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WEBSITE CONTENT
The website has sections for each State as well as National Areas. If you have ideas for State Division content, please contact your State Registrar, for National content, email web@aies.net.au
Please be aware that all content must go past the National Registrar prior to web publication to ensure it meets required guidelines.

NATIONAL EMERGENCY RESPONSE
Official Journal of the Australian Institute of Emergency Services

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REGULAR COLUMNS

FEATURES

NSW/NZ AGM

Date: 2 December
Time: 7pm
Venue: City Tattersalls Club
194-204 Pitt Street, Sydney
Additional information is being sent out to all members

FRONT COVER
NSW Rural Fire Service Mid North Coast District contingent at the annual RFS Northern Region exercise conducted in Glenn Innes 18-20 March 2016.
Photo: Steve Jenkins, AIES National President (far left).

NEW MEMBERS

The Australian Institute of Emergency Services is pleased to announce the following emergency services people joined the AIES between June and September 2016.

NAME	ORGANISATION	DIVISION
Michael Andrews	St John Ambulance (Qld)	QLD
Jill Brix	Avisure Pty Ltd	QLD
Eric Broadman	Honorary Member	National
Emma Broe	State Emergency Service (Qld)	QLD
Adrian Brown	State Emergency Service (SA)	SA/WA/NT
Andrew Chalmers	Country Fire Authority	VIC
Darryl Clare	Central Queensland University	QLD
Elizabeth Coffey	St John Ambulance (Qld)	QLD
Rhys Davies	Baseline Group	QLD
James Gegg	State Emergency Service (Qld)	QLD
Rebecca Hunt	State Emergency Service (SA)	SA/WA/NT
David Johnson	Emergency Management (Vic)	VIC
Keith Lewis	NT Emergency Service	SA/WA/NT
Darren Mackay	Falck Group	SA/WA/NT
Gina Mammone	State Emergency Service (NSW)	NSW
Jeffrey McConnell	State Emergency Service (Qld)	QLD
Daniel Rickard	St John Ambulance (Vic)	VIC
Leighton Riggall	Tasmania Police	TAS
Nicholas Roberts	Ambulance Victoria	VIC
David Stimson	Rural Fire Service	NSW
Vanessa Weaver	NSW Police	NSW
Phillippa Woolf	ACIM Solutions	National
Alex Zimmermann	SA Police	SA/WA/NT

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or log in at au.linkedin.com and search for 'Australian Institute of Emergency Services' under 'Companies'.

www.facebook.com/aies.online

BE A CONTRIBUTOR
to *National Emergency Response*

Submissions now open for the Summer edition of *National Emergency Response*.

We are looking for:

- Stories or articles
- Peer reviewed papers
- Photographs

Send your submission to editor@aies.net.au by Friday 11 November, 2016.

The best submission, as voted by the AIES National Council, receives a gold pen award at each year's Annual General Meeting.

FROM THE PRESIDENT'S DESK

Steve **Jenkins** MAIES

National President

In December 2015, as the Australian Institute of Emergency Management's (AIES) representative on the Australian Emergency Management Volunteers Forum (AEMVF), I had the opportunity to participate in the Volunteer Leadership Program (VLP) course conducted in Melbourne.

The VLP courses are now being facilitated at various locations around the nation, and AIES, as a member agency of the AEMVF, has the opportunity to nominate members to attend. I am pleased to report that AIES members have attended VLP courses in Perth, Launceston, and more recently, Newcastle. The feedback from those who have attended these courses has been excellent. A further VLP course is planned for the Gold Coast in November. The Queensland Division is seeking nominations from interested members for consideration. VLPs are now facilitated through the Australian Institute of Disaster Resilience (AIDR). Further information on VLPs is available on the AIDR website: https://www.aidr.org.au/education/volunteer-leadership-program/.

In April 2016, the Australian Government announced a new $1 million scholarship fund to provide education development opportunities to emergency management volunteers. The AIDR is administering the new scholarship on behalf of the Australian Government. A new partnership between government, education providers and industry experts will also be established to enhance the quality and relevance of emergency management qualifications, and promote education pathways. Further information on the scholarships is available on the AIDR website: https://www.aidr.org.au/education/scholarships-for-volunteers/.

I am pleased to announce that AIES has an in-principle agreement with a private education provider, ACIM Solutions, who is developing a pilot learning program that will target emerging leaders in the volunteer emergency management sector, including those from Indigenous communities. The program involves a small cohort of up to 14 regionally-based and multi-agency young volunteers participating in the nationally accredited qualification, Diploma of Public Safety (Emergency Management) PUA 52312. Agencies will be offered a limited number of positions on the course and are encouraged to nominate young volunteers who have performed at a high level and have leadership potential who would benefit from the opportunity to develop their skills. Funding options to commence the two pilot programs are being investigated, including the possibility of scholarship funding via the AEMVF and AIDR. Further details will be provided on this initiative soon.

> *Members can remain confident that the National Board is focused on ensuring the AIES remains a professional and relevant representative institute that is managed in accordance with our Constitution and Rules.*

Each year, the AIES has the opportunity to reward one young person for their outstanding and ongoing contribution and commitment to the community through their volunteering with an emergency service by providing a fully sponsored voyage on the sail training ship *Young Endeavour*. The voyage offered by the AIES' Young Volunteer's Award aims to develop the recipient's skills in teamwork, leadership and communication. The Young Volunteer's Award is proudly supported by the Emergency Response Division of the Australian Maritime Safety Authority (AMSA). Further information on the *Young Endeavour* Youth Development Cruises is available on the *Young Endeavour* website www.youngendeavour.gov.au. AIES nomination forms are available on the AIES website http://www.aies.net.au/national-awards/young-volunteer, and must be received by the AIES National Board for consideration by 4pm on 1 March each year.

In an earlier edition of this Journal, I alluded to fact that I, as National President, have a responsibility to ensure the Institute and its respective divisions are managed appropriately, and with fairness and transparency, and that Directors also perform to the required standard. In keeping with this requirement, the National Board recently approved the service on a Director of a Notice of Intention to Remove and Replace under the provisions of Section 203D of the *Corporations Act 2001* (Cth).

The Director subsequently resigned his position on the Board. The Board or myself did not take this course of action lightly, and the National Board is now working their way through the issues that this created including reports for the Australian Securities and Investments Commission. As unfortunate as this is, members can remain confident that the National Board is focused on ensuring the AIES remains a professional and relevant representative institute that is managed in accordance with our Constitution and Rules and the provisions of the *Corporations Act 2001* (Cth).

Next year will mark the 40th anniversary of the establishment of some State Divisions, which are planning to celebrate this milestone. Stay tuned for further advice on their plans.

A reminder also that articles are always required for inclusion in this Journal, no matter how big or small they are. Please consider submitting something. Each year the AIES awards a prize for the best article. Articles can be submitted to the Editor via email to editor@aies.net.au

HOW DRONE AND MAPPING TECHNOLOGY REVOLUTIONISED TASMANIA'S FLOOD RESPONSE

The partnering of cutting-edge drone and mapping technology has emerged as a crucial tool in the emergency service response to Tasmania's Huonville floods in July, enabling the State Government to determine the full extent of the deluge.

Matt **Mullens**

The Department of Primary Industries, Parks, Water and Environment (DPIPWE) used the technologies in tandem to capture and map information relating to more than 80 hectares of flood-affected land, and better direct their response and recovery efforts.

DPIPWE Emergency Services GIS Unit Manager Aaron Cashion said the imagery collected provided a detailed picture of the precise level of inundation in the Huonville township, enabling personnel to derive an accurate flood extent boundary.

"We could then quickly conduct an initial impact assessment to identify inundated properties and assess the scale of the event, which enabled better coordination of our operational responses and communication of recovery efforts," Mr Cashion said.

"For example, within minutes we were able to determine exactly how many private residences or schools were within the flood area and ensure we were responding accordingly.

"Post-event, we then used the drone-collected imagery to compare actual flood extents against existing flood modelling to give us clear evidence of where new flood modelling was required to mitigate against future risk."

Dr Dipak Paudyal, imagery specialist at Esri Australia – the country's leading Geographic Information System (GIS) technology and location-based analytics solutions provider – said DPIPWE

> *"Drones can go where people can't, collecting critical data from dangerous locations and limiting risk to government officials, police officers, fire fighters, military personnel, utility crews and others.*
>
> *"As such, they are becoming key tools for responding to emergencies, conducting police search and rescue operations, addressing hazmat and radiological accidents and inspecting key infrastructure."*

exemplified how emergency services departments nation-wide were leveraging their GIS platforms to drive greater value from drone-collected imagery.

"GIS platforms are becoming increasingly valuable for emergency services organisations, particularly in situations where search and rescue teams need an accurate, real-time view of the situation as it unfolds," said Dr Paudyal.

