



Australian Government  
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# THE AUSTRALIAN JOURNAL OF EMERGENCY MANAGEMENT

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What makes our  
volunteers stay?

Teaching emergency  
procedures in schools

How do we develop a  
'Resilient Australia'?

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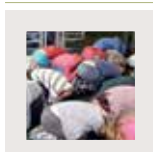
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### ABOUT THE JOURNAL

The Australian Journal of Emergency Management is Australia's premier Journal in emergency management. Its format and content is developed with reference to peak emergency management organisations and the emergency management sectors—nationally and internationally. The Journal focuses on both the academic and practitioner reader and its aim is to strengthen capabilities in the sector by documenting, growing and disseminating an emergency management body of knowledge. The Journal strongly supports the role of the Australian Emergency Management Institute (AEMI) as a national centre of excellence for knowledge

and skills development in the emergency management sector. Papers are published in all areas of emergency management. The Journal emphasises empirical reports but may include specialised theoretical, methodological, case study and review papers and opinion pieces. The views in this journal are not necessarily the views of the Attorney-General's Department.

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# Foreword

By Kym Duggan, First Assistant Secretary,  
AGD National Security Capability Development Division.

AJEM Editor-in-Chief.



I am delighted to be recently appointed as the First Assistant Secretary, AGD National Security Capability Development Division and therefore as Editor-in-Chief for the Australian Journal of Emergency Management (AJEM).

AJEM has a long and proud history, including a strong association with the Australian Emergency Management Institute (AEMI) at Mount Macedon, and I look forward to my association.

The devastation of the recent floods throughout Australia has shocked us all, particularly due to their size, severity and tragic loss of life. The emergency management response and recovery arrangements, and the efforts of the volunteers, have been appreciated by all involved. Accordingly, we have produced a special cover to this edition to mark these events.

In relation to capacity building for flood, the Attorney-General had previously released updated editions of our Australian Emergency Manuals series publications:

- Manual No 20 Flood Preparedness
- Manual No 21 Flood Warning
- Manual No 22 Flood Response
- Manual No 23 Planning for Floods Affected by Dams

We will now re-double our efforts, with the National Flood Advisory Group, to publish an updated edition of the overarching volume EM No 19 'Managing the Floodplain' as soon as possible.

Turning to editorial matters, in a recent edition of AJEM we asked readers to participate in our triennial Readers Survey. This year the survey was conducted on-line and many of you contributed. When we have assembled an analysis of the survey results we will report back to you. We also conducted a Subscribers Review, asking you to advise if you still wanted to receive AJEM, at what address or by electronic notification. Thankfully, we have been swamped with replies and a new mailing list will be drawn up accordingly.

We also called for nominations to join the AJEM Editorial Advisory Committee. This Committee meets regularly to provide advice to the Department on the strategic direction of the AJEM. I am pleased to confirm that Dr Michael Eburn has been appointed to this role. Many of you will know Michael, previously from the University of New England and now a Senior Fellow at the ANU Centre for Climate Law and Policy and the Fenner School of Environment and Society, within the ANU College of Law. Michael is an expert in legal aspects of emergency management and in 2011 will be undertaking research, funded through the Bushfire Cooperative Research Centre, looking at how emergency (in particular fire) management is incorporated into Australian law. Michael also has emergency management volunteer experience with St John Ambulance, NSW Ambulance and NSW State Emergency Service. Michael is the author of "*Emergency law: Rights, liabilities and duties of emergency workers and volunteers*" (Federation Press Third Edition 2010) which, I am advised, is a very popular title held at the AEMI Australian Emergency Management Library.

Appointments to the Committee are time quantified, so as they say "watch this space" for future opportunities to nominate. Our Committee comprises some very eminent persons in the Sector, including Dr Chas Keys (former Deputy Director General, NSW SES), Prof Jennifer McKay, Professor of Business Law, University of South Australia, David Parsons, Manager Emergency Management and Security Unit, Sydney Water Corporation, Andrew Coghlan, National Manager Emergency Services, Australian Red Cross and Raelene Thompson, Executive Director, AEMI. More information about the Committee is planned to be presented on our associated website "Emergency Management in Australia" at [www.em.gov.au](http://www.em.gov.au) shortly.



The peer review articles in this edition of AJEM contain a wide range of content, reflecting current priorities in our national emergency management industry sector, including national disaster resilience, emergency management volunteering, schools education and lessons learned from recent disaster events. This content includes: Simon Rice and Barry Fallon from Australian Catholic University on 'Retention of Volunteers in the Emergency Services'; David Johnson and Massy University NZ colleagues on 'Preparing Schools for Future Earthquakes' including a discussion of evacuations; Peter Rogers from Macquarie University NSW on 'Development of Resilient Australia', which is very timely given the proposed upcoming release of the National Disaster Resilience Strategy by Australian governments, and interestingly, a review of regional flood mitigation policy "Resilience to Climate Change Impacts: A Review of Flood Mitigation Policy in Queensland" from a collaboration of leading Queensland academics and researchers (noting that this article examines events from 2008). This paper was contributed and peer-reviewed prior to the recent Australian floods.

Also in this edition: the communiqué text from the recent meeting of our industry sector peak body, the Ministerial Council for Police and Emergency Management (MCPPEM-EM); information from the latest AEMI national workshop "International Experts Talk Resilience"; pictures and reports from the 2010 national presentation of the 'OSCARs' for our

sector, the Australian Safer Communities Awards (ASCAs); and updates from AEMI about some key upcoming emergency management sector national workshops, including the new media national workshop "Only Connect! - Workshop on community resilience, emergency management and new media" (14-15 April 2011) and the national workshop on community engagement "Engaged and resilient communities workshop" (17-19 May 2011).

Looking forward, the April 2011 edition of AJEM will be a specially "Bushfire" themed edition, for which the call-for-papers was distributed last October. It is proposed to have a Foreword prepared by the Australasian Fire and Emergency Service Authorities Council (AFAC), an opinion piece by the new Victorian Bushfire Commissioner and a range of articles co-ordinated in partnership by AEMI and the Bushfire CRC.

I look forward to being involved in the national emergency management community. If you have something to say to the AJEM readership, please do not hesitate to contribute a Letter to the Editor.

**Kym Duggan**

First Assistant Secretary, AGD National Security Capability Development Division

AJEM Editor-in-Chief.



Australian Emergency Manuals series publications.

# Workshop Report

**AEMI Workshop: international experts talk resilience.**

By Dianne Cooper, Australian Emergency Management Institute.



This year saw the first in the Australian Emergency Management Institute (AEMI) Master Class series. As part of the AEMI Research and Workshop Agenda, the Master Class concept provides an avenue by which experienced professionals can learn from and interact with visiting experts in the various fields of emergency management (EM). It is designed as a short burst of intensive theory and practice, focussed on a specific aspect of Emergency Management (EM).

On 14-15 October, seventy-five attendees at the Mt Macedon Institute were addressed by five national and international experts in various aspects of *Organisational Resilience*. Over the day and a half, those who were fortunate enough to gain a position at the Master Class heard about the need for a new approach to resilience, case studies out of Asia reflecting business resilience, emerging trends in resilience, crisis management, the UK command structure Gold, Silver, Bronze and even God's brain and uncertainty. The attendees had the opportunity to listen to, question and debate the various opinions put forward. The program was structured to enable time for interaction between the experts and the audience through question and answer time. As well there was a popular panel discussion facilitated by



**Back L to R: Professor John Handmer, Nat Forbes, Raelene Thompspon, Executive Director AEMI; Peter Power; Kym Duggan, Attorney General's Department; Dr John Bircham, Dianne Cooper, AEMI; Professor Robert Kay. Front: Professor Scot Phelps, and David Parsons.**

Peter Power, crisis management specialist and primary author of the UK Police command methodology *Gold, Silver and Bronze*.

The first day opened with an address by the National Security Capability Development Division First Assistant Secretary, Kym Duggan who stressed the importance of such forums for challenging shibboleths and fostering new and innovative practice. His call was answered in the first address by Peter Power, who explained the risks of believing resilience could be assured through frameworks such as Risk Management or Business Continuity Management. Peter stressed the importance of looking at resilience in a new way. He contended that dividing uncertainty up into various types of management approaches has served a purpose but that very approach now threatens to reinforce our vulnerability through entrenching the 'silo' mentality.

As attendees pondered the notion of management strategies creating organisational risks, Dr John Bircham took the stage to provoke them even further. John specialises in analysis, formulation and reformulation of dynamic and complex management systems. He contended we must learn to embrace

uncertainty; accept that it is our constant companion. Through his exposition on complex adaptive systems and their relation to uncertainty, he was able to convince many in the audience that the human brain abhors ambiguity and in its drive to survive will make decisions first and rationalise the reason later. He pointed out that all our organisational and management systems are based around conscious intent yet our decisions are based on unconscious drivers.

Examining another prism of organisational resilience, Director of International Association of Emergency Managers (IAEM) Asia-Singapore, Nat Forbes detailed three case studies. They told the story of internationally renowned companies which for economic reasons had located significant manufacturing plants in Asian countries. The folly of not recognising the key interdependencies that companies have with some of their suppliers became apparent. The suppliers may not have a way of guaranteeing provision of service or materials. Indeed sometimes they are geographically located in some of the most high risk natural disaster regions in the world – Asia’s ‘ring of fire’. He also noted that the next big dependency which companies have not factored in is water.

In a similar vein, Dr Robert Kay, Adjunct Professor at the University of Technology Sydney presented a dynamic argument on the importance of understanding your stakeholders and capitalising on uncertainty. Robert has assisted a number of large commercial organisations to embrace uncertainty and through innovation exploit the potential benefits. He argued in this Master Class address that if organisations are to weather the unknowable, they must seek to understand the complex, uncertain environment in which they function.

United States Professor and experienced emergency manager Scot Phelps guided the audience through a tour of Enrico Quarantelli’s theories and their relevance today. The importance of the planning process as opposed to the plan, the all hazards approach, starting simple and building expertise, all contribute to crisis capability development. It is important to understand how people make decisions in a crisis. He pointed out

that exercising for extreme events does not build competency. Rather it is the understanding of the core principles and the way people plan, train and work together that is the key. He noted that group dynamics is the whole point of emergency management training. Scot has come to these conclusions through years of field experience as well as research. He has worked in emergency management for two decades, been Assistant Commissioner for Emergency Management at the New York City Department of Health and Mental Hygiene as well as professor of EM at Metropolitan College, Western Washington University, NY Medical College and Southern Connecticut State University. Scot conducted a three hour workshop on the second day, focused on disaster decision making and incorporating the principles he had outlined on the first day.

The *Organisational Resilience Master Class* was a resounding success with attendees’ feedback clearly requesting a series be instigated. AEMI is a knowledge centre for innovative and leading emergency management practice. Master Classes provide an opportunity for leaders and experts in disaster resilience to share their knowledge and foster innovative and effective practice. AEMI will offer a Master Class series in 2011. The topics and speakers are currently being confirmed. This will see a number of speakers from the US, UK, Canada and Australia present at AEMI across a range of disaster resilience topics. Further information will be posted on the Emergency Management in Australia website [www.ema.gov.au/aemi](http://www.ema.gov.au/aemi)

### About the author

**Dianne Cooper** has extensive experience in adult education and works in Professional Education strategy and research at the Australian Emergency Management Institute. Since joining AEMI in 2000 she has been involved in the development of learning and assessment materials and the delivery of programs in areas such as emergency risk management, emergency planning, business continuity management and organisational resilience. She has designed and conducted operational debriefs at the state, national and international level.



L to R – Peter Power, David Parsons, Professor Robert Kay, Nat Forbes, Professor Scot Phelps, Professor John Handmer, Dr John Bircham.

# Ministerial Council for Police and Emergency Management

## COMMUNIQUÉ

Canberra, 26 November 2010

The Ministerial Council for Police and Emergency Management – Emergency Management (the Council) met in Canberra today (26 Nov, 2010). The Council is chaired by the Commonwealth Attorney-General, the Hon Robert McClelland MP, and comprises Commonwealth, State, Territory and New Zealand emergency management Ministers and the President of the Australian Local Government Association.

The Council discussed Australia's preparedness for the current bushfire season and other natural hazards such as cyclones and floods. The Council noted the Commonwealth is facilitating pre-disaster season operational briefings to all States and Territories and considered how these briefings could be enhanced in coming years. The Council also considered international best practice responses to natural disasters through discussion of the recent earthquakes in Christchurch, New Zealand.

The critical importance of education, for both children and adults, in preparing and responding to emergencies was discussed by the Council. Ministers agreed the Chair would write to the Commonwealth Minister for School Education, Early Childhood and Youth asking him to request the Australian Curriculum Assessment and Reporting Authority add a module on dealing with emergencies and disasters to the national curriculum.

Other key issues discussed by the Council included:

- National Strategy for Disaster Resilience
- 2009 Victorian Bushfires Royal Commission Final Report
- Triple Zero Emergency Call Service
- National Strategy to Reduce Bushfire Arson in Australia
- Bushfire Detection Camera Trials

### **The National Strategy for Disaster Resilience**

The Council took an important step in building national, whole-of-government support for resilience based approaches to emergency management by endorsing the draft National Strategy for Disaster Resilience. The draft Strategy, including recommendations for national implementation, will now proceed to COAG where it

will be considered for final endorsement. The Strategy is the cornerstone of significant national reforms in emergency management which COAG agreed to in December 2009.

### **2009 Victorian Bushfires Royal Commission final report**

The Council agreed to collaborate on, and drive the implementation of, recommendations of national significance, outlined in the Final Report of the 2009 Victorian Bushfires Royal Commission (VBRC).

The recommendations primarily relate to the delivery of advice about emergencies to the Australian public, arrangements for the provision of operational assistance to the States and Territories, and planning and building controls in bushfire-prone areas.

This agreement complements current work on the Commission's earlier interim reports including; the national telephone emergency warning system, national fire danger rating scale and Triple Zero emergency call service.

### **Triple zero**

The Council agreed to prioritise specific options to improve the efficiency of the Emergency Call Service through national collaboration.

The Council also noted the Commonwealth has engaged a consultant to identify best practice technologies, operating procedures, standards, principles and protocols for potential national adoption of compatible systems in the long term.

### **National strategy to reduce bushfire arson in Australia**

The Council noted progress on developing a National Strategy to Reduce Bushfire Arson. The aim of the Strategy is to reduce the incidence of bushfire arson in Australia through collaborative national approaches across all relevant agencies and jurisdictions.



## Disaster season operational briefing

The Council had the opportunity to participate in a disaster season operational briefing which has been delivered to State and Territory Emergency Management organisations in the lead up to the 2010 disaster season. The Council also considered feedback on how future disaster season operational briefings could be improved.

The Council noted the forecast risks for the upcoming disaster season.

## Bushfire detection camera trials

The Council noted the conclusion of the 2009-10 Remote Fire Detection Camera Trials, conducted by the Commonwealth in collaboration with Victoria, New South Wales, the Bushfire Cooperative Research Centre (CRC) and the CSIRO.

The Bushfire CRC and CSIRO evaluated the trial and provided a report which did not support further dedicated trials at this stage. The report found that although all the camera systems tested were able to observe and locate fires during both day and night, the detection by the camera systems was slower and less reliable than by a trained human observer. The report is available on the Attorney-General's Department's website at <http://www.ag.gov.au/publications>.

The Commonwealth hosted and facilitated a national workshop at the Australian Emergency Management Institute on 4-5 November 2010 to consider outcomes of the Remote Fire Detection Camera Trials and examine the performance of camera systems to detect fires, exclude false detection, and the potential integration into existing arrangements. Representatives from the

Commonwealth, the State and Territory Governments, emergency management agencies, and key members of the scientific and research community attended the workshop.

The Council also noted that, following the conclusion of the Remote Fire Detection Camera Trials, it was a matter for individual States and Territories whether to pursue the use of this technology in addition to their existing fire detection arrangements.

