in New Zealand. A New Zealand ShakeOut could be put together drawing upon New Zealand research, previous exercises and experience from the southern California ShakeOut exercise and drill¹. For the event to be a success, it would require leadership to drive it and collaboration with a variety of national, regional and local partners. This would include collaboration right down to community level, with businesses, schools and community members being intimately involved with activities related to an exercise and drill.

While a ShakeOut event is good for building understanding of how to respond to a large earthquake at organisational, community and individual levels, it can also act as a valuable educational tool for preparedness activities. Anecdotal evidence and preliminary figures from the California ShakeOut show that the exercise and drill had an influence on raising community and household preparedness. However such preparedness has to be sustained. Long term preparedness can only be sustained when supported by on-going community-based programmes. Therefore attention should also be paid to developing and running such programmes in a long term and on-going way.

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¹ A local West Coast, New Zealand, ShakeOut was to be held on 18 September 2009. A separate report will outline this event.

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