"The advantage of drones is they can reach flooded areas that are too dangerous for rescuers to navigate, which allows emergency services personnel to quickly collect high-definition 3D imagery.

"When partnered with GIS technology, these images can be used to create a before-and-after map that shows the exact location of damaged infrastructure, submerged vehicles and debris. Shared GIS platforms also allow these valuable insights to be rapidly passed on to crew on the ground for their immediate use."

Dr Paudyal said, while the drone revolution was transforming industries from agriculture to mining, its greatest untapped value was as a public safety tool.

"Drones are doing more than simply giving us a new view of the world – they are redefining how we understand the world and taking situational awareness to a new level," said Dr Paudyal.

"Drones can go where people can't, collecting critical data from dangerous locations and limiting risk to government officials, police officers, firefighters, military personnel, utility crews and others.

"As such, they are becoming key tools for responding to emergencies, conducting police search and rescue operations, addressing hazmat and radiological accidents and inspecting key infrastructure."

Dr Paudyal said advancements in GIS technology have made drones a simple and affordable way to see and analyse events, as they unfold in real-time, from all angles.

"Drones are now capable of serving imagery to people and agencies who don't have enough time or money to collect and process traditional image sources, such as satellite data.

"In this way, drones are 'democratising' the data, making it accessible and shareable with the people who work to keep our communities safe."

To learn more about how GIS technology can create safer communities, download the free whitepaper at esriaustralia.com.au/safecommunities

TOUR DE TIMOR TEACHES CFA MEMBER ABOUT HEAT STRESS

Taking care of adventurous bike riders in Timor-Leste has shed light on the effects of heat stress for a CFA volunteer.

CFA Media

Clockwise from above: Don with local firefighters known as a 'Bombederios'; A Timor-Leste Bombederio with CFA member Don Garlick; Local doctor Dr Todi with Don; Tour de Timor riders go through a check point; Don in front of the AUSMAT medical tent.

Wendouree 5th Lieutenant Don Garlick spent five days in the country for the Tour de Timor from 13 to 17 September.

Don was a member of the Australian Medical Assistance Team (AUSMAT), made up of more than 20 medical, nursing, allied health and logistical personnel. The team worked together to treat more than 100 daredevil bike riders navigating the rocky roads and barely-beaten tracks across Timor-Leste.

Injuries and illnesses ranged from abrasions, bruises and shoulder injuries to falls, dehydration, sprains and severe heat stress.

With a background as a critical care nurse, current role as Ballarat Health Services Manager of Emergency, AUSMAT member and his work with CFA, Don was well-prepared to expect the unexpected.

"One of the more common conditions we treated was heat stress, which is something firefighters are often exposed to," Don said.

"I was surprised by how much emotional responses were part of the symptoms of heat stress, with some of the riders in delayed heat stress presenting with emotional distress.

"I was lucky enough to work alongside heat specialist, Dr Matt Brearley, who taught me a lot about identifying early symptoms and best ways to treat this condition, which I can now take back with me to help at CFA incidents."

Don and the team moved their equipment and medical tent every morning to the next check point of the bike race.

"While the riders faced a more intense physical and mental challenge, it was still a lot of work for us with 4am starts to pack up the medical clinic, cooling and resuscitation tents and move to the next area," he said.

"Even driving on the roads was precarious because of the lack of infrastructure and pretty chaotic road rules.

"We were treating patients with basic resources, which came with a whole range of challenges. Among all this, we also had to take care of ourselves in the heat so we could manage the regular flow of patients."

The National Critical Care and Trauma Response Centre (NCCTRC), which manages the AUSMAT international medical response on behalf of the Australian Government, is a major sponsor of Tour de Timor. NCCTRC selects AUSMAT members who have not yet been deployed to an incident like an earthquake or cyclone, to make up the medical team for this growing event for experience.

As an AUSMAT member and CFA volunteer, Don sees both of his roles influencing each other.

"I've always viewed volunteering as bringing skills I already have to my CFA work and to use the skills I've gained at CFA to enhance the way I carry out my day job," he said.

ONSTAR REVIEW

General Motors USA OnStar subscription service was demonstrated recently at a seminar arranged by Melbourne University's Centre for Disaster Management and Public Safety.

Rod **Young** MAIES

President Victorian Division

WHAT IS ONSTAR?

You may have seen the use of OnStar or similar products in overseas movies where a person presses a console button in the roof of a vehicle or on the rear-view mirror, to which an operator answers, or viewed a news article demonstrating the remote shut down of the engine in a stolen car that is being pursued by the police.

Many newer cars in Australia are already equipped to use these services if and when released in Australia. Other vehicle manufacturers have similar services however OnStar, as the service leader, has been operational in the USA for over 20 years.

OnStar uses an embedded vehicle telematics system that combines cellular communications, global positioning system (GPS) satellite location and live human interaction to provide assistance to people in need. It is simple and easy to use and offers Automatic Crash Notification, a red SOS button for emergencies, a blue OnStar button for non-emergencies and a white voice command button.

ONSTAR FEATURES

The OnStar suite of services also includes navigation assistance, Wi-Fi hotspot capability, remote vehicle unlocks, stolen vehicle assistance and finally roadside assistance – in which you can ask the OnStar Operator to locate and call the nearest automotive service (mechanic or tow truck).

OnStar uses an embedded vehicle telematics system that combines cellular communications, global positioning system (GPS) satellite location and live human interaction to provide assistance to people in need.

HOW IT WORKS

GPS satellites provide the exact location of the vehicle. When a crash or button press is sent from the vehicle, location, voice and data are sent via the cellular system to a specially trained advisor at an OnStar contact centre. Advisors triage the call and, if necessary contact 911 (America).

AUTOMATIC CRASH RESPONSE

In the event of a moderate to severe crash, the OnStar system can automatically send a signal and transmit crash information to the advisor who assesses the situation, determines injuries and relays information to 911. The respective emergency service dispatcher then sends appropriate help to the scene.

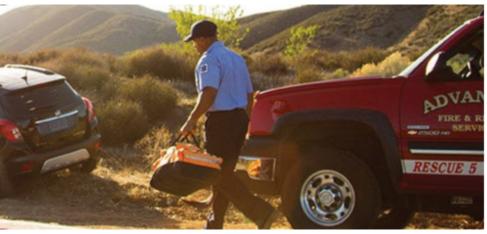
IN-VEHICLE EMERGENCIES AND GOOD SAMARITAN CALLS

Occupants of an OnStar equipped vehicle can also request emergency help through the use of the SOS button. The advisor determines the nature of the emergency and contacts the geographically appropriate 911 call centre if needed. These types of calls include medical emergencies and reporting incidents on behalf of others (good samaritan or citizen).

CALL TRIAGE

According to Jane Elkington, Telstra's Emergency Services Answering Point Manager, the number of Triple Zero calls made in Australia per day is approximately 22,000, of which a staggering 30 per cent are deemed as non-genuine, noting this figure includes mis-dials of the service.

This is reflected in the USA where emergency services have learned to appreciate the benefits of professional-level triage of incoming calls.



In OnStar's experience, approximately 90 per cent of SOS button calls are vehicle occupants pressing the button by mistake. Their reasons for this vary – adjusting the mirror, cleaning the vehicle, repair shop fixing the vehicle and the husband/wife/child/dog pressed the button by mistake.

At OnStar, these calls are triaged by the advisor speaking to the occupant and do not result in calls to 911. For SOS button calls, if an advisor does not make voice contact with the occupant, procedures are in place to re-contact the vehicle (which sends an audible tone) and triage the call based on location (vehicle located at owner's home) and sounds heard (repair shop noises). The advisor can call the vehicle and quickly attempt to verify the need for emergency assistance. If unable to verify if help is NOT needed, the advisor will contact 911 and request a welfare check of the occupants.

Moving vehicles with no response, unless sounds of distress are heard, do not result in a call to 911.

WORKING WITH EMERGENCY SERVICES AS A PARTNER

Emergency service partners in the US, Canada, Europe and Mexico appreciate this triage and call-handling, and OnStar couldn't offer it unless it understood the demands on 911 and emergency services dispatch centres. How is this accomplished?

The table below describes a few specific ways OnStar works to achieve this goal.

SERVICE	HOW IT HELPS
Confirm location of incident	Correct location verified with 911 operator and respond, sound horn/ flash lights to help locate the scene (i.e. vehicle off the road)
Filter and triage calls	Determine if emergency services are needed, don't call 911 if they are not needed
Offer to stay on the line with caller until help arrives and provide additional offers of assistance as appropriate (i.e. call a loved one)	Frees up emergency services resources for other calls while allowing the advisor to monitor the situation, provide emotional support and re-contact the 911 centre if necessary
Non-emergency button – 30 per cent of all OnStar 911 centre contacts come in on the non-emergency Blue Button (i.e. callers don't want to 'bother' the emergency people, feel their issue is urgent but not an emergency – 'just a little chest tightness')	Call 911 for emergency calls reported on the non-emergency button

WHAT NOW?