## Funding for national priorities

The Council noted funding of \$4 million provided by the Commonwealth for national projects to build the nation's disaster resilience by supporting measures to strengthen communities, individuals, businesses and institutions to minimise adverse effects of disasters on Australia. National projects include, for example, the:

- Bushfire Arson Investigation Course to assist the investigation of bushfire arson by police and fire-fighting authorities;
- National Tsunami Community Education Strategy to underpin the development of a comprehensive community education program in relation to tsunamis;
- Emergency Management Volunteer Leadership Training to promote effective leadership within volunteer structures;
- National Culturally and Linguistically Diverse Program to strengthen the emergency management sector's capability to engage culturally and linguistically diverse communities through enhanced national collaboration and coordination.

# Resilience to climate change impacts: a review of flood mitigation policy in Queensland, Australia

BASED ON CASE STUDIES OF FLOOD EVENTS IN 2008.

By Melanie Thomas, David King, Diane U. Keogh, Armando Apan and Shahbaz Mushtaq.

## ABSTRACT

The vulnerability of cities to inundation from the impacts of climate change associated with the increased inter-annual variability associated with extreme weather events has been highlighted in the 2007 Intergovernmental Panel on Climate Change report. Predictions of an increased intensity of rainfall are likely to result in subsequent flood disaster events. Flood mitigation has been addressed by planning policy in Queensland through the State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03) which will expire at the end of 2013 under the new *Sustainable Planning Act 2009*. The effectiveness of the SPP 1/03 was researched using two cases studies from the 2008 floods in Queensland: the rural town of Charleville was compared with the coastal city of Mackay.

## Introduction

The vulnerability of developed floodplains to extreme rainfall events, particularly under climate change, is increasing; and their vulnerability to inundation has been highlighted in the 2007 Intergovernmental Panel on Climate Change (IPCC) report, particularly in chapter 7 which relates specifically to industry, settlement and society. In Australia natural disasters such as bushfires, floods, landslides and cyclones cause serious disruptions to communities and cause approximately \$1 billion in damages annually to homes, businesses and infrastructure, with this figure likely to increase as a result of the impending impacts of climate change (BTE, 2001).

Floods in Australia typically account for 29% of the costs resulting from natural disasters (BTE, 2001). The insurance industry in Australia has broadly

classified floods according to three categories: flash flooding, riverine flooding and sea level rise or storm surge (Insurance Council of Australia, 2010). One mechanism by which increases in the costs of disasters is likely to occur relates to the 'sea change' phenomenon. This phenomenon has resulted in increased urbanisation of coastal areas in Australia with a consequent increased population at risk of exposure to natural disaster events associated with climate change such as flooding from sea level rise (DOCC, 2009).

An assessment undertaken of the risk of climate change to Australia's entire coastal zone was compiled by the Australian Government Department of Climate Change (DOCC) in the report 'Climate Change Risks to Australia's Coasts'. It found that between 35,900 and 56,900 residential buildings along the Queensland coastline were located within 3 kilometres horizontally and 6 metres vertically of the shoreline (DOCC, 2009a). The report concluded that Queensland residential buildings at risk of a sea level rise of 1.1 metres were valued between \$10.5 and \$16 billion dollars, the second highest level of any state in Australia (DOCC, 2009a). Mackay was included as one of the top six Local Government Areas in Queensland that collectively represented 85% of these residential buildings at risk of inundation along the Queensland coastline (DOCC, 2009a). Additionally, the IPCC 2007 report found flooding in inland areas such as Charleville may become worse in the future under climate change scenarios in which extremes of both flood and drought will be amplified.

In the paper 'Adaptation to Environmental Change: Contributions of a Resilience Framework', Nelson et al. (2007) conclude that adaptation is "a process of deliberate change in anticipation of or in reaction to external stimuli and stress" which takes into consideration Smit's (2000) definition where human adaptation techniques are either 'autonomous' or 'planned'. Planning and development that both mitigate and augment the adaptive capacity to flood disaster events through building and engineering solutions have been addressed in Australia by the National Disaster Mitigation Program (NDMP)<sup>1</sup> which identifies and

<sup>1</sup> Editor's Note: The NDMP in 2009/10 became part of the Natural Disaster Resilience Program. This paper was submitted and reviewed prior to the recent floods in Queensland.

addresses natural disaster risk priorities (AGD, 2009). Australia's Regional Flood Mitigation Program, which was rolled into the NDMP in 2007, invested \$75 million in 270 projects over the program's eight year duration comprising: construction of levees, house raising, flood proofing buildings, bypass floodways, flood control dams, retarding basins, channel improvements, flood warning systems and activities to raise community awareness (AGD, 2009). Legislation is another approach that addresses climate change mitigation and assists adaptation. Different jurisdictions in Australia have different disaster planning policy approaches for example Victoria has promoted a 'retreat' policy to the threat of coastal inundation from sea level rise and associated storm surge; whilst New South Wales has advocated the position of 'defence', endorsing engineering solutions (see Table 1).

Research was undertaken to determine the effectiveness of disaster planning policy approaches in Australia by assessing the Queensland *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (SPP 1/03) which was introduced in 2003 as a statutory instrument under the *Integrated Planning Act 1997* (now superseded by the *Sustainable Planning Act 2009* (SPA)) and the *Statutory Instruments Act 1992*. The focus of this policy is to mitigate against the disaster impacts of natural hazards on communities and the environment, and to effectively create more resilient communities including households and businesses under Queensland state planning legislation. This is of particular importance given the recently enacted Queensland *Sustainable Planning Act 2009* (SPA) which will cause state planning policies to expire after ten years. The key themes of the SPP 1/03 are:

- Natural hazards are to be identified in planning strategies and local planning schemes.
- Incompatible development should be avoided except for the following cases:
  - a. Proposed development is a development commitment by local or state government
  - b. An overriding need for the development in the public interest with no other suitable site
- Proposed infrastructure should be designed to function during and post the natural hazard event.

Prior to introduction of the SPP 1/03 there was no planning policy in Queensland that imposed any restrictions to developments in natural hazard prone areas. Floods have been recognised under Emergency Management Legislation throughout jurisdictions in Australia and planning for floods was first recognised in New South Wales planning legislation under section 55 (2)(d) of the *Environmental Planning and Assessment Act 1979* (Table 1). However, Queensland was the first state in Australia to introduce a state planning policy in 2003 specifically aimed at mitigating floods with New South Wales subsequently releasing in 2005 the *Flood Prone Land Policy and Floodplain Development Manual*. The introduction of the SPP 1/03 has resulted in mitigation measures being introduced into local government planning schemes and the development of strategic

regional plans to prevent urban development in areas particularly vulnerable to natural hazards. According to the SPP 1/03, the Queensland Government's position is: "The appropriate flood event for determining a natural hazard management area (flood) is the 1% Annual Exceedance Probability (AEP) flood." (Annex 3, A3.2).

## Methodology

The research undertaken was a qualitative study which focused on reconstructing an event recording the actions taken at the various stages of the Integrated Emergency Management System in relation to the Charleville and Mackay 2008 flood disaster events.

The study used a purposive sampling research design that was composed of three phases of quantitative and qualitative data collection in the form of questionnaires and face-to-face structured and semi-structured interviews (Kreuger and Neuman, 2006). Each phase of data collection was targeted at a different group of stakeholders: household residents, businesses and institutions. The sample sizes and response rates are given in Table 2 with the low response rates for Mackay households explained by the large proportion of the sample either not home at the time the survey was undertaken or not present during the floods, having moved into the house following the event.

## Case study: 2008 Charleville floods, Queensland

The rural town of Charleville is situated west of Brisbane and is the main town servicing the Central West region (Wagner, 1991). The Charleville population grew around the agricultural industry from 1871 to peak in 1961 with 5,154 people and then declined to a population of 3,278 recorded at the 2006 Australian Census of Population and Housing (CGQ, 2009; ABS, 2006). The decline in population is reportedly linked to the downturn in the pastoral industry, fluctuating sheep-wool and cattle prices, a number of poor seasons and the effect of rising operational costs (Lord, 1982).

Charleville lies on a floodplain in the heart of Queensland's mulga country on the left bank of the Warrego River and was laid out in the form of a grid by a Government surveyor (Wagner, 1991). The Bradley's Creek catchment covers 200 km<sup>2</sup> and flows through Charleville running almost parallel to the Warrego River before it discharges into the Warrego River downstream of the town (Sargent, 1991). Charleville has a low average rainfall of 450mm but the township has historically been flooded by the Warrego River numerous times to the point where the flood disaster event of 1997 led to the construction of a levee to protect the town (figure 2; BOM, 2009).

The January 2008 flood was not caused by the flooding of the Warrego River but by the riverine flooding of Bradley's Gully which flows through the township of Charleville (BOM, 2009). Flooding occurred over 3 days from 17 to 20th January 2008 and it was the largest Bradley's Gully flood event since 1963 with floodwaters reaching approximately 3.1 metres (BOM 2009).

TABLE 1. Flood related disaster planning legislation and policy in Australia.

Australian State/ Territory	Emergency Management Legislation	Planning legislation	Flood mitigation planning policy	Coastal legislation	Coastal Policy	Sea level rise benchmark
Australian Capital Territory (ACT)	Emergencies Act 2004	Australian Capital Territory (Planning and Land Management) Act 1988	Floodplain Protection Guidelines	N/A	N/A	N/A
New South Wales (NSW)	State Emergency and Rescue Management Act 1989	Environmental Planning and Assessment Act 1979	State Environmental Protection Policy  Flood Prone Land Policy and Floodplain Development Manual 2005	Coastal Protection Act 1979  Coastal Protection and Other Legislation Amendment Act 2010	Draft NSW Coastal Planning Guideline: Adapting to Sea Level Rise	40cm by 2050 & 90cm by 2100
Northern Territory (NT)	Disaster Act 2008	Planning Act 2009		No specific legislation	NT Marine and Coastal Biodiversity Management Strategy being developed	Not stated
Queensland	Disaster Management Act 2003	Sustainable Planning Act 2009	State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide	Coastal Protection and Management Act 1995	Draft Queensland Coastal Plan – Draft Guideline Coastal Hazards	Draft – 30cm by 2050 & 80cm by 2100
South Australia (SA)	Emergency Management Act 2004	Development Act 1993		Coast Protection Act 1972	Under review – Coastal Planning Information Package	30 cm by 2050 & 100cm by 2100
Tasmania	Emergency Management Act 2006	Tasmanian Planning Commission Act 1997		No specific legislation	Revised Draft State Coastal Policy 2008	Not stated
Victoria	Emergency Management Act 1986	Planning and Environment Act 1987	SPPF Coastal Areas policy (Clause 15: 08-2)	Coastal Management Act 1995	Victorian Coastal Strategy 2008	80cm by 2100
Western Australia (WA)	Emergency Management Act 2005	Planning and Development Act 2005	State Planning Policy No. 3.4: Natural Hazards and Disasters 2006	No specific legislation	Statement of Planning Policy 2.6: State Coastal Planning Policy 2003 (under state planning legislation)	38cm by 2100

Sources: Emergency Management Australia (2008; AGD, 2009); Briggs et al. (2010)

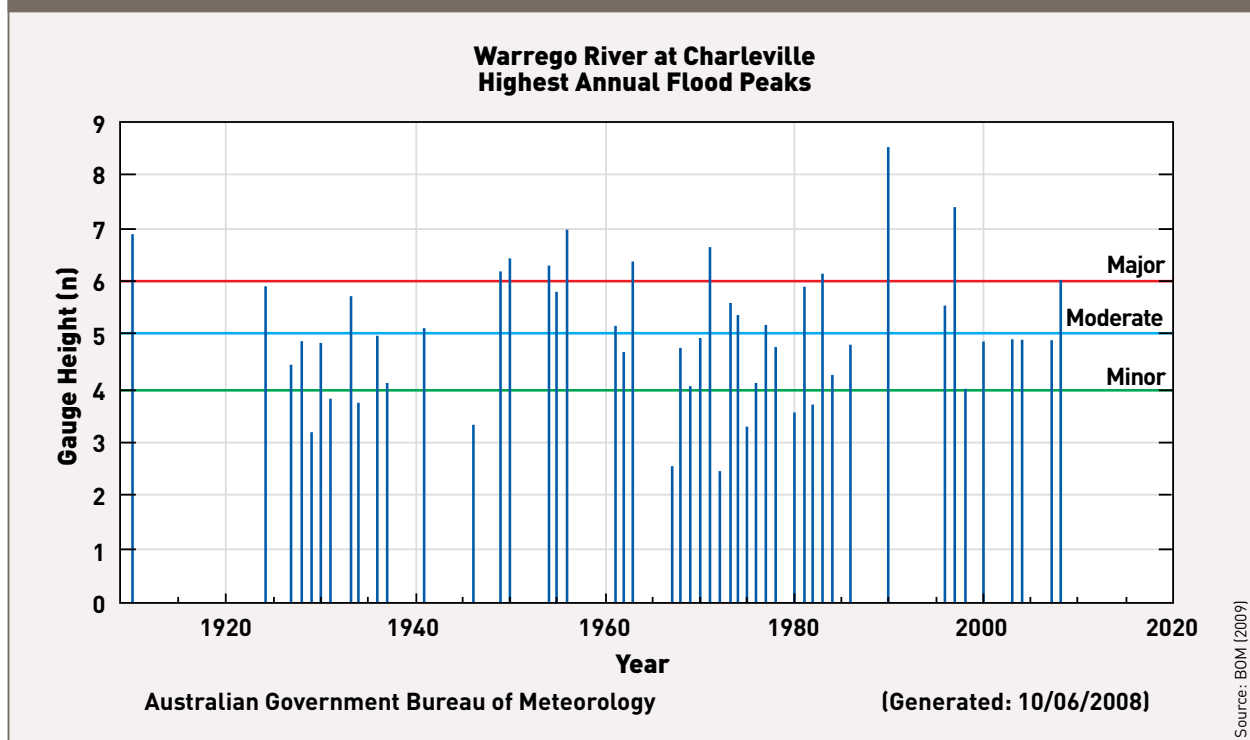


TABLE 2: Total sample and response rates.

Sample Group	Statistical group	Charleville	Mackay	Total
Households	Number contacted	65	400	465
	Effective in-scope sample	55	87	142
	Response rate	85%	22%	31%
Businesses	Number contacted	15	142	157
	Effective in-scope sample	13	47	70
	Response rate	87%	33%	44%
Institutions	Number contacted	30	38	68
	Effective in-scope sample	23	12	35
	Response rate	77%	32%	41%

The questionnaire asked whether they had required approval of a development under the SPP 1/03 and respondents were asked to rate its effectiveness.

FIGURE 2. History of flooding of the Warrego River at Charleville.



Approximately 40 businesses and residents in the lower-lying areas of Charleville and some hospital patients were evacuated (ABC, 2008). There were 920 families assisted through the Natural Disaster Relief and Recovery Arrangements (NDRRA) grants totalling over \$446,000 in Emergency Assistance and Essential Household Contents Grant payments (pers. Comm.. Jill Peters. Community Recovery Unit, Queensland Department of Communities, Brisbane, 23-12-2009). There were 96 primary producers that received grants to the value of \$1.341 million and several other small business grants and concessional loans paid out to primary producers under NDRRA (QRAA, 2010). The total

cost of the restoration of essential public assets was estimated at \$2.5 million by the Queensland Department of Infrastructure and Planning (pers. comm. Allan Pemberton, Murweh Shire Council, 2-11-09). Emergency Management Queensland counter disaster operations costs for Murweh Shire totalled \$216,000, whilst no freight subsidies were paid out to primary producers by the Department of Employment, Economic Development and Innovation (pers. Comm. Stephen Hinkler, Queensland Department of Community Safety, 18-01-2010).

**Case study: 2008 Mackay floods, Queensland**

The city of Mackay, situated in Northern Queensland, was established in 1860 by explorer and harbourmaster John Mackay on an expedition in search of northern grazing land, and was founded on an estuarine wetland floodplain (Mackay Family History Society Inc., 2009). The township has developed, including reclaimed wetlands areas, around the port and services that support the primary industries of the region such as the large mining and agricultural sectors (REDC, 2009). The Mackay statistical division is a relatively wealthy area in comparison with many other regions of Australia with 10-16% of households earning a gross income of \$2500 or more per week with almost 50% of workers employed in construction or mining-related professions (46.7%; ABS, 2006; ABS, 2008).