This article reflects the experience in the USA of OnStar. General Motors has commenced consultation with the National Emergency Communications Working Group, which is the peak Australian body for all matters related to Triple Zero and 106 and 112 calls. Some of its members include emergency services, telecommunications carriers and government agencies.

FOR MORE INFORMATION VISIT

OnStar's website
www.onstar.com/publicsafety

Rolling Stop YouTube
www.youtube.com/watch?v=_e_ZeYy3qjs

Theft Alarm Notification
www.onstar.com/us/en/services/security.html

THE POWER OF A NOT FOR PROFIT — aps GROUP benefits — THE POWER OF A CO-OPERATIVE

The APS Benefits Group is a not for profit co-operative that provides a wide range of personal and financial services to current and ex-government department employees and contractors, their families and friends. Having been in existence for over 110 years, the APS Benefits Group family has earned the trust of over 29,000 members and clients now offering the following personal and financial services listed.

APS Tax & Accounting

Richard Ferraro at APS Tax, Accounting and Business Services is an experienced CPA taxation accountant. Whether it is setting up a business, managing your superannuation fund or just obtaining quality service, Richard can help you.

APS Financial Planning

Timothy Foster provides access to advice and information on the important financial decisions we all face, whether it be superannuation, investments, pre and post retirement planning, income protection, disability, trauma and life insurance, gearing, managed funds or savings plans*.

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Sam Athans treats every mortgage as if it were his own. He has access to 20 mortgage lenders and has over 40 years experience in banking. Let us do the leg work for you.

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Danielle Rowe heads up our insurance broking team. She has access to products that include home/contents, motor vehicle, boat/caravan, landlord, public liability, business & professional indemnity insurance. Let Danielle find the insurance that is right for you. Have you checked to see if your current insurer is giving you the best deal? You owe it to yourself to find out. Call Danielle Rowe from the APS Benefits Group now on 1300 131 809.

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The APS Benefits Group personal loans team can assist members to obtain an unsecured loan, or they can apply online at **www.apsbenefitsgroup.com.au**. Either way, loans can be approved within 24 hours.

APS Funeral Cover

Gain immediate funeral cover up to $20,000 for adults and $7,000 for dependent children (aged 2 to 15 next birthday). Do you have cover in the greatest time of need?

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APS Savings Ltd is a wholly owned subsidiary of the APS Benefits Group and offers a Fixed Term Investment product. Ask Sam Athans about the interest rate on offer and you will be pleasantly suprised. The term can be 6 months, 12 months or 24 months.

APS Wills & Estates

Phil Lambourne from APS Wills & Estates has over 25 years experience as a lawyer. Phil can help you with wills, powers of attorney, probate and estate administration. Is your will up-to-date? Have you reviewed your will recently? It affects more than just you!

APS Benevolent Foundation

Recently launched, the Foundation is a registered charity and a deductible gift recipient. Donations above $2 are tax deductible. The Foundation will enable the Society to expand our level of benevolence.

Further to this, the APS Benefits Group is owned by its members, so any profits are channelled back to members. Help spread the word by introducing new members and the APS Benefits Group will send you, your nominated charity or your staff social club $50 for each new friend that joins as a member.

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TECHNICAL NOTE: EARTHQUAKE SCENARIO

Adelaide, Mw 6.0


Editor's note: Dr Koschatzy was the guest speaker at the South Australian Division Annual General Meeting held in May 2016. Dr Koschatzy's presentation was based on this Technical Note.

Valentina **Koschatzky** and Felipe **Dimer de Oliveira**

Risk Frontiers

Despite its low seismic activity, Australia is more vulnerable to earthquakes than one would expect due to the concentration of population and the large stock of buildings which are structurally unable to withstand even moderate seismic shaking.

This was demonstrated by the 1989 M5.6 Newcastle earthquake, one of the costliest natural disasters in Australia, despite its low magnitude. One question elicited by these circumstances is: what would happen if one of Australia's main cities were hit by an earthquake similar to the Newcastle earthquake?

An example of a near miss is the 1954 M5.6 Adelaide earthquake, whose epicentre, far from developed areas at the time, would lie in densely developed areas were it to occur today.

Providing realistic estimates for natural disaster scenarios is essential for emergency managers. A systematic approach to developing such scenarios can reveal blind spots and vulnerabilities in planning.

SCENARIO SELECTION

The Adelaide region is undergoing active tectonic deformation caused by earthquakes occurring on a system of prominent active thrust faults that are oriented approximately north-south and are uplifting the Mount Lofty and Flinders Ranges.

The earthquakes are caused by high horizontal compressional stresses oriented in the east-west direction.

The largest historical earthquake to have occurred in Adelaide is the 1 March 1954 Mw 5.6 earthquake, which is thought to have occurred on the Eden-Burnside Fault that lies just east of Adelaide (Figure 1a). The Para fault is located directly beneath the Adelaide CBD (Figure 1b). The largest earthquakes that can occur on these faults have magnitudes that are thought to lie in the range of 7.0 to 7.5, but earthquakes that large would have notional recurrence intervals of tens of thousands of years [Clark and McPherson, 2011]. Earthquakes as large as magnitude 6 are estimated to have recurrence intervals of about 1,000 years. Earthquakes with return intervals of 500 years, which form the basis of the seismic provisions for the building code [Standards Australia, 2007], have magnitudes of about 5.5. Smaller earthquakes also occur in a distributed manner throughout the region, not only on the identified active faults. Figure 1a shows the epicentres of the historically recorded earthquakes in the Adelaide region from 1840 until present days.

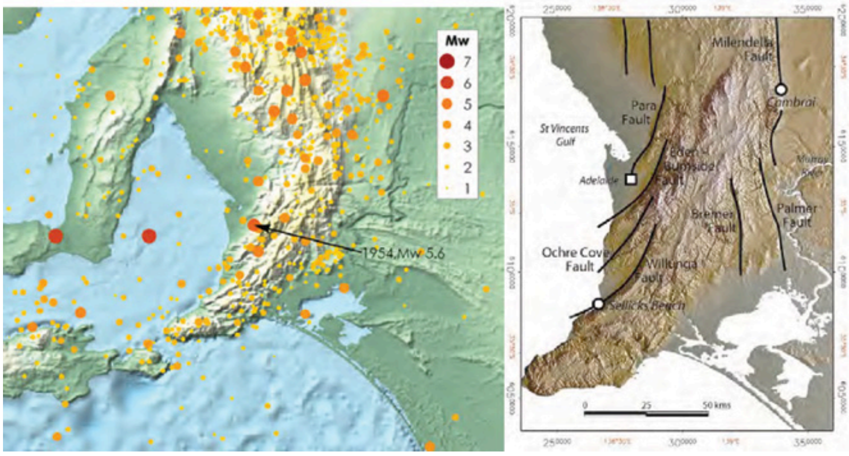


Figure 1: Scenario's selection information. (a) Historically recorded earthquakes (1840-present), source: Geoscience Australia. (b) Active Faults, from Sandiford [2003].

The event we consider is an M6 occurring on the Para Fault, with an epicentre about 7km from Adelaide CBD, generating peak ground accelerations in the range 0.3-0.4 times the acceleration of gravity (0.3g-0.4g) in the CBD. Figure 2 shows the location of the epicentre.

Figure 2: Epicentre location.

METHODOLOGY

Loss modelling is the exercise by which we develop statistical models to quantify damage (material, financial and casualties) based on the physical parameters of a disaster event.

To perform this exercise it is necessary first to estimate the probabilities of the physical parameters that may lead to damage. For earthquakes this is: the probability of an event occurring at a given location, soil conditions, and probable ground motion levels. To calculate damage, it is necessary to use a set of statistical models that tell us how much damage is expected for a given level of ground shaking.

We estimate the probable ground motion level for the chosen event, a magnitude 6 earthquake with epicentre shown in Figure 2, using the ground motion prediction equations developed by Somerville et al. (2013) and the soil condition maps from McPherson and Hall (2006).

The calculation of losses is performed with the methodology developed by the US Federal Emergency Management Agency (FEMA) through its model HAZUS (FEMA, 2004).

This model is derived from expert opinion and past-event experience. The HAZUS methodology provides functional relationships between physical earthquake parameters and probability distribution of building or infrastructure response to shaking. Physical earthquake parameters can be peak ground acceleration (PGA), velocity (PGV), displacement (PGD) or the full response spectrum.

The HAZUS methodology describes four damage states and provides the probabilities for a particular building or facility to be in any one of these. HAZUS also provides the financial cost relative to the total value associated with each damage state; this allows us to calculate loss estimates for this scenario.

The HAZUS methodology also provides estimates of the number of casualties. These estimates take into consideration the probability that a structure will collapse, the spatial distribution of people at different times of the day, and the likelihood of a person being indoors or outdoors at the time of the earthquake.

The methodology provided by HAZUS entails a high degree of uncertainty since many factors determining the outcome of an earthquake cannot be modelled *a priori*. For example, the time of day plays an important role in determining human casualties.

The first Christchurch earthquake on 4 September 2010 hit at 4.25am. In spite of the many collapsed buildings in the CBD, no fatalities resulted. The aftershock on February 22, on the other hand, occurred during business hours (12.51pm on a Tuesday) and killed 168 people.

The fact that the aftershock's ground motions greatly exceeded building code levels while the main shock's ground motions were generally at or below building code levels in Christchurch was another cause of the larger number of casualties in the February event. The same can be said of the 2007 Gisborne earthquake, which hit at 8.55pm resulting in no direct casualties, despite many parapets falling in footpaths across the town (see section 2 of AEE [2008]).

To estimate the damage (material, financial and casualties) caused by the earthquake we combine the following exposure and hazard datasets:

- Population distribution data, from an analysis of the 2011 Census and statistics provided by the Department of Higher Education.
- Inventory (building stock distribution) data, from the National Exposure Information System (NEXIS) database and the Geocoded National Address File (G-NAF) database.
- Damage state probabilities, calculated using Risk Frontiers' earthquake loss model QuakeAUS. This model implements the HAZUS methodology for the damage states estimate on top of a seismic source model [Hall et al., 2007], and ground motion prediction equations [Somerville et al., 2013], developed specifically for Australia.

EXPOSURE

In this section we summarise the data sources and the methodology followed to model the exposed buildings, population and essential facilities.

BUILDINGS

Exposure data consisting of the number of addresses exposed are taken from the Geocoded National Address File (G-NAF) database, developed by PSMA [PSMA, 2015]. G-NAF combines over 30 million addresses all over Australia from 10 authoritative sources: each of the governments of Australia, the Australian Electoral Commission and Australia Post. Each address in G-NAF has a unique identifier and geographic coordinates.

Data on building types and age distributions across Australia are taken from the National Exposure Information System (NEXIS) database, developed by Geoscience Australia [Geoscience Australia, 2015]. NEXIS maintains information about residential, commercial and industrial buildings. In the version used for this scenario, the data is aggregated at a SA2 level.

Figure 3 shows the G-NAF addresses locations, the black dots, and the SA2 areas on which the NEXIS information is available, the coloured polygons.

Figure 3: Buildings exposure data. Black dots: G-NAF addresses. Coloured polygons: SA2 areas.

POPULATION

We estimate the population distribution at two different times of a mid-week day:

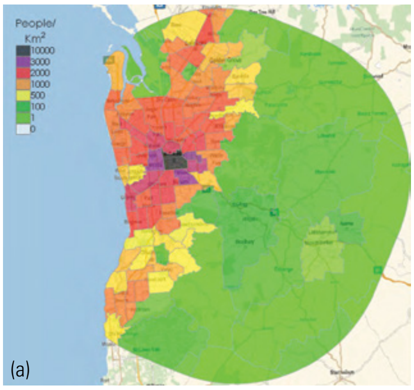
- 2am (night time scenario)
- 2pm (day time scenario)

These scenarios are expected to generate the highest casualties for the population at home and the population at work/school, respectively. Table 1 provides the relationships used to determine the population distribution. There are two multipliers associated with each entry in the table. The first multiplier apportions the population of a given occupancy into indoors and outdoors. The second multiplier indicates the fraction of the total population that is present in an occupancy at a particular time. For example at 2am, 99 per cent (0.99) of the population will be in a residential occupancy and 99.9 per cent (0.999) of those people will be indoors. Figure 4 shows the estimated population density during the day and at night time.

Occupancy	2.00AM	2.00PM	Notes
INDOOR			
Residential	(0.999)0.99(NRes)	(0.7)0.74(DRes)	Residents at Home
Commercial & Industrial	(0.999)0.02(Wor)	(0.8)1.0(Wor) +(0.8)0.2(DRes)	Workers Residents Attending Business
Educational		(0.8)1.0(L15) (0.8)0.06(DRes)	Pre-Schoolers and Grade Students Higher Education Students
OUTDOOR			
Residential	(000.1)0.99(NRes)	(0.3)0.74(DRes)	Residents at Home
Commercial & Industrial	(0.001)0.02(Wor)	(0.2)1.0(Wor) +(0.2)0.2(DRes)	Workers Residents Attending Business
Educational		(0.2)1.0(L15) (0.2)0.06(DRes)	Pre-Schoolers and Grade Students Higher Education Students

WHERE: NRes: All Residents, **DRes:** Not Working, **L15:** All Residents Less than 15, **Wor:** Working

Table 1: Population distribution at different times of the day.



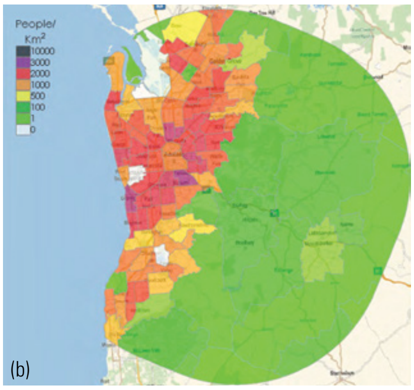


Figure 4: Population density within 25km from the epicentre. (a) Day time, (b) Night time.

ESSENTIAL FACILITIES AND INFRASTRUCTURE

We gather data about the location of critical buildings and infrastructure from two databases:

- RoadNet, developed by Map Data Services
- Features of Interest, developed by PSMA.

HAZARD MODELING

We model the event (Figure 2) as a rupturing fault plane. The top centre of the fault plane is placed 7km ESE of the surface trace of the Para Fault at a depth of 7km on a 45 degree fault dipping at 45 degrees to the ESE. Fault dimensions are consistent with Leonard [2010] and Somerville et al. [2013].

GROUND SHAKING

Spectral acceleration is used to model ground shaking, and describes the response (e.g. amplitude, maximum velocity) of a simple harmonic oscillator (mass-spring system) subject to seismic ground motion. This definition is important because buildings can be modeled as simple harmonic oscillators to a first approximation. As a general rule, the resonance frequency of a building depends on its height and rigidity; according to an engineering rule-of-thumb, by a factor of 10 of the motion period (i.e. a 10-storey building will respond to 1s spectral acceleration, 5-storey to 0.5s and so on).

The probable (median) ground motion level for the chosen event is calculated using the ground motion prediction equations developed by Somerville et al. [2013] and the soil condition maps from McPherson and Hall [2006]. We calculate the full demand spectrum for each location.

Figure 5 shows spectral acceleration at all the affected locations for a range of periods.

GROUND DISPLACEMENT

In this section we discuss permanent ground displacement due to liquefaction.

Liquefaction is a soil behaviour phenomenon in which saturated soil loses a substantial amount of strength due to high excess pore-water pressure generated by, and accumulated during, strong earthquake ground shaking. The likelihood of experiencing liquefaction at a specific location is primarily influenced by soil type, ground shaking intensity and duration, and depth of groundwater.

Liquefaction damage was one of the main causes of destruction in the Christchurch 2010 event, affecting transportation and water networks. In general it has greater probability of occurrence along river banks and, when it occurs, it tends to damage bridges as river banks start sliding towards each other. We have produced a liquefaction potential map for Adelaide by using a statistical model that uses distance to water bodies, elevation, soil type and ground shaking to parameterize the probability that a site will liquefy, [Knudsen et al., 2009]. For this scenario, liquefaction would likely occur around the banks of the Torrens River and of the creeks on the south-east of the CBD, and could potentially destroy a number of bridges. Combined with shaking, liquefaction damage may render parts of Adelaide inaccessible for large extents of time and cause long-term infrastructure damage – see the historical notes on water supply damage in Christchurch in the Similar Past Events section. Figure 6 shows an overlay of the Adelaide road network and the liquefaction potential map.

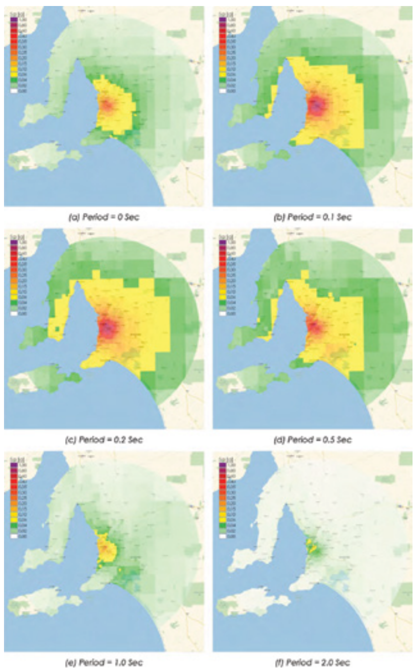


Figure 5: Spectral acceleration [g] at different periods.