The history of flooding from the Pioneer River is illustrated in Figure 3 and records date back to 1884 (BOM, 2009). The highest occurring flood recorded was in February 1958 which peaked at a height of 9.14 metres on the Mackay flood warning gauge at the Forgan Bridge (BOM, 2009). The February 2008 flood was not a riverine flood but a flash flood, caused by intense local rainfall, with the river peaking at only seven metres (BOM, 2009).

On 15 February 2008 the Bureau of Meteorology (BOM) Mackay Alert automatic gauging station located in North Mackay recorded a total 24 hour rainfall of 629.2 mm and classified the rainfall as a synoptic scale event (BOM, 2008).

Mackay’s annual rainfall is between 1600 – 2000 mm and February’s average rainfall based on records since 1959 records is 326.7 mm and median rainfall

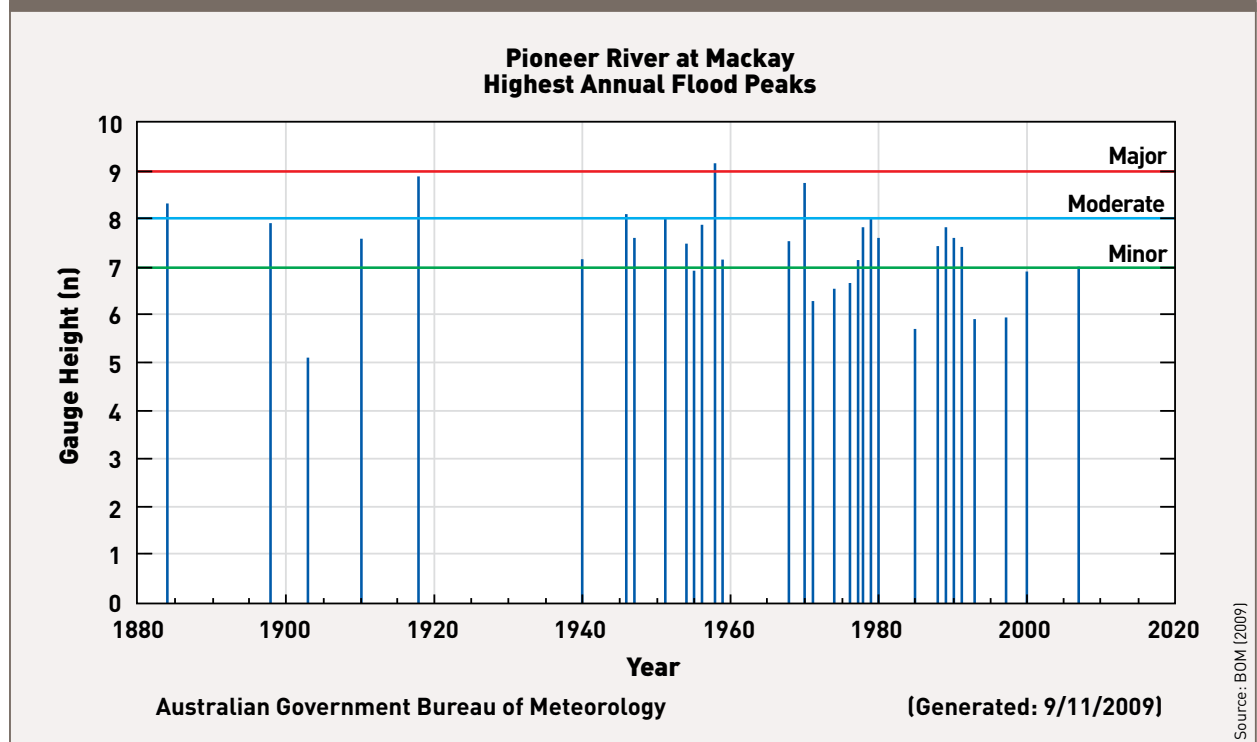
275.2 mm (BOM, 2009). Twice the city’s monthly average rainfall and almost a third its annual rainfall fell within six hours on the morning of 15 February 2008 between 3:00am and 9:00am.

The whole city of Mackay was affected by the rainfall but the worst impacts were caused by a wave of runoff which travelled from the north-west in Glenella and followed the Gooseponds creek using roads as channels in an effort to get out to sea through the city. This wave of runoff caused the most significant disaster impacts, resulting in the greatest impacts in the low lying, sloped areas of the suburbs of Glenella and North Mackay. It was particularly notable that in the suburbs of Glenella and North Mackay, residences located adjacent to new in-fill developments, which were former wetland areas, appeared to receive the greatest amounts of water in their homes.

The State Emergency Service (SES) responded to approximately 2000 calls for assistance during the 2008 Mackay floods (EMA, 2008). The floods resulted in disruption to power and telecommunications, overflow of sewerage stations into an estimated 200 homes, people trapped in their homes and vehicles, and closure of the airport and roads into the city (Courier Mail, 2008). Six evacuation centres were established and there were two deaths associated with the floods (EMA, 2008). Post disaster dangers included water passages which enabled crocodiles to travel to and within urban, more populated areas (Courier Mail, 2008).

More than \$419 million in infrastructure and contents damage occurred as a result of the floods. The Insurance Council of Australia (ICA) recorded a total of \$410 million in claims of flood damage to private residences including buildings and contents, cars, rural fences, business

FIGURE 3. History of flooding of the Pioneer River at Mackay.





An estimated 200 homes experienced disruption to power, telecommunications and an overflow to sewerage systems.

interruption, motor cars and business (ICA, 2009). Many insurance companies did not cover riverine flood damage in Mackay due to the high likelihood so if the February 2008 flood had not been a result of flash flooding but a riverine flood, many insurance companies would not have covered the damage. This would have left flood impacted households and businesses at greater economic vulnerability which would have increased the impacts on the Mackay community. Expenditure by government institutions in response and recovery operations to the floods was in the millions, for example, the Department of Transport and Main Roads alone spent \$9.3 million on public infrastructure repairs following the 2008 Mackay floods.

### Research findings

This study highlights the creative solutions that enable development to continue on flood-prone areas and key findings relating to research on the SPP 1/03 are listed in Table 3. The levee construction in Charleville has created a flood-proof mindset which has resulted in reverting to building on slabs as opposed to raising the floor level. Loopholes in the Mackay City Planning Scheme 2006 that enable extensions to existing developments were also detected. This case study shows the difficult task of forward planning in towns built on historic planning decisions where restrictions for building above flood lines were only introduced in 2003.

Table 3 outlines the limits to the implementation of the SPP 1/03 in both Charleville and Mackay including mitigation measures attempted and those omitted, misconceptions and loopholes. The case study examples of Charleville and Mackay are illustrative of many issues in other councils throughout the state.

The importance of planning is highlighted in a changing climate where this study reveals that a greater disaster event is only a matter of time for the city of Mackay and other similar coastal cities built on floodplains. Alarm was raised amongst Mackay residents in the two years following the 2008 disaster event when flash floods were forecast in February 2009 as a tropical low, a remnant of former tropical cyclone Ellie, crossed the coast and again in March 2010 from tropical cyclone Ului (Daily Mercury, 2010; MRC, 2010). Moreover, Charleville was flooded again by Bradley’s Gully in March 2010 which demonstrates the town’s vulnerability when around a third of the population in Charleville had to be evacuated and flood waters from Bradley’s Gully cut through the centre of the town (BOM, 2010; ABC, 2010).

TABLE 3: Summary of findings relating to the SPP 1/03: Mitigating the adverse impacts of Flood, Bushfire and Landslide.

Town	Findings
Charleville	<ul style="list-style-type: none"> <li>The Murweh Shire has a flood overlay as part of the Town Plan</li> <li>Industrial area outside flood prone area</li> <li>New commercial premises in flood area required to have an upstairs area or an Evacuation Management Plan</li> <li>Habitable dwellings 300mm above last known flood height (1997 flood event used)</li> <li>Unaware that SPP 1/03 is a policy – thought merely a guideline.</li> <li>A levee constructed in an attempt to ‘flood-proof’ the town.</li> </ul>
Mackay	<ul style="list-style-type: none"> <li><i>Mackay City Planning Scheme 2006</i> contains a ‘Flood &amp; Inundation Management Overlay’ which relates to riverine flooding</li> <li>Storm surge is covered under the <i>Emergency Action Guide</i></li> <li>No provisions for flash flooding</li> <li>Min floor level 300mm above the Defined Flood Event (DFE – 1/100 ARI flood event used) which relates to the flooding of the Pioneer River</li> <li>Extensions to developments permitted if there is 1 “Habitable Room” at least 300mm above the Defined Flood Event (DFE)</li> <li><i>Mackay City Planning Scheme 2006</i> specifies a maximum of 50 cubic metres of infilling for a development before it is required to be code addressed</li> <li>An example of a flooded street where houses with raised floors above the 1/100 Annual Recurrence Interval (ARI) flood event were not flooded.</li> </ul>

## Discussion

The substantial costs required to rebuild following flood damage may result in unaffordable insurance premiums leaving a cleanup bill to be paid. Historically natural disasters have caused insurance companies to become insolvent and costs have been passed onto government agencies and ultimately tax payers (Salt, 2003). This raises the question of who should pay for the costs associated with climate change. The risks associated with climate change have caused increasing concern amongst the Australian population. This has been evidenced at the federal level where politics has been dominated in the last three years by significant decisions relating to climate change policy. For example, it has been suggested that the 2007 federal election was won on the key election promise to ratify the Kyoto Protocol and that confidence was said to have been lost in the Labor government because of its failure to deliver an Emissions Trading Scheme (Flannery, 2010). In attempting to address the costs associated with climate change, whilst government will inevitably be required to play a role as extreme weather events result in natural disasters, greater responsibility should be placed on individuals to consider the impacts of climate change in their own risk assessments.

Australians continue to make the lifestyle choice of living by the beach and councils face significant liability concerns under climate change where the legislative responsibilities are often held by local governments and so the trend by both state and federal governments has been to devolve responsibility for decision making and costs to the local council level (Gold Coast City Council, 2010). Local governments feel as though they face a no-win liability situation under climate change scenarios (Gold Coast City Council, 2010). They are afraid that they will be sued if they approve developments in flood prone areas but are equally concerned that they will be taken to court if they do not allow development along the coast, as in the recent case where landowners took the South Gippsland Shire Council to VCAT ([1545] 2008) in relation to the Victorian state planning policy that requires councils to identify and avoid development in areas susceptible to flooding. Despite the case brought by the landowners being unsuccessful, it highlights that coastal policies such as the Victorian approach are having the effect of reducing coastal property values which could also lead to an alteration in former real estate market trends over time as impacts from climate change compound. Approaches in other jurisdictions have cost local governments such as the recent court proceedings between Byron Shire Council and a local resident where the court upheld an owner's right to protect their property from sea level rise in Byron Bay, New South Wales (Briggs et al, 2010).

Instruments are currently being designed at both state and federal levels that address the increased impacts on infrastructure resulting from climate change. For example, Queensland's coastal policy, the 'Queensland Coastal Plan', is in draft form and



A rebuild of parts of the city was required after the floods.

likely to include measures that recognise a rise in sea level by incorporating a height above which buildings must be constructed and a sliding scale from 800 mm above current sea level which is unclear as to how this will be assessed (DERM, 2010a). Emergency Management Queensland currently uses the 'Guidance for considering climate change in Natural Disaster Resilience Program funded projects in Queensland Guidelines', issued by the Department of Climate Change, when assessing the funding of disaster recovery projects to ensure that alterations that recognise resilience to climate change impacts are considered in future design (DOCC, 2009b). Engineers Australia is in the process of updating the Australian Rainfall and Runoff (ARR) tables used currently by engineers to incorporate climate change models (Engineers Australia, 2009).

The recent changes in Queensland planning legislation will have the effect of overriding local government policies. This may result in increased destruction from natural disasters where state government policy that aims to encourage development and economic activity overrides initiatives by local governments – for example in the case of Mackay, where local government planners have been trying to influence state planning policy to introduce stronger measures to prevent development in areas susceptible to flooding. The introduction of an expiry date for all state planning policies could create havoc for the Integrated Development Assessment System (IDAS) in three years time when this policy is due to expire at the end of 2013.

The changes in Queensland's planning legislation have already been enacted to slow the development



of wetlands in the Great Barrier Reef Catchments by the introduction of the *Temporary State Planning Policy 1/10 Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments*, which was released in May 2010 by the Department of Environment and Resource Management (DERM, 2010b). This will require any developments on wetlands in the Great Barrier Reef catchment area to undergo a specific assessment and will also assist in reducing the severity of floods by allowing overland flows and ground water infiltration. This is the first planning policy that has been enacted in Queensland by joint Ministers, the Honourable Kate Jones MP, Minister for Climate Change and Sustainability, and the Honourable Stirling Hinchliffe MP, Minister for Infrastructure and Planning, under the new legislation included in chapter 2, part 4, division 3 of the *Sustainable Planning Act 2009* (SPA; DERM, 2010b). The introduction of this policy indicates the state recognition of the threat of wetlands in the Great Barrier Reef catchment to development as requiring urgent protection. It should be noted that the current status of this policy is 'temporary' so will expire within a year under SPA.

## Conclusion

Policy solutions that rely heavily on emergency management as distinct from solving or mitigating problems at source during development may be considered as negligent under climate change scenarios. Planning policy solutions which effectively address development patterns in floodplains are critical to increasing the resilience of communities and decreasing the cost of natural disaster recovery. The emergence of coastal planning policies that address storm surge flooding from sea level rise should be consistent with disaster flood mitigation planning policy to ensure their effectiveness as flood mitigation tools and provide resilience to climate change impacts. The SPP 1/03 needs to be revised to increase its effectiveness, to incorporate the projected impacts of climate change and to ensure that it is harmonious with Queensland's coastal policy.

## Actions for future consideration

1. State disaster planning legislation and policy need to be harmonious with state coastal legislation and policy concerning flood disaster events and anticipated sea level rise levels to avoid confusion for individuals, developers, councils and the legal system.
2. A mechanism should be initiated in local government development assessment processes, either at the planning scheme or council decision making end, so that the total land infill impacts are factored into the consideration of the approval of new developments, particularly estates, in flood prone areas.

3. Use a cost-benefit analysis or other economic model to account for the greater costs incurred to the council and subsequently rate paying residents from any disaster impacts on proposed developments.
4. Ensure that new developments incorporate adequate measures so that they are built off the ground but allow for water passage on ground levels.
5. Include a gradient overlay in the local government planning scheme.
6. Undertake research detailing the comprehensive costs from road outages due to flooding including validating historic figures and future estimates, so that future flood mitigation and road maintenance business cases can be presented to decision makers in government at the state and federal levels.
7. Ensure that terminology is more specifically defined under the SPP 1/03 and ensure a greater focus on the intended outcomes of the recommended processes. Use scenarios in the rewriting of the SPP 1/03 to make it understandable to practitioners.
8. To design more resilient communities, create provisions that require flood damaged houses to be rebuilt above the 1/100 ARI flood line and building materials such as plastic cladding rather than timber cladding are used in houses located in floodplains.
9. Commence a campaign that assists individuals and businesses to consider the impacts of climate change into their own risk assessments of property location purchases to transition cost-sharing across individual, business and government sectors.

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# Retention of volunteers in the emergency services: exploring interpersonal and group cohesion factors

By Simon Rice & Barry Fallon, Australian Catholic University.