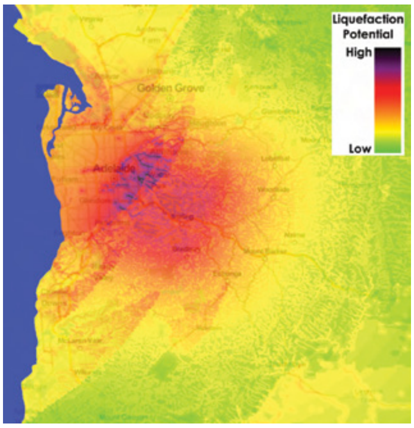


Figure 6: Liquefaction potential map for Adelaide. Hot colours represent areas with higher probability of liquefaction.

IMPACT MODELING

BUILDING DAMAGE

The demand spectrum described in the Ground Shaking section is applied, via the capacity spectrum method described in HAZUS, FEMA [2004], to each building category present in the location according to NEXIS. This allows the evaluation of the structural response of every particular building to each particular demand spectrum. We then use the vulnerability curves provided by HAZUS which best match the NEXIS building categories to estimate the probable damage to the buildings. Figures 7 and 8 show the extent of the damage to residential addresses. Table 2 summarise the number of equivalent addresses destroyed (count of replacement values) for the whole area.

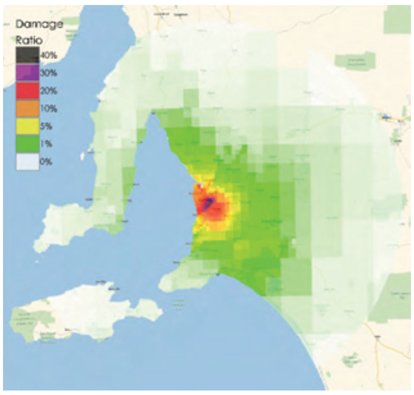


Figure 7: Residential damage: percentage of replacement value of the local buildings' stock.

Line of Business	No of Addresses
Residential	88,440
Commercial	4,815
Industrial	1,650

Table 2: Number of equivalent addresses destroyed.

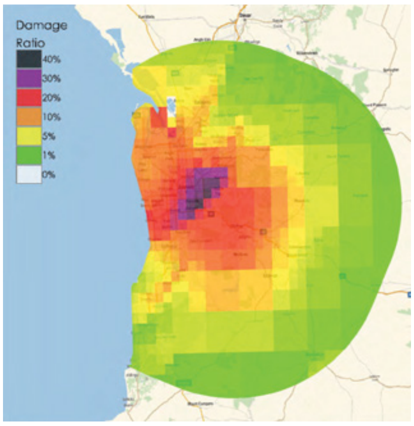


Figure 8: Residential damage: percentage of replacement value of the local buildings' stock, within 30km of the epicentre.

CASUALTIES

The damage states probabilities for the building stock are used in conjunction with the estimated population distribution to calculate casualties. The output from the HAZUS model is given on a four-level injury severity scale:

- **Severity 1:** Injuries requiring basic medical aid that could be administered by paraprofessionals. Injuries that could be self-treated are not considered.
- **Severity 2:** Injuries requiring a greater degree of medical care and use of medical technology such as x-rays or surgery, but not expected to progress to a life threatening status.
- **Severity 3:** Injuries that pose an immediate life threatening condition if not treated adequately and expeditiously.
- **Severity 4:** Instantaneously killed or mortally injured.

Figure 9 shows the median spatial distribution of severe injuries and deaths (sum of severity 3 and 4) to be expected from the modeled event while Table 3 summarises the total counts for all the severity levels.

Severity	Day	Night
1	4,988	5,324
2	1532	1,650
3	170	167
4	322	327

Table 3: Median total casualties by severity level and time of the day (number of people).

ESSENTIAL FACILITIES

Essential facilities comprise hospitals, fire and police stations, emergency operation centres and schools – all are essential to provide support in the event of an earthquake (schools provide evacuation centres). Such buildings are designed to withstand higher levels of shaking than ordinary buildings.

It is expected that hospitals should continue to operate even in the event of failures in the power and water networks. Using the appropriate HAZUS methodology, we have estimated a loss of capacity in the area near the epicentre of up to 22%, and up to 14 per cent in the area encompassing the Adelaide CBD, which includes the Royal Adelaide Hospital. Figure 10 maps the loss of capacity overlain with hospitals, police, fire and SES stations, and ambulance centres. It is estimated that the 7 hospitals nearest to the fault will experience a damage of 20 per cent and around 80 will experience damage on the order of 5 per cent. Some hospitals may have to interrupt their functioning for safety reasons; others may sustain extensive or even complete damage.

Schools are expected to experience similar rates of damage as hospitals, but these facilities are likely to lack the capacity to generate their own power; thus we expect that only those far from the epicentre will be usable as temporary shelter. In Table 4 we show the number of facilities expected to experience sufficient damage to hinder their operations (i.e. > 10%).

Facility	Number
Hospitals	46
Schools	167
Fire Stations	5
Police Stations	5
SES Stations	1
Ambulance Stations	3

Table 4: Number of essential facilities expected to experience damage in excess of 10%.

INFRASTRUCTURE

The following summarises impacts to infrastructure as modelled using the HAZUS methodology.

Damage was estimated using ground motion parameters shown in Figure 5a and 5e, where areas referred to as 'near the epicentre' correspond approximately to the red-to-yellow coloured region in Figure 5a. This area includes approximately 680,000 addresses and more than 100 hospitals. This methodology does not take into account work or replacement materials shortage and should be seen as an estimate of the amount of work without considering the inter-relationships between downtimes from different infrastructures.

Transport

Roads may be blocked as a consequence of debris from fallen buildings. Roads may also be shut where there is the potential for surrounding buildings to fail during aftershocks, even if no debris has yet fallen. As a result, and as observed in Christchurch, areas of the CBD may be cordoned off for a minimum of seven days following the event and described further below.

Bridges and tunnels

In the absence of liquefaction, bridges may be closed for a day to a week for inspection and repairs of moderate damage. Near the epicentre, a small number of bridges could experience extensive to complete damage and take a minimum of 150 days to be completely restored. Liquefaction may cause damage to bridges at locations indicated with hot colours in Figure 6.

Trams and trains

At this ground shaking level (in the absence of liquefaction) there is no significant proportion of railway lines completely damaged. However, some rail and light rail bridges close to the epicentre may be extensively damaged and take a minimum of 110 days to be repaired. A greater proportion (40 per cent) of railway and tram lines close to the epicentre will experience minor damage, which corresponds to a downtime of two to seven days but may be longer depending on ground rupture patterns. The fuel and maintenance facilities for this infrastructure located in the proximity of the epicentre will mostly suffer minor to moderate damage, which may add two to seven days to the downtime. The fuel and maintenance facilities in the neighbourhood of the epicentre will also have a 40 per cent chance to suffer extensive damage, with associated downtimes of up to four months.

Airports

Adelaide Airport is situated around 10km from the epicentre of this scenario and is situated on soft soil which is prone to liquefaction. Airports are usually well built and are expected to perform reasonably well. However, as observed in Christchurch, airports are expected to be closed for a short period of time for damage assessment.

"Christchurch International Airport was operational for emergency flights the evening of the earthquake and re-opened at 7am on 23 February, the day after the earthquake. Lyttelton Port was located very near the earthquake's epicentre and was further affected by liquefaction ground damage and strong shaking, but was able to continue functioning almost immediately with services re-established to meet demand after 10 days. Despite this, it is estimated that damage and business interruption costs will extend to $300 million. Nearly all rail lines opened for freight on 24 February with some speed restrictions. The Lyttelton to Christchurch line and West Coast to Lyttelton line re-opened on 5 March 2011. The functionality of the airport, port and rail lines guaranteed large freight movements that were vital to support the emergency management operations." From Giovinazzi et al. (2011).

Electricity

The HAZUS methodology provides downtime estimates for several types of electrical components and facilities. The complete failure of large power components, such as transformers or substations, may occur in the proximity of the epicentre with a probability of around 40 per cent and downtime of approximately two months. According to the HAZUS model, almost all addresses close to the epicentre will experience at least minor power failures with downtimes of up to three days (if no nearby substation is completely damaged), see Figure 11. Some power stations, close enough to the epicentre to sustain some slight or moderate damage, will take a month or longer to fully recover, see Figure 12.

The scenario described above is consistent with historical experience in Christchurch (2010) and Newcastle (1989):

"The impact of the 22nd February earthquake vastly exceeded previous disruptions to the Christchurch power network. With an estimate of 629 million customer-minutes lost, it resulted in 20 times more outages than were experienced during the 1992 snowstorm, the most significant natural hazard event affecting Orion network before the 4th September earthquake. The cost of the 22 February event for Orion was 10 times greater than the 4 September 2010 event." From Giovinazzi et al. (2011).

"The Newcastle earthquake of 1989 had a significant effect on the high voltage transmission assets of the NSW electricity supply grid operated by the Electricity Commission of NSW. Multiple failures of equipment, mainly switchgear, occurred in a number of the electricity substations closest to the earthquake epicentre. These failures initiated a general and immediate shut-down of electricity supply to both industrial and domestic consumers in the affected area. The response of the Commission to this unexpected emergency was immediate and effective. Operational recovery saw high voltage supply restored to major industrial customers an hour-and-a-half after the incident. Restoration of supply for general distribution began within 30 minutes, with all bulk supply points energised after two-and-a-half hours. Of course, the damage then had to be assessed, plant safety assured and repairs commenced so that normal levels of reliability could be returned to the community. This phase of restoration took three weeks to repair most major circuits and many months to complete. In the latter stages, it was accompanied by a third phase of review which identified any areas where either the system design or the response of a power authority to any future such emergency may be improved." From Caldwell (2009).

Water supply

Major water facilities such as pumping stations and reservoirs may experience extensive damage with a probability of 15 per cent, which implies a downtime of 40 days. Minor damage may occur across the network, with a downtime of three days (if no major system was completely damaged). In case of liquefaction, breakage of pipes is likely to be widespread in the hot coloured regions in Figure 6, and concerns over contamination may render the water not suitable to drinking.

This is supported by the experience in Christchurch:

"Christchurch water and waste networks suffered extensive damage as a result of the 22 February 2011 earthquake. Approximately 50 per cent of the city was without water for the first days following the earthquake; more than a third of households were without water for over a week. A month after the 22 February 2011 event, over 95 per cent of occupied units (outside of the cordoned Christchurch CBD) had water, however a 'boil order' was in-place for over six weeks for most of the city due to potential contamination caused by severe damage to the

wastewater system. Chlorination, which was not used pre-earthquake, remains a requirement to ensure water is disinfected. Water conservation orders are in place as a result of damage to key water reservoirs and the loss of many groundwater pumping wells; all related to geotechnical problems. However, with few exceptions, water reservoirs structures and pump stations performed very well owing to pre-earthquake engineering and seismic upgrades." From Giovinazzi et al. (2011).

Waste water

Extensive damage is modelled to occur in 25 per cent of waste water systems near the epicentre even without the occurrence of liquefaction; addresses within this zone may be without sewage services for up to 150 days.

"Due to liquefaction, parts of Christchurch are, to date (> 1 year after the second event) without sewage systems, and much of the population rely on portable toilet facilities. Furthermore, leakage in waste water piping was responsible for contamination of the clean water supply immediately after the event (2010)." From Giovinazzi et al. (2011).

Communications

We have estimated that most of the area near the epicentre will experience minor to moderate damage with downtimes ranging from less than one day to a week. About 30 per cent of the major facilities (central offices and broadcast stations) located in the area near the epicentre will experience extensive damage with associated downtimes of up to a month. Below is an extract describing Christchurch's experience.

"There is no doubt that the telecommunications sector generally performed well following the February 2011 Christchurch earthquake. Telecommunication service providers (TSPs) took strong steps to restore services, and most services were back (or close) to normal within a week or so (except in the CBD where immediate restoration was not possible – nor was it a priority given cessation of most CBD activity). Nevertheless, the ability to make calls immediately after the earthquake, including 111 and other priority calls, was impacted by electricity outages, cable failures in liquefaction areas and congestion. Cordless phones immediately ceased to work where electricity failed. Some physical damage to telecommunications assets also occurred but the effects were secondary – congestion largely resulted from the sudden substantial increase in call attempts rather than to equipment failure. Battery life at cabinets and cell towers also quickly became a constraint on telecommunications performance and significant losses of cellular coverage." From Fenwick (2011).

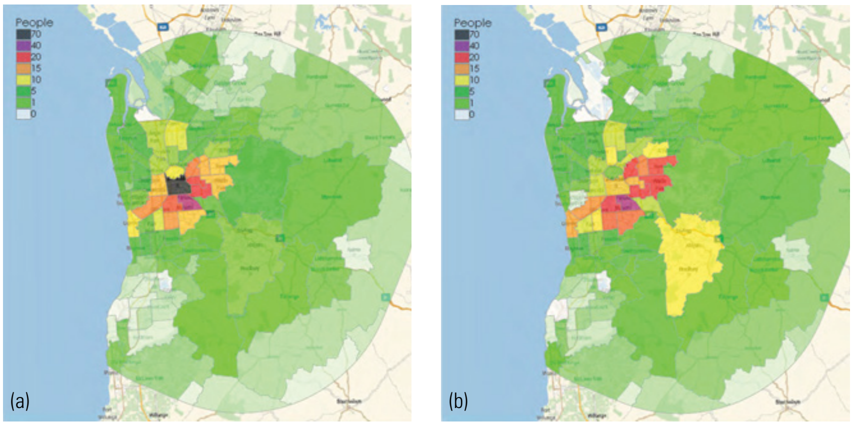


Figure 9: Severe injuries and deaths within 25km from the epicentre. (a) Day time, (b) Night time.

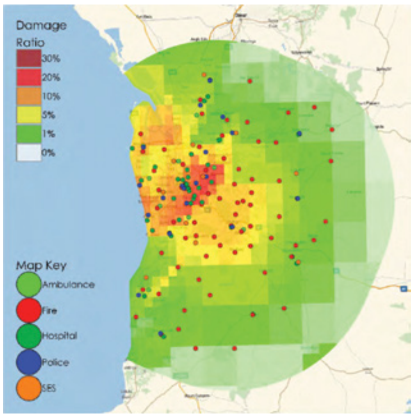


Figure 10: Damage ratio to essential facilities.

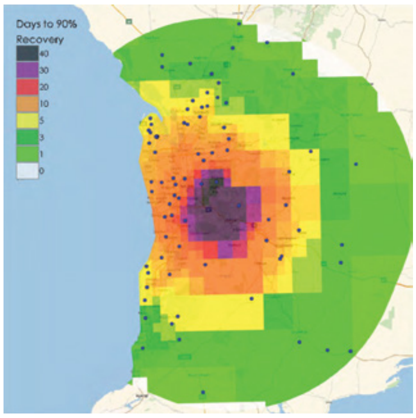


Figure 11: Estimated number of days to reach 90% of the substations' functionality. The blue dots indicate the substations' location.

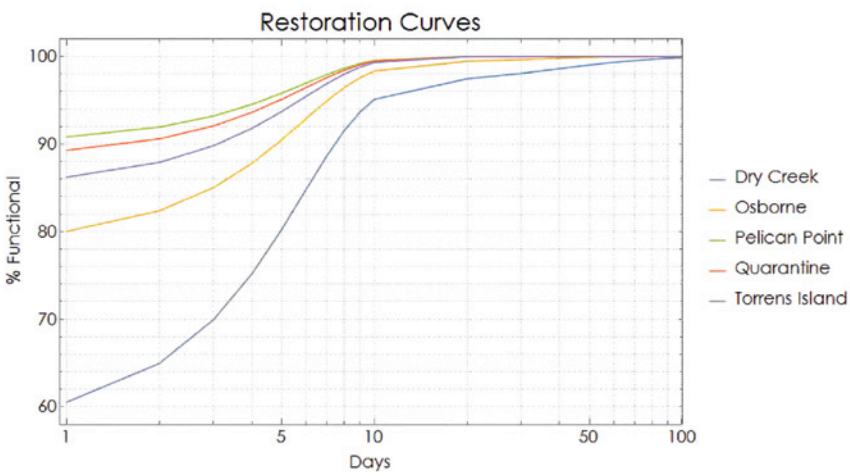


Figure 12: Restoration curves for some of the power stations near the epicentre.

We will continue this Technical Note in the next edition of *National Emergency Response* Journal where unforeseen and social impacts will be discussed and similar past events explained. A full biography for this Technical Note will be published in the Summer 2016/17 edition.

DON'T JUST DO SOMETHING, STAND THERE!

Mitigating goal seduction in emergency management

Paper presented at the Australian and New Zealand Disaster and Emergency Management Conference, Broadbeach, Gold Coast (QLD), 30-31 May 2016.

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In emergency management people frequently need to make rapid decisions in the context of complex, dynamic situations (Klein, 1999). In such situations the person making the decision must balance multiple competing goals while managing factors that exert pressure on their decision-making (Orasanu et al., 2001). Humans do not operate in isolation, but in the context of a complex social milieu, which necessarily influences the decisions they make (Bearman et al., 2009a, Reason, 1990).