## ABSTRACT

Emergency service agencies within Australia remain heavily reliant on the contribution of volunteers. As such, there is significant need for effective strategies and procedures to promote the retention of emergency service volunteer members. This study reports data from 2,306 emergency service volunteers on interpersonal and group cohesion factors thought to enhance volunteer satisfaction and promote ongoing commitment to the agency. Results indicate that supervisor support, interactional justice, recognition, and group cohesion all significantly contributed to greater volunteer satisfaction and ongoing commitment to the agency. Findings are discussed in the light of social exchange theory, highlighting the need for adequate supervisor training, enhanced volunteer recognition schemes, and attention to interpersonal climate within agency units.<sup>1</sup>

Australia's emergency services sector is heavily reliant on the contribution of trained, experienced and committed volunteers. Of concern, within the last decade, the average time contributed by volunteers to emergency service agencies has decreased and the recruitment of volunteer personnel has become increasingly difficult (Baxter-Tomkins & Wallace, 2006; 2009). One commonsense approach to maintaining volunteer numbers is to minimise attrition through retention practices that seek to provide benefit to volunteers, increase morale, and facilitate commitment to the agency (McLennan & Bertoldi, 2004).

## Social exchange and volunteer motivations

Volunteer motivation can be conceptualised within the framework of social exchange theory – in order for volunteer efforts to be sustained over time, the rewards to the volunteer must exceed, or at minimum, balance out the costs (Schafer, 1979). The decision to continue volunteering is typically re-evaluated throughout the volunteer's tenure, where assessments are made about the relative rewards and costs of their involvement (Philips, 1982).

Research demonstrates that the expansion and mobilisation of personal relationships and social networks is a key benefit perceived by individuals seeking to volunteer within emergency service agencies. Volunteer fire-fighters report being motivated by a range of community safety concerns, community contribution desires, and enlightened self-interest, with those in the 18–34 age range likely to be attracted by personal benefits of volunteering such as career enhancement, skill development, and opportunities for friendship and camaraderie (McLennan & Birch, 2008). Surf lifesavers identify that participation in an organisation with structured training that coexists with a beach lifestyle and contribution to community safety were primary motivators, followed by social factors such as camaraderie, recognition and appreciation from others (Hall & Innes, 2008). Amongst volunteer ambulance officers, community contribution, skill acquisition, achievement and social benefits were reported as important motivators (Fahey, Walker & Lennox, 2003). While emergency service volunteers report high levels of camaraderie and social connection to others as a consequence of involvement, conflict and dysfunction within the workgroup can quickly erode such social benefits, and may prompt volunteers to resign (Baxter-Tomkins & Wallace, 2009). Consistent with this, when volunteer fire-fighters were asked in exit interviews what they least enjoyed about volunteering,

<sup>1</sup> Sections of this manuscript were presented at the 8th Industrial & Organisational Psychology Conference of the Australian Psychological Society, June 2009, Sydney, Australia.



the most frequently identified responses related to poor brigade climate characterised by conflicts, factionalism, exclusion, and bullying (McLennan, Birch, Cowlshaw, & Hayes, 2009). Further, McLennan and colleagues reported that 25% of volunteers discontinued their involvement because of disputes with other members, exclusion from brigade activities, concerns regarding the direction of the agency, and losing interest in the role of volunteer.

An additional factor that assists with volunteer retention is recognition and acknowledgement. Despite high levels of service delivery, it has been argued that those working within the emergency services in Australia experience a broad lack of recognition (Howard, 2003). Recognition of volunteers is of particular concern to emergency service agencies given that organisational studies repeatedly find that staff frequently quit in instances where they feel undervalued (e.g. Lilienthal, 2000). Recognition of service is a symbolic gesture that undoubtedly carries importance for emergency service volunteers and agencies must tread the fine line in balancing easily achievable versus unobtainable reward and recognition systems for their volunteers (Aitken, 2000). While many services provide public recognition and award opportunities for their volunteers, dissatisfaction with some programs has been reported on the basis of long periods of time required for award eligibility (McLennan, 2005).

## The current study

For emergency service volunteers, the rewards of their involvement will be varied and idiosyncratic, but are likely to draw on the social benefits experienced through camaraderie, expanded social networks, and recognition from the agency or wider community. Within the framework of social exchange theory the present study examined the contribution of interpersonal and group cohesion factors on emergency service volunteer satisfaction and turnover intention. Interpersonal factors, conceptualised to include volunteer perceptions of supervisor support, fairness in the implementation of policies and procedures, and the degree of recognition experienced by the volunteers were all expected to increase satisfaction and ongoing commitment to the agency.

## Method

### Participants

Data was analysed from 2306 volunteer personnel (246 of which were female), recruited within an Australian state based emergency service provider. The agency comprises approximately 60,000 volunteers and 1,000 paid office administration, technical and management staff. The total response rate represented 4% of the total volunteer population within the agency (see Table 1 for a breakdown of participant age and tenure).

TABLE 1. Participant Age (top) and Tenure (bottom).

Age Group	<i>n</i>	% within sample
25 years or less	146	6.3
26 – 35 years	223	9.7
36 – 45 years	495	21.5
46 – 55 years	629	27.3
56+ years	805	34.9

Tenure	<i>n</i>	% within sample
2 years or less	193	8.5
3 – 5 years	320	14.0
6 – 10 years	358	15.7
11 – 20 years	486	21.3
20 – 30 years	455	19.9
31 – 40 years	251	11.0
40 + years	221	9.7

## Procedure

Volunteer members of the emergency service agency were made aware of the research project via a promotional campaign where notices were placed in the agency's publications, and posters were displayed at local depots and offices. A hardcopy of the survey was distributed as an insert within the agency's quarterly magazine along with reply paid envelopes. Participants could also complete the questionnaire online. Members were made aware that the survey was anonymous and confidential.

## Measures

The current study reports a subset of data collected as part of an organisation wide climate survey. All questionnaire items were presented to participants on seven point scales where 1 = *Strongly Disagree*; 7 = *Strongly Agree*. Sample items for the six scales used within the current study (group cohesion, intention to leave, interactional justice, job satisfaction and recognition) are listed in Table 2. All scales demonstrated satisfactory reliability for the current sample.

## Results

Scale means, standard deviations, and correlation coefficients are presented in Table 3. All inter-correlations were statistically significant, and ranged from medium to large.

**TABLE 2.** List of Scales, Reliability Coefficients and Sample Items.

Scale	Reliability ( $\alpha$ )	Sample item
Group Cohesion (Developed for Current Study)	.80	'Members at my agency readily take action when others are not being treated with respect'
Intention to Leave (Colarelli, 1984)	.79	'I frequently think of leaving my agency'
Interactional Justice (Moorman, 1991)	.93	'Supervisors at my agency treat members with consideration'
Job Satisfaction (Wright & Croponzanno, 2000)	.91	'I am satisfied with my role'
Recognition (Martin & Bush, 2006)	.87	'Members can count on a pat on the back from the agency when they perform well'
Supervisor Support (Patterson et al., 2005)	.95	'Supervisors show an understanding of the members who work for them'

**TABLE 3.** Means, Standard Deviations, and Inter-correlations among Study Variables.

Scale	M (SD)	1.	2.	3.	4.	5.	6.
1. Group Cohesion	5.02 (1.44)	-					
2. Intention to Leave	1.86 (1.35)	-.37**	-				
3. Interactional Justice	4.69 (1.44)	.64**	-.42**	-			
4. Job Satisfaction	5.34 (1.36)	.34**	-.55**	.66**	-		
5. Recognition	4.42 (1.53)	.59**	-.36**	.72**	.65**	-	
6. Supervisor Support	4.69 (1.48)	.68**	-.41**	.79**	.72**	.76**	-

Note. \*\*denotes significant at  $p < .01$  (two-tailed).

Structural equation modelling (SEM) was used to explore the relationships between interpersonal factors and group cohesion on satisfaction and intention to leave. The model used in the current study comprised three scales (supervisor support, interactional justice and recognition) contributing to the latent variable named interpersonal factors. This latent variable was then used to predict job satisfaction and intention to leave. In addition, the group cohesion scores were simultaneously regressed upon job satisfaction and intention to leave (see Figure 1). Indices of fit were all excellent<sup>2</sup>, indicating that the hypothesised model fit the observed data very well.

In summary the model indicates that supervisor support, interactional justice and recognition all significantly contribute to the latent variable, interpersonal factors. For every one unit increase in volunteer's perceptions of interpersonal factors, there is a corresponding increase of .84 in volunteers' perceptions of job satisfaction, and a corresponding

decrease of .50 in intention to leave the agency. Further, for each unit increase in group cohesion there is an increase of .22 in job satisfaction, and decrease of .12 in intention to leave.

## Discussion

In focusing on the social exchanges that occur through interpersonal and group cohesion factors, the current study identifies aspects of the volunteer experience that enhance satisfaction and ongoing commitment. Consistent with the notion of mobilisation of personal relationships (Baxter-Tomkins & Wallace, 2009) and the impact of team climate (McLennan, Birch, Cowlshaw, & Hayes, 2009), findings indicate that interpersonal and group cohesion factors within the workgroup significantly contribute toward volunteers' perceptions of satisfaction and future volunteering intentions. This research contributes to the list of studies indicating the essential role played by social factors in determining

<sup>2</sup> The current study reports model fit indices of GFI = .998, AGFI = .976, TLI = .988, CFI = .998 and RMSEA = .055. Byrne (2001) suggests that GFI, AGFI, TLI, CFI values above .95, and RMSEA values of below .06 are indicative of a well fitting model.

involvement and retention of emergency service volunteers (e.g. Fahey, Walker & Lennox, 2003; Hall and Innes, 2008; McLennan and Birch, 2008).

The results of the present study fit neatly within the framework of social exchange theory – that volunteers maintain their involvement with the agency when perceived rewards outweigh, or are equal to perceived costs (Philips, 1982). Perceptions of recognition, fairness of procedures, and supervisor support all related to increased satisfaction and future intentions to remain committed to the agency. These domains can be viewed as some of the tacit and symbolic rewards that emergency service volunteers receive – credit and acknowledgement for a job well done, and consideration, interest, support and concern from superiors. Further, similar to the interpersonal factor, group cohesion was also associated with greater volunteer satisfaction and future commitment. This highlights the important role played by agency workgroup climate, whereby volunteers are clearly sensitive to the degree of cohesion within their workgroup unit, which in turn impacts upon feelings of satisfaction with the volunteering role.

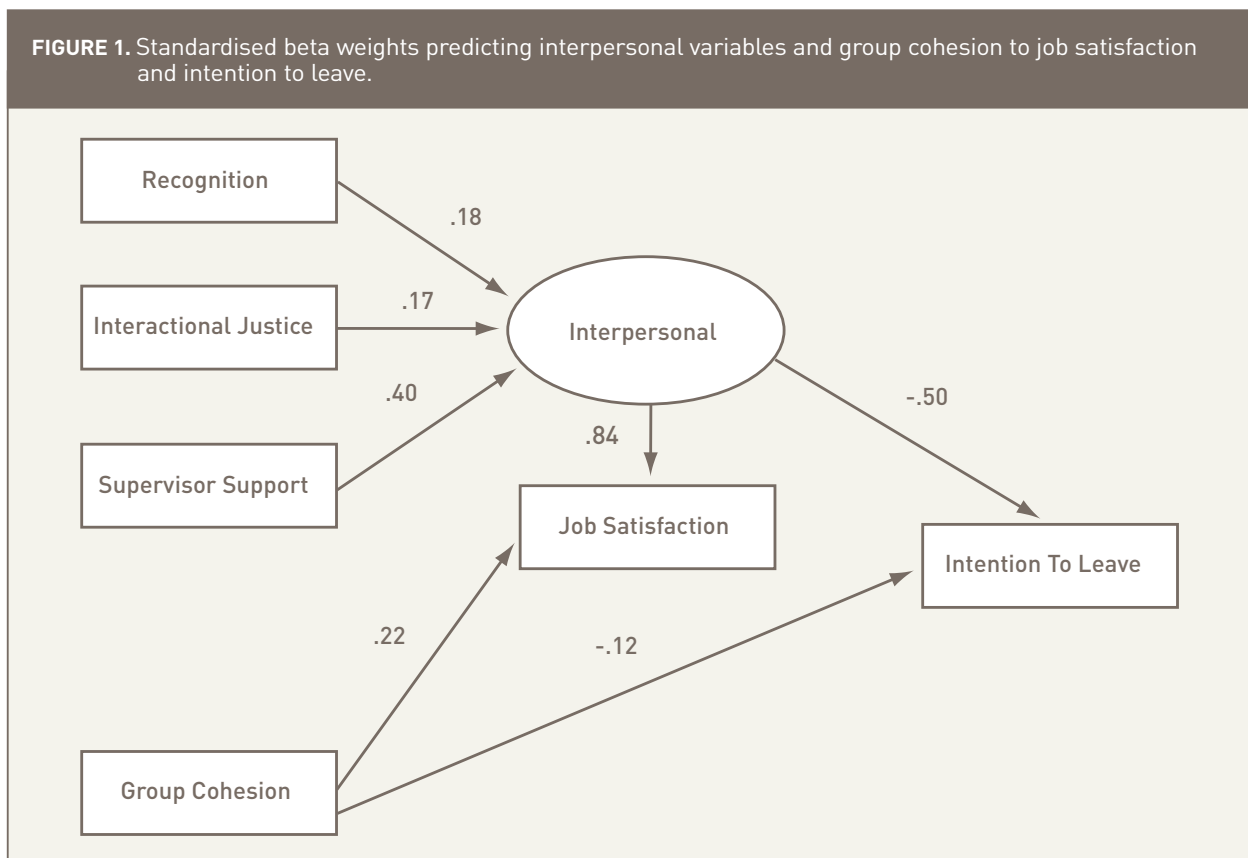
Within the model tested, volunteers perceived the relationship with their direct supervisor as the greatest determinant of job satisfaction and future volunteering intention. The quality of local volunteer leadership has been noted as the most critical of all factors in promoting volunteer retention (Aitken, 2000). Being a member of a well led, inclusive and harmonious team is typically associated with higher levels of satisfaction and intended commitment to the

agency, and to this end, as indicated by McLennan and colleagues (2009), emergency service agencies should look to strengthen training in leadership and people management skills for supervisors. Although costly, such training will give supervisors skills in managing workgroup culture through leadership and modelling. In addition to promoting retention, this may in turn lead to greater efficiency and responsiveness in the face of emergencies.

The group cohesion factor primarily assessed respect amongst volunteers for one another, and informal intervention amongst volunteers when harassment and discrimination norms are violated within the workgroup. As such, the group cohesion factor assesses the internalisation of prosocial and inclusive practices amongst volunteers. Naturally, when group cohesion is high, the social identity of the unit or brigade is collectively understood and supported by all, leading to a positive interpersonal climate. Group cohesion requires good leadership, and supervisors must be always mindful of the interrelationships within their workgroup, directly intervening when necessary. This requires a degree of skill, further underscoring the need for effective supervisor training schemes.

Also of importance to retention is the degree of reward and recognition experienced by volunteers. Currently, formal awards within the emergency services require arduous long-term volunteer commitment, or demonstration of valour or bravery (McLennan & Bertoldi, 2005). Other forms of recognition should be explored such as agencies sponsoring attendance at professional development activities (e.g. Hagar &

**FIGURE 1.** Standardised beta weights predicting interpersonal variables and group cohesion to job satisfaction and intention to leave.



Brudney, 2004), offering scholarships and study awards (e.g. Aitken, 2000), or hosting regular informal public acknowledgement ceremonies such as volunteer appreciation luncheons or barbeques. On these occasions volunteers may receive certificates, plaques, or t-shirts honouring their contribution.

Further research may seek to examine the specific factors that generate volunteer commitment to agency. Focus groups may serve to identify the specific recognition needs and wants of subgroups across agencies. Implementation trials could then be undertaken, and tracked in conjunction with exit interview data, or figures provided by HR sections. In addition, future research may seek to assess more specifically the types of social benefits that volunteers receive. For example, studies may seek to explore the organisational impact of regular informal social functions where volunteers can enjoy the company of others and strengthen social bonds. Further, future researchers may also profit from exploring volunteers level of understanding of equal opportunity and diversity practices within their respective agencies. Given that many emergency service agencies are primarily composed of male, English speaking Caucasians (Baxter-Tomkins & Wallace, 2006), future recruitment of members from multicultural backgrounds may significantly boost personnel numbers.