The different pressures that people need to manage have been developed into a theoretical model known as the "Y of Decision Context" (see Figure 1). The Y of Decision Context is a model of the different influences on a person from the context in which that decision is made. The model is complementary to behavioural and naturalistic models of decision-making, such as: the recognition-primed decision model (Klein, 1999), heuristics and biases (Gilovich et al., 2002) and fast and frugal heuristics (Gigerenzer et al., 1999). The Y of Decision Context is designed to overlay these models of decision-making and provides a more distal level of influence that shapes the decision processes in these other models.

According to the Y of Decision Context, factors that may exert pressure on a person's decision-making may be internal (such as the effects of fatigue) or they may be external.

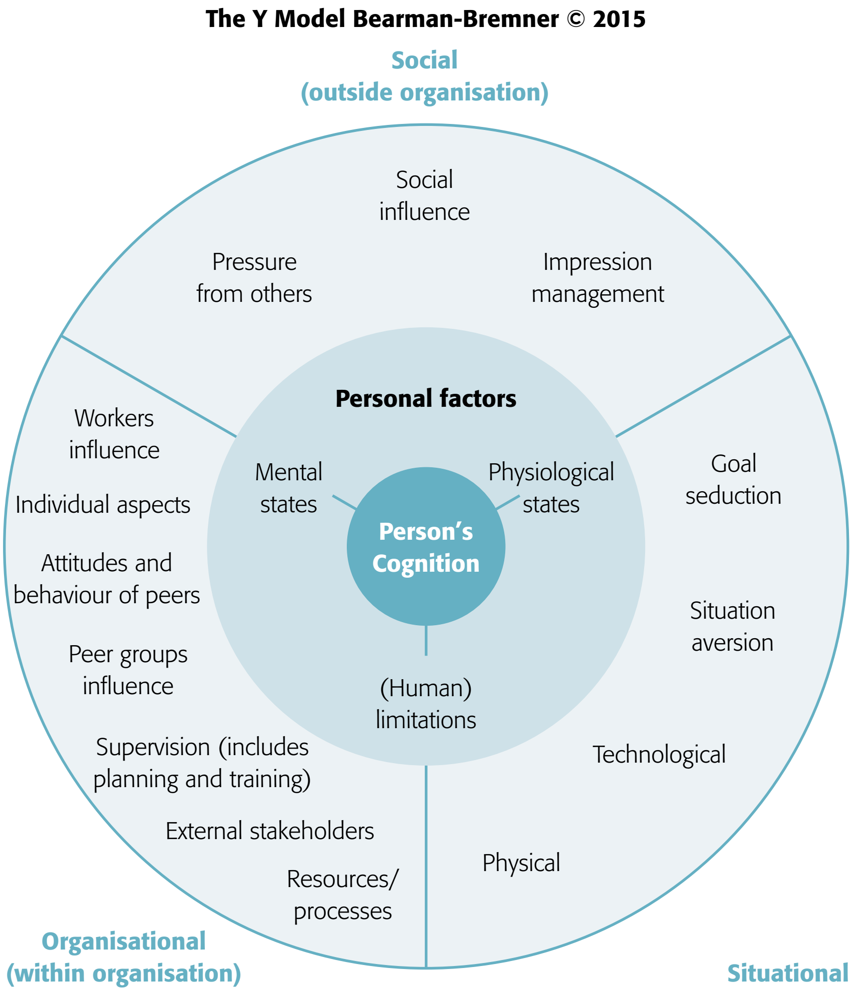

Figure 1. The Y of Decision Context

External pressures may come from the situation that a person is facing, the organisation they work for, and/or the social world of which they are a part (Paletz et al., 2009, Bearman et al., 2009b, Michalski and Bearman, 2014, Bearman et al., 2009a). The different pressures on decision-making are presented in Figure 1 and are discussed below.

Organisational pressures come from the organisations that one works within. In emergency management this is typically the agency that a person belongs to. Organisational pressures can come from supervisors (such as incident controllers or crew leaders) who may set the operational tempo at too high a level or behave in ways that are not consistent with best practice (Wiegmann and Shappell, 2003). They may come from the attitudes and behaviour of peer groups who may also not always act in ways that follow best practice (Bearman et al., 2009b). People at lower levels of the chain of command in an organisation can also exert pressure on decision-making, where people may be reluctant to make unpopular decisions. Finally, people have internalised notions of their agency's values (Owen et al., In Press) and possess career aspirations that may influence how people carry out their duties (Michalski and Bearman, 2014).

Social pressures describe pressures that come from a person's social world but are not part of the organisational setting within which people work. Social pressures may come directly from other people who may try to influence a person's decisions or they may be more subtle, where we try to manage the impression of ourselves that we are presenting to other people (Paletz et al., 2009). We exist in social worlds and we frequently take our reference from other people (Deutsch and Gerard, 1955). In many situations (particularly those that are uncertain) we look to other people to see how we should act (Deutsch and Gerard, 1955). If those people are acting in unsafe ways or have information or protections that we lack then this can lead us into making a poor decision.

Situational pressures come from the situation in which the decision itself is made and may arise from the physical environment (time of day, heat, etc.); the technological environment (the tools we use) or the nature of particular situations. In addition to these situational pressures, Bearman et al. (2009) have described certain strong situations that exert too much pressure over a person's decision-making. These pressures are described as goal seduction and situation aversion. Goal seduction describes the attraction that we feel towards trying to achieve goals and situation aversion describes the repulsion that we feel from unpleasant situations (Bearman et al., 2009a). We are particularly interested in this paper in pressures from goal seduction.

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Goal seduction was identified by Bearman et al. (2009) in their studies of small commercial pilots in Alaska. Bearman et al. (2009) identified a number of examples where the situation had exerted undue pressure on their participants to take a less safe course of action. These examples could be categorised as: time pressure, wanting to rescue other people, wanting to meet up with a significant other, only having one chance to achieve the goal and not getting paid unless the mission was completed (Bearman et al., 2009a). One of the participants in this study indicated that the desire to keep moving on led them to view the situation more optimistically than they should have done (Bearman et al., 2009a). In emergency management, given the important and urgent nature of the goals that people are trying to achieve, it is likely that goal seduction would be a significant pressure that people need to manage. While it is reasonable to try to achieve the goals of emergency management as quickly as possible this needs to be done in a manner that does not jeopardise the safety of the crew, the people who are affected by the emergency or other people in the community. This study is therefore interested in the influence of goal seduction in emergency management and how it is managed by incident controllers.

METHOD

DESIGN AND PROCEDURE

The present paper comes from a larger study into the role of the incident controller, the pressures they face, the errors they make and how both pressures and errors are managed. The study consisted of a two-part semi-structured interview. The first part of the interview was a critical decision method interview, where participants were asked to relate challenging situations they had experienced. The situations described by participants were probed for more information by the researchers with questions like "Why did you do x?" This allowed a clear picture of the situation to be developed. The second part of the interview consisted of discussions about a task analysis (prepared by the research team) of the volunteer incident controller's role. The data for this paper comes predominantly from the critical decision method interviews. The interviews ranged from 48 to 129 minutes (with a mean of 84 minutes) and were conducted at a quiet location chosen by the participants (typically the brigade fire station). The interviews were recorded using a digital audio-recorder and were later transcribed by the second author.

PARTICIPANTS

The participants were 10 volunteer incident commanders. Participant ages ranged from 34 to 67 years and experience ranged from nine to 34 years (M=22). The participants were from three different Australian emergency management agencies. Participants were recruited using a snowball sampling method.

DATA ANALYSIS

The data was analysed using a bottom-up data driven thematic analysis technique (Braun and Clarke, 2006), which focused on linking together common themes in the data. The process of data analysis consisted of iterating through collection, documentation, extraction, classification and synthesis. The analysis considered both pressures on the incident commander and pressures on the crew.

RESULTS

The incident controllers indicated that while the emergency response needed to be fast it should be done safely, as the following quote shows.

"There is an expectation that if somebody has an emergency you need to respond to that emergency in the quickest possible manner, bearing in mind though the safety of the people you have on your truck and other people on the road."

This emphasises that while we desire a fast response to an emergency we don't want too much haste that leads to sub-optimal decisions.

Goal seduction was found to occur in three different parts of the emergency response: getting to the fire station quickly; getting to the incident quickly; and dealing with the incident straight away. The consequences of goal seduction in this study included: neglecting things at home, having road accidents; violating policy and procedures, violating orders, leaving the station before the location of the incident was known, and crews putting themselves at risk. Table 1 presents examples of these problems.

Many of the controllers appeared to be aware of the effects of goal seduction (although they didn't use this term) and identified ways that could be used to mitigate its effects. These included verbally reinforcing the need for crews to obey road rules, monitoring and replacing unsafe fire vehicle drivers, monitoring the crew to ensure they are not placing themselves at risk, and constraining the actions of crew members. Table 2 presents examples of these methods.

Finally, a number of incident controllers found that it was useful to isolate themselves from the pressures of the situation so that they could appropriately size up what was going on.

"I'll tend to stay in the front left seat from there while the crew get out and just observe the scene I don't, as soon as the crew get out as well I'll watch from the cab and look around… you've got quite an advantage point, but it just gives you that time you're not as soon as you get out of that you're doing something."

DISCUSSION

Situations where goal seduction appeared to be influencing the actions of the participants could be identified in this study. This is consistent with previous research on goal seduction in aviation (Bearman et al., 2009a). Rather than being a simple category, goal seduction appears to be a complex multifaceted concept that is likely to have multiple causes. While goal seduction may be obvious when considered out of context, it is likely that it exerts rather subtle effects that may well not be obvious to the people involved at the time (Bearman et al., 2009a).

Table 1: Quotes highlighting the consequences of goal seduction.

Neglecting things at home
"And it's happened to me…fortunately I've…been aware of the fact that I've got something on the stove. I haven't actually run out the door but it could happen very easily."
Having road accidents
"A lot of people are involved in [road] accidents…because they are only thinking of one thing and the adrenalin is rushing around."
Violating agency policy and procedures
"Because every minute is absolutely vital, which is why I drove and not put… it's against [fire agency] policy and I shouldn't have done it…I should have been in the passenger seat."
Violating crew leader's orders
"I gave orders to the crews, so that it is an electrical fault, stay right away from it until [power company] arrived…he just took the crews up to the house window and around the corner to have a look."
Leaving the station before you know where you're going
"Everyone was in such a hurry to go, but quite frankly they didn't actually know how to get there."
Crews putting themselves at risk
"You get blokes that err will just turn up or appliances just turn up and they'll barge off of the truck, grab a hose and disappear into the smoke."

Table 2: Quotes highlighting how incident controllers manage goal seduction.

Verbally reinforcing the need to obey road rules
"[Crews need to] drive within the road rules but there's plenty that don't and I'm always telling them off."
Monitoring fire vehicle drivers
"Monitor the driver's driving because again, they will go like a million miles an hour."
Replacing unsafe fire vehicle drivers
"I've done it in situations, say stop the vehicle and went and removed the driver, put another driver in there."
Monitoring the crew to ensure they are not placing themselves at risk
"Looking after the crew…that they're not going to do something silly, rush into a building that's going to collapse on top of them."
Managing new crew members
"A lot of them if they're new, the adrenaline starts running and you know they just want to get off the appliance, even before the appliance stops, to go and start fighting it."
Physically constraining the actions of crew members
"I had to stop [person's name] from, he charged the door to try and get in… I pulled him out the way and kicked the door from one side and when we did, it came out like a blast furnace."

The study identified a number of potentially dangerous problems that result from not managing goal seduction effectively. These included violating policy and procedures, violating orders, crews putting themselves at risk and having road accidents. The potentially serious consequences indicate that incident controllers need to be aware of the impact of goal seduction and take steps to manage this pressure in themselves and their crew.

It is worth noting that even experienced controllers could succumb to goal seduction. This was highlighted by the participant who violated their agency's procedures by driving instead of being a passenger because they wanted to get to the incident quickly. This suggests that goal seduction can influence both the incident controller and their crew. To a large extent the incident controller sets the tone of the response. An incident controller who is experiencing goal seduction may be less effective at managing crew members' goal seduction and in fact may cause their crew to experience goal seduction through their decisions and actions. Interventions to mitigate goal seduction therefore need to take both the incident controller and their crew into consideration.

A number of different methods that incident controllers used to try to manage goal seduction could be identified in this study. These methods ranged from verbally reinforcing the need to obey road rules, monitoring and replacing unsafe fire vehicle drivers, monitoring the crew to ensure that they are not placing themselves at risk, and constraining the actions of crew members. Monitoring crew members and on occasions taking action to remove or constrain the actions of the crew is clearly important in managing goal seduction. While this is not the only way that can be used to manage goal seduction this does provide a starting point for discussions within agencies about how best to actively manage the pressure of goal seduction experienced by crew members.

One action that incident controllers discussed appears to be particularly useful in managing feelings of goal seduction. This was for the incident controllers to mentally or physically isolate themselves from the situation. This allows the incident controller to build an appropriate mental understanding of the situation outside of the goal seduction caused by wanting to deal with the incident straight away. While many agencies advocate the use of 'size-up' procedures this may be particularly difficult for people to do because of the pressures of goal seduction. The paradox here is that while taking time to effectively size-up the situation can mitigate the problems of goal seduction, if the incident controller is feeling the effects of goal seduction this can be very hard to do. Practical training in the use of such procedures should therefore include situations where there is goal seduction.

Goal seduction then is one of the pressures that can lead people into making sub-standard operational decisions. This pressure is part of the wider influences on a person from the context in which decisions are made. Other pressures outlined in the Y of Decision Context model come from other aspects of the situation, the organisational and the social worlds in which the person exists. In a normal situation it is unlikely that goal seduction will exist in isolation from the pressures generated by these other aspects of the decision context. In fact the model presents an interactive

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set of influences that mutually enhance and inhibit each other in a complex network of pressures. Goal seduction then is likely to be exacerbated by other factors, such as fatigue and adverse mental states. Ongoing research into the model is designed to better understand some of these linkages.

CONCLUSION

This paper has outlined some of the influences of goal seduction in emergency management. This pressure may affect both crew members and incident controllers. It is important then that people are aware of the affects of goal seduction and have strategies to manage it. The paper discusses a number of potential strategies to mitigate goal seduction that agencies can use in training or can develop into enhanced tools for use during emergencies. Goal seduction may be characterised as the pressure to try to achieve a goal when this is not the safest course of action. In such cases it is better to do nothing rather than act inappropriately, which is captured by the popular slogan "Don't just do something, stand there!"

BOOKS/EDITED BOOKS/BOOK CHAPTERS

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Volunteer Ambulance Officer Association Tasmania

20th anniversary celebrations

Friday 27 May, 2016

Photos: Laura Leworthy and Mary Knowles

Foundation members: Marg Dennis, Colin Dell, Lorraine Gardiner, Cheryl Wilson, Dianne Coon, Robyn Dell, Wayne Doran.

Presidents/Vice Presidents past and present: Colin Dell, Mary Knowles, Dianne Coon, Lorraine Gardiner, Pat Taylor, Cheryl Wilson, Wayne Doran.

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F/Response Editor: Marg Dennis.

Current Board members: Pat Taylor, Dianne Coon, Jack Spinks, Lesley Green, Leith McHarry, Deb Van Veizen, Cheryl Wilson, Wayne Doran, Marg Dennis (F/Response Editor), Steven Thompson, Laura Leworthy. (Absent: Jack Van Tatenhove, Keitha Munro, Sue George).

Treasurers past and present: Robyn Dell, Jack Van Tatenhove, Lesley Green.

AT staff past and present: Paul Templar, Grant Lennox, Ted Freshaw, David Godfrey Smith.

Find out more about AIES membership on page 26.

EUREKA CLIMB
EMERGENCY SERVICES CHALLENGE

Photo: Emma Jaques

Sunday 13 November 2016
Eureka Tower
Riverside Quay, Southbank, Melbourne

The annual race up 1,642 stairs at Melbourne's tallest building, the Eureka Climb, rewards participants with a fantastic view of the world's most livable city from the finish line at Skydeck88 – the highest viewing platform in the Southern Hemisphere.

This event, presented by OsteoEze, is a fundraiser for two charities – Whitelion and Interplast Australia and New Zealand.

The Emergency Services Challenge is always a big part of the Eureka Climb and has its own wave times and while official uniforms are optional, participants are encouraged to wear their uniforms and full kit.

For more information and to register, visit www.eurekaclimb.com.au


Photo: Emma Jaques


Photo: Emma Jaques

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Membership forms are available online at www.aies.net.au

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- To facilitate full interchange of concepts and techniques amongst members.
- To bring to the notice of the public such matters that are deemed to be important for safety and protection of the community and to promote research and development of emergency services generally.
- To establish a national organisation to foster international
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NATIONAL EMERGENCY RESPONSE JOURNAL

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CONGRATULATIONS

The AIES Board and its members extend their congratulations to recently retired Queensland Police Senior Sergeant Paul Hopley who received the Australian Radio Communications Industry Association (ARCIA) Industry Professional of the Year award for his contribution to the Radio and Electronics Section over 34 years.

The award was presented by ARCIA President Hamish Duff at a dinner in Brisbane recently, which was attended by AIES President Steve Jenkins who presented an award at the event.

(L-R) former Senior Sergeant Paul Hopley and ARCIA President Hamish Duff.

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