## Conclusion

Retention of volunteers is a commonsense way to ensure adequate numbers of trained and experienced personnel are available to attend to emergencies. To enable policy makers to develop successful retention programs, the specific factors that motivate emergency service volunteers need to be identified. By viewing findings in the light of social exchange theory, this study provides a platform for appreciating that volunteers continually reassess and balance the rewards and costs of their involvement. Positive interpersonal relationships with supervisors, recognition, and group cohesion all appear to contribute to greater satisfaction and intention to remain committed to the agency in the longer term. As these are among the few benefits that emergency service volunteers receive, agencies should seek to maximise their impact and presence in the interest of retaining a qualified and experienced volunteer workforce.

## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily represent the views of the emergency service agency from which the study data was collected.



Interpersonal and group cohesion factors contribute to volunteer satisfaction.



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# Preparing schools for future earthquakes in New Zealand: lessons from an evaluation of a Wellington school exercise

By David Johnston, Ruth Tarrant, Karlene Tipler, Maureen Coomer, Sandy Pedersen, and Ruth Garside.

## ABSTRACT

The purpose of the present study was to observe and evaluate an earthquake response and evacuation exercise in a Wellington primary school (Years 1-8) comprising 200 pupils and 15 staff. Processes and behaviours were observed by a team of six emergency management personnel who met with teachers at the conclusion of the exercise to discuss the exercise and identify areas requiring modification. Key lessons learnt include the following: frequent, well-learned emergency practices are likely to increase the probability that in a real emergency at school, staff and pupils will respond in an informed and predictable manner, and engage in behaviours that are recognised as best practice, and; schools that have well developed and regularly practised emergency preparedness plans in place send a message to pupils and caregivers alike that in the case of an emergency, the school is prepared to protect the safety of the children. Lessons learnt will inform future hazards preparedness in New Zealand schools, and promote community resilience in the event of a significant earthquake.

## Introduction

The city of Wellington is situated at the southern end of the North Island of New Zealand and is the nation's capital city. It is exposed to a wide range of potentially devastating impacts from a range of natural hazards and is situated in one of the most active seismic regions in New Zealand (Cousins et al. 2008, Wallace et al. 2009).

Schools have a responsibility to prepare for emergencies so they can keep children as safe as possible in the event of an earthquake. Educating the children needs to be followed up with regular emergency response practices (safety behaviours and building evacuation) and emergency evacuation exercises (emptying the school by having caregivers collect their children) (Ministry of Civil Defence and Emergency Management, 2009). Preparedness helps reduce fears concerning the possibility of a major earthquake, and can increase the children's ability to respond effectively in a potentially dangerous and stressful situation (Ronan et al., 2008; Ronan and Johnston, 2005).

Schools can provide an important link between children, families and the wider community in preparing for hazardous events. Educating children about hazards is seen as an effective way to encourage their caregivers to improve home-based preparedness (Dufty, 2009; Finnis et al, 2004; Ministry of Civil Defence and Emergency Management, 2009; Ronan, et al., 2008; Ronan and Johnston, 2005), and by involving caregivers in the exercise, families are empowered to prepare.

The Ministry of Education requires every New Zealand school to have documented Health and Safety Policy that complies with relevant legislation such as the Health and Safety in Employment Act 1992, the Fire Service Act 1975 No. 42, and the Building Act 2004 No. 72, and their amendments. Schools are also required to have preparedness plans and evacuation schemes in place for a range of emergencies, including those resulting from natural hazards (Ministry of Education, 2008). Much of the previous research on emergency exercises in schools has focused on the *frequency* of children's participation in drills, rather than on specific content and evaluation (Coomer et al, 2008; Finnis et al, 2004; Ronan and Johnston, 2001). This research sets out to observe school emergency drills and exercises while they are being practised, so the content and processes of the emergency preparation can be evaluated.

## Purpose of the study

The purpose of the present study was to observe an earthquake response and evacuation exercise in a Wellington primary school, and to recommend modifications to the exercise for improvement where appropriate. This paper summarizes the key issues presented in the exercise report (Johnston et al. 2010).

## Aims

Using the present case as an exemplar, the broad aims of the observation were to:

- Assist schools in their preparedness for an earthquake response and school evacuation;
- Promote community recovery following an earthquake; and
- Inform future hazards preparedness in NZ schools.

## Method

The information in this report was gathered through direct observation of one primary school (i.e., Years 1-8) as they conducted their annual emergency response practice and evacuation exercise.

## Participants

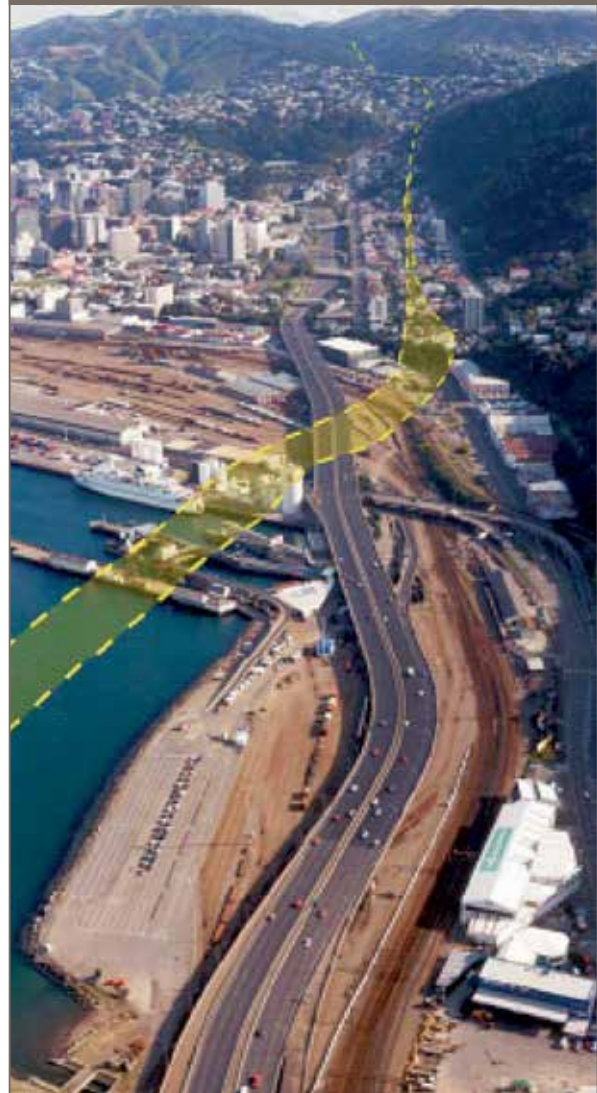
Participants were all 200 children and the 15 teachers and general staff in a decile 9, co-educational, primary school (Years 1-8) in a hill suburb within five kilometres of Wellington City CBD. Children ranged from 5-13 years of age. A caregiver was to collect each child in the evacuation exercise. [A school's decile ranking indicates the extent to which the school draws its students from low socio-economic communities, with decile 1 schools having the highest proportion of students from low socio-economic communities, and decile 10 schools, the lowest (Ministry of Education, 2010)].

The observation team comprised five members: two research staff and a post-graduate student from the Joint Centre for Disaster Research (JCDR) in Wellington, New Zealand; one researcher from GNS Science; and one researcher from a private emergency management consultancy firm. The observers were divided among three classes at the school.

## Observation criteria

- Observe the *processes* of the emergency response and evacuation exercise;
- Observe the *behaviours* of staff and children as they undertook the exercise; and
- Observe whether caregivers collected their children from the school in the evacuation phase of the exercise.

FIGURE 1. The Wellington fault running through the centre of the city.



[Photo: GNS Science]

## Evaluation criteria

After the conclusion of the evacuation phase of the exercise, the observation team and school staff were to evaluate the exercise. Evaluation criteria were as follows:

- Listen to teachers' perceptions of the exercise and to their suggestions for improvement to procedures;
- Provide feedback to the teachers on observations made during the exercise;
- Clarify with teachers an understanding of what is required of staff, children, and caregivers in an emergency event; and
- Recommend modifications to the exercise that would increase the likelihood of minimising potential impact from a significant earthquake, and help maximise community recovery.



## Background

At present, the school undertakes full emergency evacuation exercises once a year (normally in the first term), and fire drills three times a year. The school sends information about their preparedness plans home to caregivers at the start of each school year, and includes reminders about specific exercises in the school newsletter.

The exercise studied was a combination of an emergency response practice for an earthquake (which included use of safety behaviours and a building evacuation), followed by a school evacuation exercise (which required children to be collected from the school by their caregivers).

Prior to the exercise, staff were familiarised with the school's current preparedness plans and requirements of staff and pupils. Classroom teachers then ensured that children were familiar with, and practised, appropriate earthquake safety behaviours, and that children were aware of building evacuation routes.

## Findings

For clarity of reporting, the emergency exercise is divided into a series of pre-determined steps within two phases (Emergency response practice; Evacuation practice), as follows:

### Phase 1: Emergency Response Practice

#### *Ready to start the emergency response procedures*

Prior to the exercise being conducted, all children and staff had been familiarised with the rationale, protocol, and requirements of the exercise. All children and staff were in their usual rooms, ready for the start of the exercise (i.e., there was no one in the playground, and no one placed elsewhere in the school grounds).

### *Use of safety behaviours*

At 2pm, all teachers in the school called "Earthquake" to their classes. The children and their teachers immediately sheltered under desks in the classrooms, or adopted the Drop Cover Hold position. While sheltering under the desks, the children held onto the desk-legs and ensured their whole body was covered. A child was seen encouraging others to get further under the desk so they were completely covered. Another child was seen to role-play fear, calling, "Mummy help me," as he sheltered under his desk, though he appeared undisturbed by the practice as he continued to shake the leg of the desk, simulating an earthquake. Everyone remained under the desks until the school bell rang (5 minutes later), this being an all clear message indicating the 'earthquake' was over, and signalling to teachers that it was safe to evacuate the classroom. No teachers or observers reported seeing any emotional disturbance in any of the children at this stage.

### *Building evacuation*

Once the all clear had been given by the class teachers, children immediately left the classrooms by the designated emergency exit doors, and moved away from the buildings in an orderly manner. Teachers were last to leave the classrooms after all their pupils had left (followed by the observers). Teachers then joined their class-groups, and instructed the pupils to move together to a pre-identified area which was a safe distance from the classroom. At this point, teachers checked their class rolls to ensure all children were accounted for. Teachers then moved with their classes to the school's designated assembly area, a large asphalt area a safe distance away from all school-buildings. At the assembly point, the principal accounted for all classes.

FIGURE 2. Children of Ridgway School, Wellington, taking part in their annual earthquake drill (photo D Johnston)





**Building safety check**

When all classes had assembled, the principal and most of the teachers stayed with the children while several teachers, designated as safety wardens, checked that no one was left in the particular part of the school for which they were responsible, and that there were no "visible hazards" within the school. The wardens then reported their "findings" back to the principal at the assembly area. For the purposes of the practice, no "hazards" were reported, and it was safe for children and staff to return to the buildings.

**End of the emergency response procedures**

While the school was still assembled outside, the principal concluded the emergency response phase by giving the children feedback on the exercise. She congratulated them on following instructions quickly, behaving sensibly, on listening to staff, and for helping other children. The principal then asked the children to return to their rooms, accompanied by their teachers.

**Phase 2: Emergency Evacuation Practice****Start of evacuation procedures**

By the time children were back in their classrooms, it was the end of the school day. Children packed their bags and waited to be collected by caregivers. The children behaved normally, and no signs of disturbance were observed in any of the children following the exercise. There was no class-discussion of the exercise at this point, and no observers heard any children discussing the exercise among themselves.

**School evacuation**

Caregivers came to the classrooms and signed their child out before leaving the school grounds.

**Alternate arrangements**

A key strength of this exercise was having caregivers make plans for collecting their children from school following the exercise. Caregivers had been advised beforehand of the date and time for the evacuation exercise. They had been asked to provide emergency contact details to the school in advance of the exercise, and to name who would be collecting their child after the exercise (or any alternate arrangements for their child to be collected from school). This requirement communicated the importance of planning for emergencies to both the children and their families, while also providing an opportunity for the school to update emergency contact details for the children.

**End of evacuation procedures**

After the children had been collected by caregivers, the observation team met with the teachers and other staff to discuss the exercise. The discussion centred around the evaluation criteria described earlier. Conclusions emerging from the discussion and evaluation are reported immediately below, followed by recommended modifications to the exercise.

**Conclusions****The process**

The present emergency response practice and evacuation exercise was completed as planned and as routinely practised in the school. The children and teachers were well prepared, aware of their particular roles, and there were no instances of any confusion. Staff reported they were satisfied that emergency procedures were well understood by children and staff alike, and that practice- and evacuation-procedures were appropriate for keeping the children as safe as possible in the event of an earthquake.

Following the initial emergency response, children remained in their class-groups, well clear of buildings while class rolls were checked; this is important in case of damaged or weakened structures, or after-shocks. Once the children were all together in the school assembly area, teacher-wardens checked the buildings for "visible hazards" before the children were allowed to return to the classrooms. This is an important part of earthquake emergency procedure, as in an earthquake there may be damage to buildings, or there may be fallen wires, or broken glass, etc. After the children returned to their classrooms, caregivers supported the exercise by signing their children out with the class teacher before the children left the school grounds. Any children still waiting to be collected by caregivers were supervised in an after-school care programme. Thus teachers kept track of, and accounted for, all of the children. The benefit of requiring caregivers to plan for the collection of their children prior to an emergency cannot be overstated. As well as reassuring children that their caregivers were prepared for an emergency, the evacuation exercise also served to update the school's caregiver contact lists. Reuniting caregivers and children after an emergency would be a high priority. Already having the appropriate preparedness plans in place would help to provide reassurance to children and caregivers, especially if there are delays in reuniting families.

**Behaviours**

The children and teachers demonstrated appropriate safety behaviours, and appeared confident in their ability to respond effectively to the situation. Children and teachers were fully engaged in the exercise, some children appearing quite excited by role-playing the 'earthquake' phase; depending on the layout of the rooms, children either generally enjoyed shaking the desks quite vigorously as they squeezed in together to make sure they were completely covered, or adopted the *Drop Cover Hold* position.

At the end of the emergency response phase of the exercise, the principal spoke to the assembled children and congratulated them on their appropriate behaviour (as described above). The principal's reinforcement of the children's behaviour sent yet another message to the children that this exercise was important in protecting their safety at school.

FIGURE 3. Children and teachers assembling on the school field as part of the 2007 drill. (Photo: D Johnston)



### Recommendations for modifications to the exercise

1. During the emergency response phase of the exercise, while the 'earthquake' was continuing, teachers could provide reassurance and ongoing communication with the children.

For example, teachers could remind children that staying sheltered under their desks was the safest place to be at that time. Children could be reminded to ensure their own and head and legs remained under the shelter of the desks, and to check that children near them were also fully sheltered. In instances where it may not be possible for everyone to get under a desk or table, children could be reassured that remaining in the turtle shape is safest for them.

2. Once the school has assembled in the common area outside, and all classes are accounted for, children could be united with their siblings from other classrooms.

Many children are likely to be very frightened in a major earthquake, and may benefit from being joined with family members. Similarly, children could be given the opportunity to support and encourage others during an emergency (e.g., holding hands with another child) to provide reassurance and comfort. In instances where children may out of their class group, it is important for teachers to keep track of their classes by keeping a record of who has moved.

3. Teacher-wardens should check not only that buildings are cleared of children after the emergency response phase, but also that buildings appear safe for children and staff to return to after an emergency event, and that there are no hazards such as fallen wires, broken glass, etc.

4. The school could consider potential local hazards that may arise in the event of an earthquake, and plan for how the children might be kept safe in these cases. For instance, power lines may fall on the road, or landslides may occur in a hilly area.
5. At the beginning of the exercise, several children could be placed in the school grounds and in buildings other than their own classroom. This would help to establish a protocol for the children's required behaviour in this case, and generate classroom discussion regarding this scenario.
6. Consideration could be given to allowing older children to play a role in organising or conducting the emergency exercise. Such involvement at school may encourage them to conduct their own practices at home and in the community.
7. Feedback on the exercise could be gathered from children immediately following the completion of the exercise.  
By running the practice at the very end of the school day, an opportunity was missed for children and staff to talk about the exercise together (e.g., for the children to express any fears or concerns, to ask questions, or make suggestions for improving the exercise) while it was 'fresh' in their minds.
8. Greater involvement, enthusiasm and understanding of earthquakes, preparation, and responses may be achieved by integrating the exercise with other areas of the curriculum. There was no evidence of the exercise being linked into any other part of the curriculum in the present case.
9. Following the exercise, caregivers could be given an opportunity to provide feedback from their perspective. Feedback forms could be sent home in the school newsletter. This would likely encourage discussion with the children at home too.

10. Schools could send home material in children's homework to encourage home-based disaster preparedness.

Such material would require interaction with the whole family, and perhaps neighbours. Using information about different hazard events and scenarios could be used to add variety to take home materials. Homework relating to the school exercises is also an opportunity for families to test their own household plans, such as where family members can meet after an emergency, and for children to become familiar with who will collect them from school.

11. Children could be trained to lead and support other children in an emergency response.

Such training could be useful in the case of a teacher being injured and unable to care for his/her class. Training could include, for example, administering first aid and positioning the teacher so s/he is comfortable when the shaking is over, going for help when the shaking is over, or leading other children through the next stage of the exercise.

12. The school should have an up-to-date plan for order of staff leaving the school in the event of an earthquake.

Several teachers raised the difficulty of reconciling their responsibility to care for their pupils in the event of an earthquake, against their need to leave and know if their own families, including their own children, were safe somewhere else around Wellington. After discussion, staff agreed that those with children of their own would be among the first to leave the school after a destructive earthquake. These staff members would leave as soon as appropriate, while the remaining staff cared for children until caregivers arrived, or until teachers who had left earlier were able to return to the school. In a major earthquake, children may need to be cared for at school for several days before they could be reunited with their families.

13. Staff could give some attention to anticipating how they themselves, and the children, might react to a real and frightening event (in comparison to responding in an exercise).

Ramirez et al. (2009) identify this area of comparison between real and simulated emergencies as in need of research. Human reactions in a traumatic event are not necessarily predictable, or consistent for a particular individual (Dufty, 2009; Ronan et al., 2008). For example, decision-making may be compromised due to reduced cognitive capacity resulting from emotional distraction. However, studies have demonstrated that in areas of high anxiety, rehearsed simulations, drills, and practices increase the likelihood that these behaviours will be enacted in the 'real' event (e.g., Ronan et al., 2008). Thus, staff may benefit by receiving some psycho-educational material that discusses issues

that can affect people when exposed to high anxiety, emergencies, or trauma and hazardous events.

14. Full emergency practices are encouraged, on a biennial basis for example. A full emergency practice would involve the wider community (including local emergency and civil defence personnel) and enable a trial and evaluation of a wider ranging emergency scenario.
15. A summary of the present exercise could be made available to other schools to encourage greater preparation in instances where schools conduct only basic drills such as requiring children only to shelter under their desks in case of an earthquake.

### Key lessons learnt

- Schools that have well developed and regularly practised emergency preparedness plans in place send a message to pupils and caregivers alike that in the case of an emergency, the school is prepared to protect the safety of the children.
- Before any emergency exercise, all participants must be fully familiar with the required procedures and behaviours. Frequent, well-learned emergency practices are likely to increase the probability that in a real emergency at school, staff and pupils will respond in an informed and predictable manner, and engage in behaviours that are recognised as best practice.
- Involving children in role-playing aspects of an emergency encourages children to engage in the exercise, and better understand possible ramifications of an earthquake.
- Children are likely to perceive emergency practices as important parts of their learning when practices are held regularly during school time, when caregivers are involved, and when feedback from the principal reinforces appropriate responses.
- School emergency exercises that involve caregivers may encourage families to develop home-emergency plans.
- It is important for teachers to maintain contact with children throughout the exercise, staying with them throughout the exercise and ensuring all children leave the school with a caregiver. Such contact with teachers is likely to reassure children that there will be adult care and assistance available to them at all times.
- It is important that teacher-wardens check that buildings are clear of children after the emergency response phase, and that buildings appear safe to re-enter.
- It is necessary to conduct and evaluate emergency response practices and evacuation exercises. An opportunity for staff and outside observers to discuss the exercise at its completion provides an opportunity to evaluate processes and behaviours, and to modify the exercise where appropriate.

## Acknowledgement

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# The public and a radiological or nuclear emergency event: threat perception, preparedness, and anticipated response

FINDINGS FROM A PRELIMINARY STUDY IN SYDNEY, AUSTRALIA.

By Mel Taylor, Wendy Joung, Barbara Griffin, David Hill, Robert Chisari, Beryl Hesketh, and Beverley Raphael.

## ABSTRACT

This paper presents selected findings from a preliminary study that sought to assess the impacts of a radiological or nuclear emergency event on an Australian population, and their anticipated responses to such an event. The questionnaire was wide-ranging and included sections on threat perception, preparedness, use of media sources and trusted organisations, as well as socio-demographic, personal resilience and health-related data. Survey data were collected from samples of the general public living in Sydney, Australia during the period May-June 2008 using a mixed convenience sample approach (n=324). In general, data suggest that the public is not highly concerned about terrorism involving radiological or nuclear materials and is unprepared for such an event. First Responders (Fire, Police, Ambulance) and the Australian Nuclear Science and Technology Organisation (ANSTO) were the authorities the

public had most confidence in to respond to such incidents and these were also the agencies the public was most likely to trust for credible information. When respondents were prompted with a series of possible behaviours they might elicit in the event of a radiological or nuclear emergency incident, their immediate most likely responses included calling family members to check they are OK, washing off radioactive material, seeking shelter indoors, calling emergency services, covering their mouth to prevent inhalation of dust, and trying to get back home. Longer-term behaviours included having more frequent health checks. These findings suggest that there would be high demand on telecommunication services soon after such an event, and the general lack of preparedness of the public suggests that there would be a high degree of confusion and uncertainty in their responses. This emphasises the importance of timely communication and direction following such an event, preferably delivered by one of the authorities most trusted by the public.

## Introduction

What would happen if a dirty bomb exploded in Sydney? Would people rush to evacuate, or shelter in place? Are people concerned about, or prepared for, such a radiological or nuclear event? This study was undertaken, as a preliminary investigation, with the aim of understanding how the public might respond to a radiological or nuclear (R/N) emergency incident, including R/N terrorism. We investigated how prepared people are for such an incident, how confident they are in the preparedness of authorities

to respond, their anticipated responses in the event of an R/N emergency, who they would trust for credible information and the forms of media they would use to obtain information. The findings of this research may help support discussion on ways that agencies can communicate, educate, and heighten awareness of R/N issues in the wider population and plan for the psycho-social impacts of a radiological or nuclear threat or attack. More broadly, the findings could provide useful information for emergency agencies planning for other types of emergency incidents.

1 Editor's Note: This paper was submitted and reviewed prior to the recent floods in Queensland.

The study examined a wide range of variables and potential factors that might influence public response to an R/N emergency event, building on similar research conducted in Canada (Lemyre et al, 2005). In this article, we present a subset of findings under numbered section headings. To assist the reader in interpreting the findings, the implications of each set of findings are discussed section by section, with summary comments at the end.

## Study areas

### Threat perception: likelihood and concern regarding CBRNE forms of terrorism

One of the aims of this study was to assess the level of perceived threat of radiological and nuclear terrorism and compare this to the perceived threat of other forms of terrorism, i.e. chemical (C), biological (B) and explosive (E) or 'conventional' terrorism. Respondents were provided with a general definition of each and asked how likely they thought each form of terrorism would occur in Australia, and how concerned they were that they or their family might be directly affected. As yet, such baseline measures of threat perception have not been established for CBRN forms of terrorism. However, Stevens, et al (2009) recently reported data for the New South Wales (NSW) population with reference to a 'terrorist attack', finding that 30% of those surveyed believed that a terrorist attack was very or extremely likely to occur in Australia and that 43% would be very or extremely concerned that they or their family would be affected. A comparable study in Canada found that the perceived likelihood of a 'terrorist bombing' was slightly lower; with approximately 20% feeling this would be very or extremely likely (Lemyre et al. 2005). That study also assessed the perceived likelihood of CBRN forms of terrorism, reporting a lower likelihood for these; with approximately 10%, 15%, 9% and 8% of the general population feeling that C, B, R and N forms of terrorism were very or extremely likely to occur in Canada. Concern about terrorism has been found to be a significant predictor of behavioural response (Lee and Lemyre, 2009)

### Preparedness: confidence in authorities to respond

Respondents were asked about the extent to which they thought various organisations were prepared for R/N emergencies and their level of confidence in the ability of each to respond. Public confidence is related to feelings of trust and has implications for whether the public would follow the instructions of authorities in the aftermath of an emergency event. Lemyre et al (2005) reported that Canadian respondents had most confidence in First Responders (Fire, Ambulance, Police) (49% extremely or very confident) and least confidence in local government (13% extremely or very confident).

### Preparedness: personal preparedness

Respondents were asked about the extent they had prepared for emergencies. Other researchers (Lemyre,

et al, 2005, Redlener et al, 2006, and the Wirthlin Report, 2004) suggest that citizens in Canada and the U.S. have put very little thought or action into preparing for terrorism, with the most common action being emergency first aid or CPR training and assembling an emergency supply kit. The general lack of preparedness is not surprising, since the majority of people did not feel threatened by terrorist attacks. Londoners, however, appeared to be better prepared; 51% of Londoners surveyed immediately after the London bombings in 2005 had four or more emergency plans in place, such as having a method of contacting family and knowing the emergency procedures for their children at school, and 48% had gathered four or more relevant emergency supplies (Page et al, 2008).

### Trusted sources of information

Building trust and reducing misinformation are important elements in addressing the public's fears; a finding that emphasises the importance of effective communication (Rogers et al, 2007, Becker, 2004). Lessons learnt from previous incidents, e.g. Three Mile Island, suggest that failures in information and risk communication can have a great effect on the human impacts of an accident (Becker, 2004). We therefore asked respondents who they would seek credible information from. Equivalent Canadian data reported by Lemyre et al (2005), suggested a tendency to trust First Responders, the Canadian media, and health professionals most, and to trust government officials and elected politicians least.

### Preferred forms of media for credible information

Respondents were asked how likely they would be to turn to specific forms of media for credible information in the event of an R/N emergency event. Canadians were most likely to turn to television, followed by newspapers and magazines, radio, and the internet (Lemyre et al, 2005). Information brochures and pamphlets were the least likely to be used. These findings provide useful information for emergency agencies about preferred channels for message dissemination.

### Anticipated response

In this section we investigated what respondents thought they would do: Would they seek shelter indoors? Would they stop to help others? Would they flee immediately or pause to gather information? In the longer term, what behavioural changes would they be likely to make? Would they be likely to take action which might lead them to suffer avoidable harm? For instance, would people throw out water and food from their homes because they believed it was no longer fit for consumption?

## Study details

### Survey development, format and content

A questionnaire was developed by the research team with the assistance of subject matter experts from

ANSTO, Defence Science and Technology Organisation (DSTO) and the NSW Fire Brigades. The questionnaire comprised ten sections; demographic information, coping and personal resilience, general opinions on R/N issues, R/N knowledge, CBRNE terrorism threat perception, personal preparedness, anticipated response, information seeking, trusted sources of information, and risk perceptions based on uses of R/N materials. The survey took approximately 30 minutes to complete and was made available both in paper and electronic versions (a copy of the questionnaire is available on request). The research project was approved by the University of Western Sydney Human Research Ethics Committee (Approval No. 07/133).

**Data collection and sample description**

Three targeted subgroups formed the sample. As this study was a detailed preliminary study used to guide the development of later population-wide studies, the groups were selected to represent a spread across the general population, also allowing comparisons to be made on the basis of R/N interest, knowledge and age. These three subgroups were:

1. *'Contact' group*: members of the public on the ANSTO newsletter mailing list. All had previous contact with ANSTO through local community liaison or engagement activities or through tourist visits. It was anticipated that this group would be more interested in, and knowledgeable about, R/N issues than the wider general population. Approximately 780 questionnaires were posted to this group, and 204 completed responses were returned (Response rate = 26%).
2. *'General' group*: members of the public recruited from a number of sources, e.g. rail commuters, retirees, university administration staff, parents of young children. This group was convenience-sampled to form a mixed general population group with a range of ages and education levels. As they were contacted in a variety of ways, e.g. handed paper copies of the survey and sent open e-mail links to the survey, the response rates are unknown for some.
3. *'Young' group*: young people under 25, contacted through the social networking website, Facebook. It was felt important to collect data from a sample of younger people, as they may report differing degrees of vulnerability or resilience and may have different views on the uses of radiological or nuclear materials and the threat of terrorism. The survey link was sent to approximately 400 'Friends' and 49 complete survey responses were received. Given the 'friends' represented a range of different and unspecified ages an accurate response rate for under 25 year olds, cannot be estimated.

In the figures that follow (with the exception of Figure 6), data are shown for the sample as a whole. Responses which differ significantly between sub groups are reported in the text.

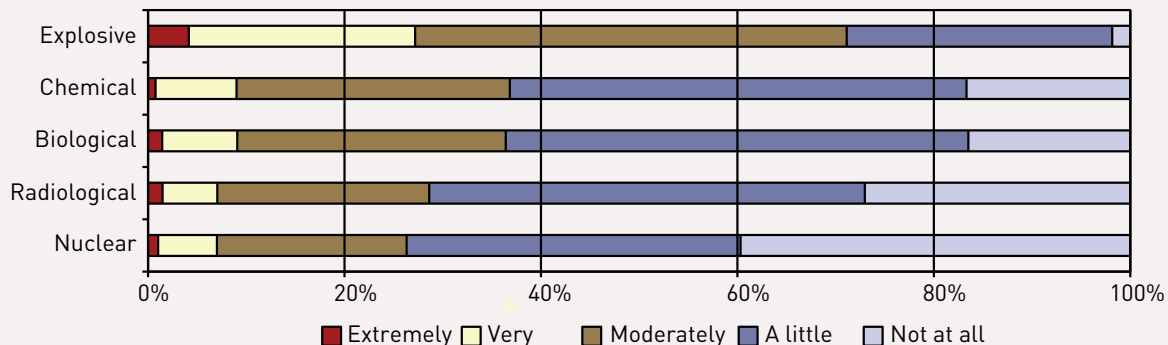
In total, 324 completed questionnaires were collected during the period May-June 2008. The sample comprised 63% 'Contact' (n=204), 22% 'General' (n=71), and 15% 'Young' (n=49) subgroups. Table 1 presents the demographic characteristics of the overall sample and the three subsamples in this study.

**TABLE 1.** The demographic characteristics of the study sample.

Category	Sub-grouping	Contact	General	Young	Combined
<b>Total sample (n)</b>		204	71	49	324
<b>Gender (n)</b>	<b>Total</b>	198	71	49	319
	Male (%)	51.5	36.6	30.6	44.8
	Female (%)	48.5	63.4	69.4	55.2
<b>Age (n)</b>	<b>Total</b>	193	69	49	312
	<25	4.1	10.1	97.9	20.2
	25-44	16.6	40.6	2.1	19.9
	45-64	35.2	34.8	-	29.5
	≥65	44.0	14.5	-	30.4
<b>Highest level of formal education (n)</b>	<b>Total</b>	200	70	49	320
	≤Year 10	18.0	4.3	-	12.2
	Year 12 / HSC	8.0	12.9	69.4	18.8
	Certificate/ Diploma	27.0	40.0	4.1	26.3
	Bachelor's degree	22.5	28.6	24.5	24.1
	Post graduate qualification	24.5	14.3	2.0	18.8

Data in Table 1 indicate that the overall sample comprised more females, was slightly older, and was generally fairly well educated compared to the wider general population. Within the sample, the 'Contact' group was more evenly split by gender, more highly educated and older; the 'general' group was female dominated, mostly represented working aged people (24-64), and was less educationally qualified than the 'Contact' group. The 'Young' group was heavily female dominated, young, and generally less educationally qualified, although most (82%) were university students.

FIGURE 1. Perceived likelihood of each form of terrorism occurring in Australia.



### Findings and implications

#### Threat perception: likelihood and concern regarding R/N terrorism

Respondents indicated how likely they felt that different forms of terrorism (explosive, chemical, biological, radiological and nuclear) would occur in Australia, and how concerned they would be that they or their family would be directly affected by each form of terrorism, should it occur. These data are summarized in Figures 1 and 2 respectively.

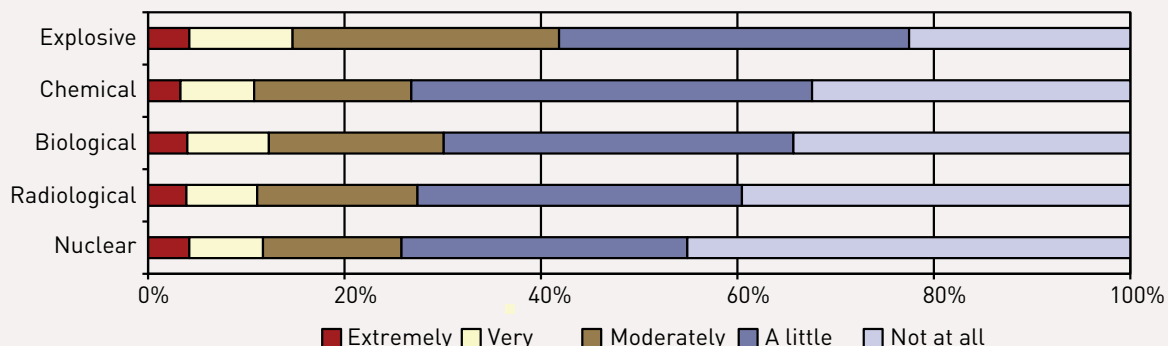
Most respondents believed the likelihood of terrorism occurring in Australia was low. As illustrated in Figure 1, the perceived likelihood of explosive terrorism was regarded as far greater than the CBRN forms of terrorism; with 27% of respondents reporting that they felt conventional terrorism was very or extremely likely to occur, compared to 9%, 9%, 7% and 7% for C, B, R, and N forms, respectively. This finding is very similar to previous Australian data from a representative sample of the NSW population in which 30% reported that a terrorist attack was very or extremely likely to occur (Stevens et al, 2009), and, again, suggests that Australians have slightly higher terrorism threat perceptions than the Canadian population (25%) (Lemyre et al 2005). However, Australian and Canadian threat likelihood for CBRN forms of terrorism was comparable; although the Canadian data suggests that their population felt that biological terrorism was more

likely (15% compared to 9% in this study). One possible explanation for this might be a heightened sense of threat caused by actual events, e.g. anthrax attacks in the neighbouring United States.

Concern that self or family would be directly affected by a terrorism event was low, only around 11-15% felt very or extremely concerned. This is much lower than comparable research (Stevens et al, 2009) which found that 43% of the NSW population was concerned about being directly affected by a 'terrorist attack'. A breakdown of the data showed differences between the three subgroups. The more heterogeneous 'General' group was more concerned (23% very or extremely concerned) compared to the 'Contact' group (10%) and 'Young' group (4%). With reference to the 'not at all' concerned responses in Figure 2, it can be seen that the percentage of respondents with negligible concern rose increasingly from 22% to 45% from E to C, B, R, and N forms respectively, suggesting that overall perceived vulnerability to the impacts of a terrorist event was low.

These threat perception findings have implications for those tasked with enhancing population vigilance and preparedness, since it is difficult to motivate individuals to prepare for, or be alert to, low probability events, especially if the negative consequences of such events on that individual or his/her loved ones are also regarded as low.

FIGURE 2. Concern that self or family would be affected in the event of each form of terrorism.



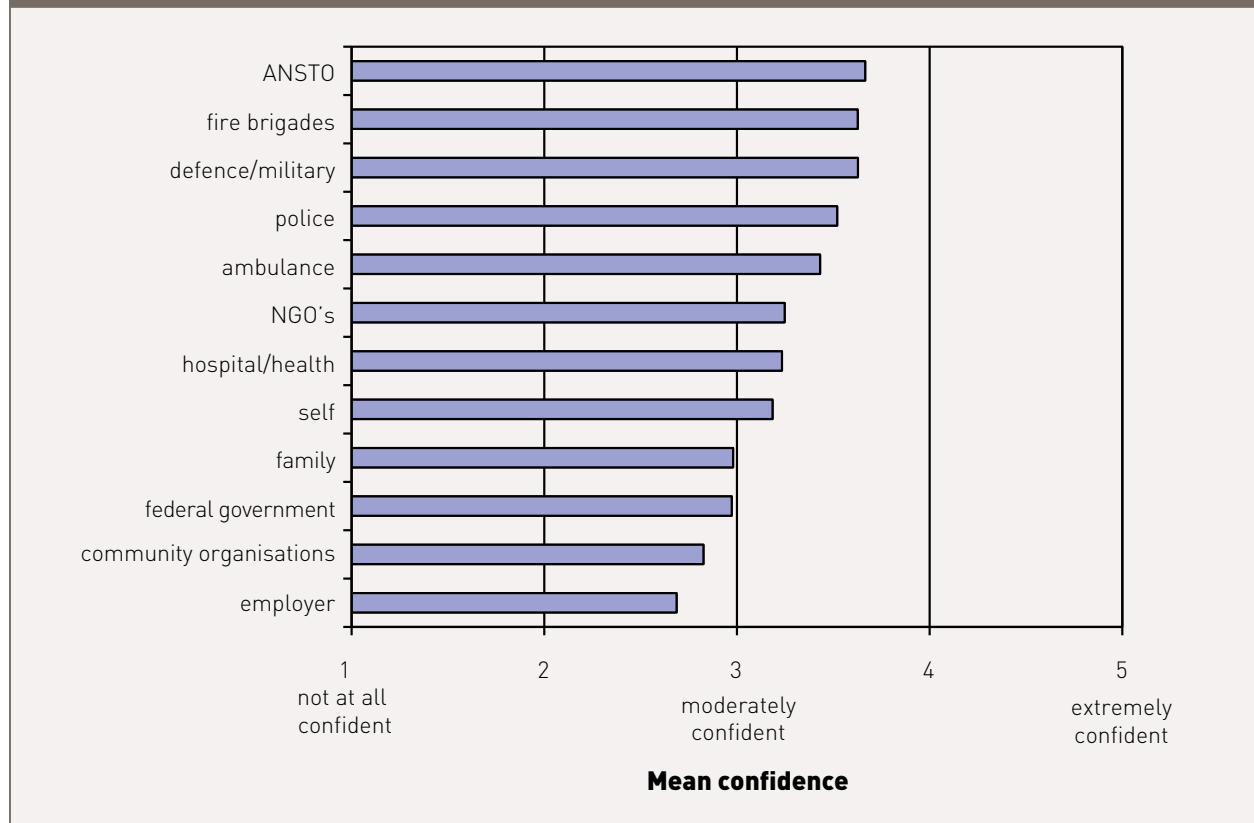


**Preparedness: confidence in authorities' ability to respond**

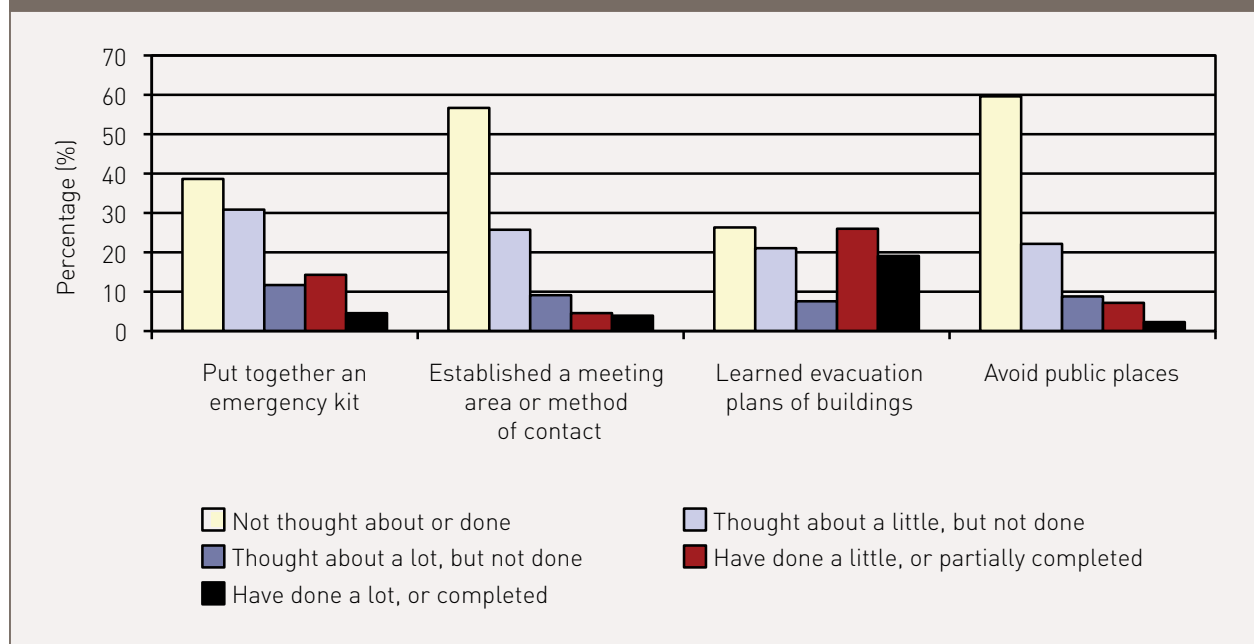
Figure 3 illustrates respondents' level of confidence in the ability of a range of organisations and groups to respond to an R/N emergency event in their area.

Overall, the highest levels of confidence were in ANSTO, the Fire Brigades and Defence/Military (62%, 59%, and 59% reported feeling very/extremely confident in each group, respectively). Respondents were the least confident in their employers' ability to respond to incidents (only 27% very/extremely confident).

**FIGURE 3.** Confidence in the ability of the listed organisations or groups to respond to an R/N emergency event, listed in order of mean confidence levels. Mean confidence was calculated using the 5-point response scale; 1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely.



**FIGURE 4.** Levels of personal preparedness for emergencies in general.



## Key Implications

The general public thinks that CBRN terrorism is unlikely to occur in Australia and does not appear to be highly concerned that they or their loved ones would be affected by it.

Low levels of threat perception to CBRNE terrorism events (low probability and low vulnerability) are likely to result in poor awareness, vigilance, and preparedness to respond to such events, and this will also create challenges for community engagement in this area.

General emergency preparedness is low. The public will require clear and timely guidance on what to do in the event of an R/N emergency event. Good crisis communication from a trusted source will reduce uncertainty, fear and misinformation, and will encourage a more consistent and manageable public response.

The public has high levels of trust and confidence in First Responder groups to respond to an R/N event. Communication from these sources is likely to be trusted the most widely by the public.

In the event of an R/N emergency there would be very high demands on communication services. Lack of contact and reassurance that loved ones are safe is likely to be a major source of distress, and may result in increased anxiety and possible crowd management issues; such as anger, frustration and lack of compliance, e.g. leaving the scene, avoiding screening or processing.

The public is most likely to go to the ABC and online news/internet for credible information in the event of an R/N emergency, therefore these would be the best media to use for broadcasting information and guidance information post-event.

There were some subgroup differences, for instance, the 'General' group, was less confident in ANSTO's ability to respond (42% very/extremely confident) compared to the 'Contact' (67%) or 'Young' groups (62%); possibly because ANSTO is an organisation less well known by this group.

### Preparedness: personal preparedness

The survey asked respondents to indicate the extent to which they had thought about or actually done things to prepare for an emergency event. These data are summarised in Figure 4.

Our results suggest that levels of personal preparedness are low and that most respondents had neither thought about nor done anything to prepare, except in terms of learning about building evacuation plans, which possibly is due to mandatory fire drills in the workplace or at college/university. Only a small proportion of respondents had put together an emergency supply kit (19%) or established a meeting area or method of contact with family (9%). This is consistent with other Australian data (Nicolopoulos and Hansen, 2009) in which 11% of Western Australian respondents had discussed an agreed meeting place. Survey data from the US suggest the figures are around 30-40% for both preparation activities (Redlener et al, 2006; Wirthlin Report, 2004). For Londoners, these figures were higher still; 48% had gathered at least 4 out of 5 recommended emergency supplies and more than 50% had established a method of contacting family (Page et al, 2008).

Focus groups conducted with the Canadian population (Gibson et al, 2007) reveal some insights on people's attitudes on preparedness. Many questioned the effectiveness of preparing for terrorism and whether it was possible to do at all. Some felt that excessive

attempts to prepare can lead to paranoia and panic or, conversely, apathy. Given our finding that many Australian respondents perceive the radiological or nuclear threat to be remote, a more effective method of preparedness planning may be to utilise an 'all hazards' or generic emergency approach.

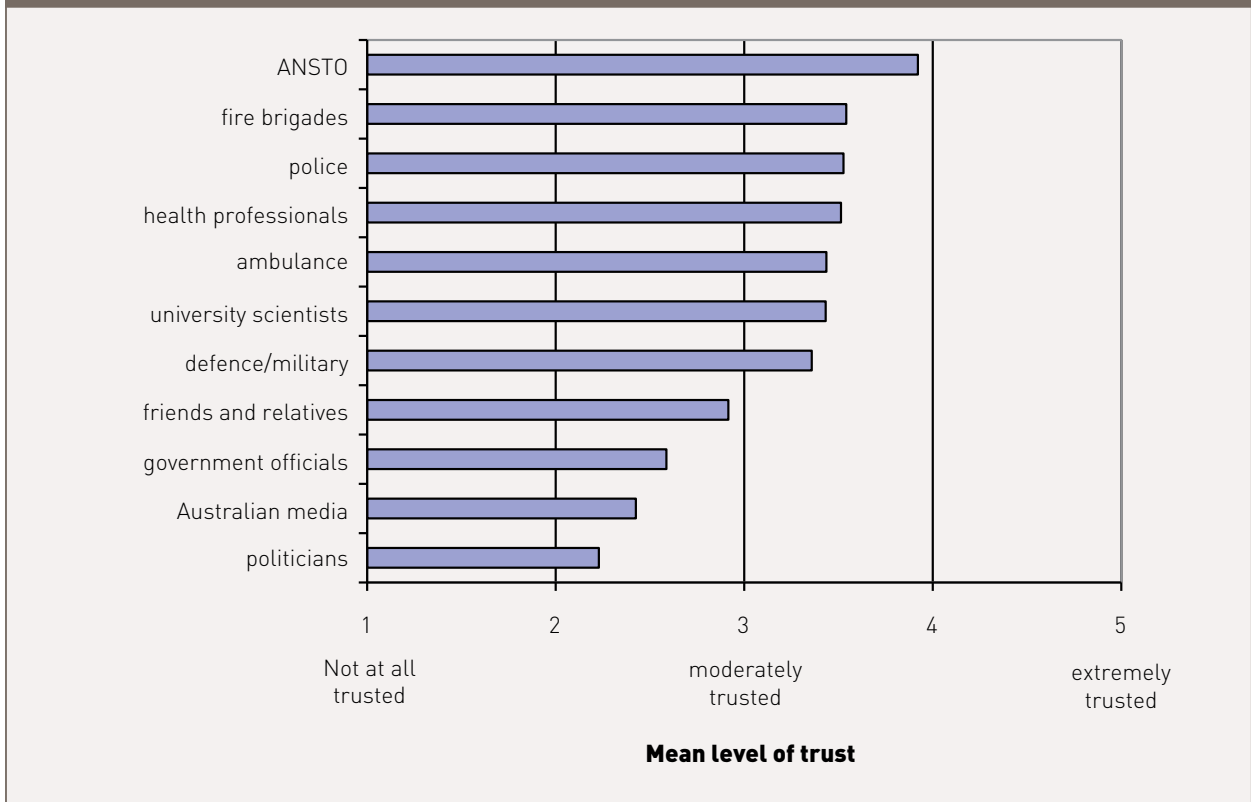
### Trusted sources of information

Respondents were asked to indicate how much they would trust certain groups and individuals for credible information in the event of an R/N emergency event. These data are presented in Figure 5.

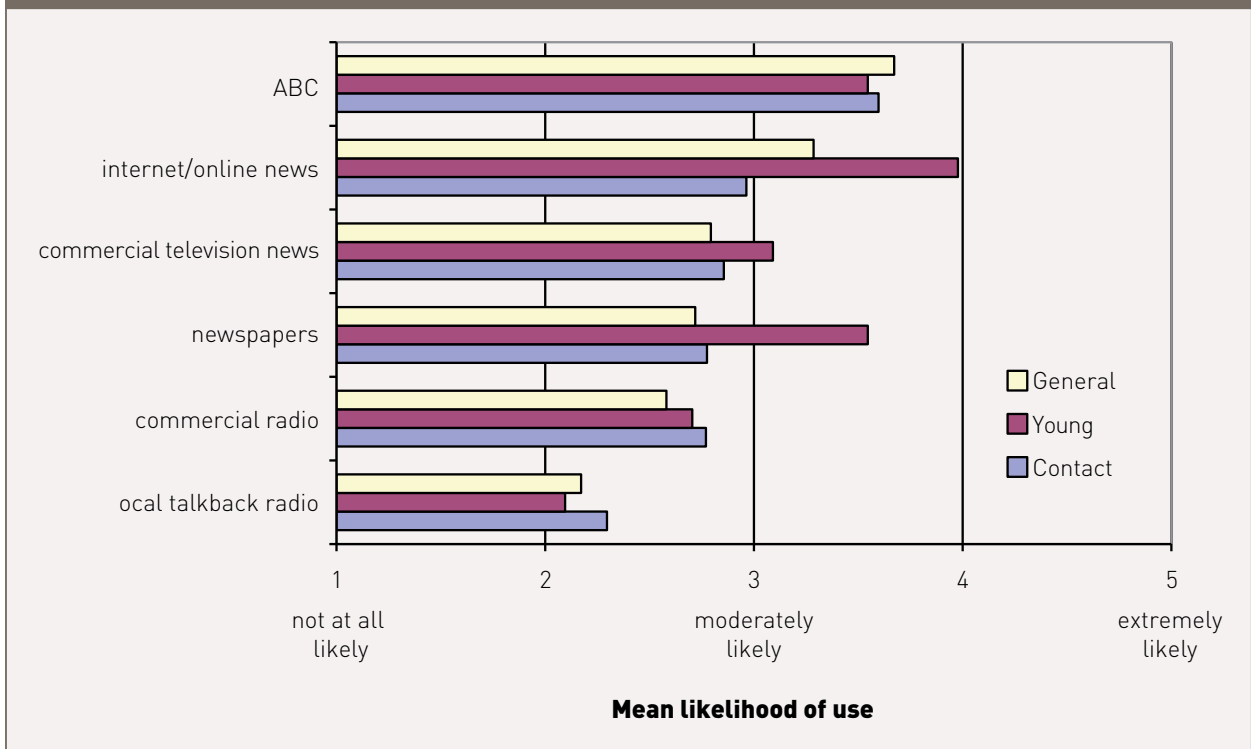
The most trusted sources of information were ANSTO, First Responders (fire, police, ambulance) and health professionals. The least trusted were the media and politicians. Inclusion of the ANSTO 'Contact' group in this study is likely to have increased awareness of ANSTO as an organisation in this context and therefore we would expect it to be less prominent in a general population sample. In general, results were similar to Canadian trends (Lemyre et al, 2005) although Australian media was ranked lower than Canadian media and university scientists ranked higher in Australia than in Canada. Interestingly, Europeans believe that scientists are the most trusted to give them information about nuclear safety (European Commission, 2007).

Trust, cooperative behaviour and adherence to advice provided by authorities are likely to be influenced by the level of openness in the communication strategies adopted by authorities. Following accidents at Chernobyl and Three Mile Island, attempts to minimise alarm or panic by restricting information about the risk led to rumours of conspiracy and secrecy (Sheppard et al, 2006). Similarly, inadequate or mixed information, or lack of awareness of existing perceptions and understandings during the anthrax attacks in the U.S.

**FIGURE 5.** Level of trust in the listed organisations and groups, in order of mean trust level. Mean level of trust was calculated using the 5-point response scale; 1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely.



**FIGURE 6.** Likelihood of turning to the listed forms of media for credible information in the event of a radiological or nuclear incident. Mean likelihood of use was calculated using the 5-point response scale; 1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely.



**TABLE 2.** The likelihood of respondents enacting the listed behaviours in the event of a radiological or nuclear incident occurring in their area. Mean likelihood was calculated using the 5-point response scale; 1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely. (\*Only 42% of respondents answered this one question as it was not applicable to all respondents).

Behaviour type	Specific behaviour	Not at all/ a little (%)	Moderately (%)	Very/extremely (%)	Mean likelihood
Targeted Actions	Seek shelter indoors	5.6	14.1	80.4	4.1
	Cover self with something – like a blanket or a coat	32.2	22.9	44.9	3.1
	Cover face to avoid inhaling or ingesting dust	9.1	15.0	75.9	4.1
	Call family members to check if they are OK	1.3	6.5	92.1	4.5
	Wash off radioactive material as soon as possible	6.8	12.0	81.1	4.2
Helping Behaviour	Call the emergency services	11.4	12.4	76.3	4.0
	Stop to help other people	9.5	40.1	50.4	3.5
	Band together with others to respond in whatever way is needed	7.6	22.4	69.9	3.9
	Volunteer to support emergency services	28.1	33.0	38.9	3.2
Impulsive Behaviour	Try to get back home as soon as possible	13.4	21.3	65.2	3.8
	Go home, pack, get away in car from the area	27.8	28.8	43.4	3.3
	Throw away stored food & water	67.0	18.5	14.5	2.1
Pausing	Spend time gathering information that might guide your response	10.8	23.2	66.0	3.8
	Remain & await instructions from the emergency services	22.2	28.4	49.4	3.4
Long Term Change Behaviour	Decide not to have more children for fear of passing on genetic damage*	63.5	20.4	16.0	2.3
	Move away permanently to another town, city, or area	35.5	27.1	37.4	3.0
	Have more frequent health checks	12.5	19.3	68.2	3.8

(2001) and Sarin attacks in Japan (1995) created public distrust, anxiety and fear (Sheppard et al, 2006). Distrust in government agencies is known to heighten perceived risks and hinder public health efforts, especially those that rely on the voluntary cooperation of the public such as evacuation, quarantine and vaccination (Sheppard et al, 2006).

### Preferred forms of media

Respondents indicated how likely they were to access different forms of media for credible information in the event of an R/N emergency event. These data, presented by sub-groups, are summarised in Figure 6.

It appeared that the subgroups preferred different types of media. While the ABC received the highest ratings overall, there was a preference amongst the 'Young' group to use the internet and newspapers as credible sources of information whereas the 'Contact' and 'General' groups were more likely to go to the ABC. The results suggest that different communication channels may be necessary and further research is needed to determine the most appropriate communication channels to reach other sub-groups within the general population.

### Anticipated response

We presented 17 plausible behavioural responses to a radiological or nuclear incident (informed by past research, e.g. Lemyre et al, 2005, Becker, 2005, and discussion with subject matter experts). Respondents were asked how likely they would be to do each behaviour in the event of an R/N incident or accident. Factor analysis identified five clusters of behaviours. These were labelled Targeted Action, Helping Behaviour, Impulsive Behaviour, Pausing, and Long-term Change Behaviour. Table 2 summarises the responses within each factor cluster.

The results indicate that an R/N incident is likely to result in a high demand on phone services; with many respondents being very or extremely likely to call family members (92%) and emergency services (76%).

It is encouraging that a significant proportion of respondents would consider helping others and would band together to respond (50% and 70% very/extremely likely, respectively), especially given the potential for greater radiation exposure and the fear and dread that such an event might evoke. Somewhat confusing was the finding that respondents seemed willing both to stop to gather information (66% very/extremely likely) but also likely to get home as soon as possible (65% very/extremely likely) and get away (43% very/extremely likely). Although this seeming contradiction is most likely due to the structure of the question, i.e. respondents rated a series of independent behaviours, the results suggest that there will not necessarily be a stampede to flee.

In the longer term, concerns about radiation exposure and the fear associated with not knowing whether they had been exposed may result in ongoing high demands on medical services with 68% of respondents very/extremely likely to have more frequent health checks. Over a third of respondents (37%) reported that they would be highly likely to move away permanently after an incident suggesting that many were not confident about living safely in an affected area without long term risk from radiation hazards.



## Conclusions and further research

These preliminary study findings identify many parallels between the Australian data presented here and other international data. This is the first study to our knowledge to measure public preparedness and anticipated response to an R/N event in an Australian sample and the consistencies with other findings suggest that our data, although from a limited sample, may be a reasonable and useful indicator of how the Australian population could respond to an R/N event. However, the study is not without its limitations. Due to the small sample size and the convenience sampling strategies employed, the data may be regarded as indicative, rather than representative, of the general population. There are also issues of non-response bias due to limited information on response rates in parts of the convenience sample. As mentioned earlier, this study was a large preliminary investigation developed to assess a wide range of issues with a broad selection of respondents. This initial study has led to funding for a representative population-based study (through the Research Support for Counter Terrorism program, funded through the National Security Science and Technology branch of Prime Minister & Cabinet). This will enable us to build on these initial findings and investigate how well they extend to the wider population, and more broadly to CBRNE and all hazards. In addition, this future research programme will develop risk communication strategies and messages and assess their applicability to this broader range of hazards.

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# Vehicle abandonment behaviour in earthquakes

By Steve Lamb & Darren Walton.

## ABSTRACT

**A simulated earthquake event was presented by computer-aided personal interview to two-hundred and twenty-one participants to examine likely vehicle abandonment behaviours during post-earthquake travel on a disrupted transport network. The effects of social influence and trip distance on their intended behaviours were examined. An overreliance on private motor vehicles was observed. Walking was preferred up to 6.25 km, and driving became more likely at greater distances. Thirty-two percent of drivers attempted to drive as far as possible before they abandoned their vehicle to complete their journey by walking. Participants who observed other people abandoning their vehicles were significantly more likely to choose to abandon their vehicle.**

## Introduction

Abandoned vehicles can become obstacles for emergency services in the immediate aftermath of an earthquake (Ministry of Civil Defence & Emergency Management, 2009) and present logistical and environmental problems for the recovery process (Peterson, 2005; Foster, 2006). An estimated 2,800 vehicles were abandoned following the September 11, 2001, collapse of the World Trade Centre Towers in New York (Foster, 2006) and a total of 12,000 vehicles were abandoned following hurricanes Rita and Katrina (Department of Environmental Quality, 2007). People tend to travel by motor vehicle after earthquakes (Lamb & Walton, 2009), which creates a large volume of traffic that can overload the transport network (Mikami & Ikeda, 1985; Mileti & Nigg, 1984; Takuma, 1978; Walton & Lamb, 2009). Road blockages and damage to the road surface as a result of an earthquake will mean that some people may need to abandon their vehicle as they attempt to travel.

This study examines the likelihood of vehicle abandonment in response to a landslide that blocks the participant's trip home in a simulated earthquake event.

Computer-Aided Personal Interviewing (CAPI) was used to present the survey, which allowed for the multimedia presentation of the simulated earthquake and subsequent scenarios. Walton and Lamb (2009), and Lamb and Walton (2009) measured mode dependencies in relationship to trip distance, this study builds on those findings, also examining the normative influence of others.

In uncertain situations, individuals have been found to model their behaviours on others, referred to as informational influence (Baron, Vandello, & Brunsman, 1996; Deutsch, & Gerard, 1955; Kelly, 1952). While post-earthquake survey based studies, such as Borque, Russell, and Goltz (1993) have compared how responses differ depending on the presence or absence of others, this study examines social influence using an experimental methodology.

Distance is key factor in determining mode choice. Walton & Sunseri (2007) showed that under normal conditions 820 m is regarded as a reasonable walking distance for a specific purpose. After a simulated earthquake, people with access to motor vehicles were more likely to walk distances up to 3.25 km and were more likely to drive journeys over this threshold (Walton & Lamb, 2009). Given the importance of trip distance on mode choice, trip completion distance (distance from home when the landslide was encountered) was examined to ascertain whether distance influenced the likelihood of vehicle abandonment.

Lamb and Walton (2009) found that intended travel behaviours, measured using CAPI, were comparable to travel behaviours observed after the 2007 Gisborne earthquake in New Zealand. A similar link between intentions prior to disasters and actual behaviour was observed by Kang, Lindell and Pratter (2007). This study examines vehicle abandonment, across two independent measures: Trip completion distance and social influence. Three hypotheses were examined. First, a higher proportion of participants will choose to drive than walk. Second, social influence will increase the likelihood of participants choosing to abandon their vehicle when they encounter a landslide. Third, participants will be more likely to abandon their car if they are closer to their destination (75% trip complete) than further away (25% trip complete).

**FIGURE 1.** Images of landslide with and without social influence.



## Method

### Participants

Two-hundred and twenty-one participants were recruited from Te Papa, New Zealand's national museum, during a three-day exhibit on earthquake awareness. Members of the public were approached by experimenters and asked to participate in the study if they drove to Te Papa (to ensure that they had the opportunity to drive after the event). Participants were evenly represented across gender (100 males; 107 females; 14 did not respond to the question),  $\chi^2(1, N = 207) = .24, n.s.$ , and reported a mean age of 37.9 years.

### Materials

The survey contained thirty items and was presented via laptop computer [see Walton, Lamb & Dravitzki, 2007, for a description of CAPI methodology]. The main measures included the participant's home location, mode of travel on the day of the survey, vehicle type and ownership, as well as whether the participant was looking after children. The earthquake was depicted using a shaking image of the exterior of Te Papa accompanied by an audio sample of a rumbling earthquake. Participants were asked to imagine that they had decided to travel home. Participants estimated the distance from their current location to their home, the length of time it would normally take to make this trip, how long they would expect it to take after an earthquake, and the mode they would use to travel home. The actual distance in kilometres from Te Papa to the participant's house via road was calculated using Google mapping software. A 5-point likert scale was used to measure seven items examining participant's expectations of the trip, specifically; the suitability of their footwear for walking long distances and for walking through debris, their expectations of damage to roads and level of danger, likelihood of traffic jams, and judgements of the impact of their travel on others and whether driving after an earthquake was appropriate.

Participants who indicated they would walk home were given feedback on the accuracy of their estimation of the

distance to their home, asked demographic questions and the survey was concluded. Participants who indicated they would drive home were randomly assigned to one of the four conditions across the two independent variables, social influence (social influence and no social influence) and trip completion distance (25% and 75% of the trip). Participants were presented with the landslide scenario and given feedback on their estimate compared with the actual distance to their home. The landslide scenario was depicted by one of two images of a road blocked by debris, shown in Figure 1. One image simply showed the landslide, the other was a manipulated version of the image that included people walking over it.

Participants were presented with four options; Try and drive over landslide, abandon your vehicle and walk, turn around and find another route, or wait in your vehicle. An interactive graphic illustrating the scenario was presented, shown in Figure 2. When each option was selected, a corresponding animation was triggered. The image in the social influence condition showed people walking over the slip, while no others were present in the control condition. Participants were then asked how long it would take to travel home from where they encountered the landslide.

Based on their response to the scenario, participants were presented with nine items on a 5-point Likert scale that examined their reasons for abandoning their vehicle, or their reasons for staying with their vehicle. All participants were asked to rate the realism of the landslide scenario on a 10-point continuous scale. The survey concluded with three demographic items; age, gender, and number of children.

### Procedure

Participants were seated at a laptop computer and asked to follow the on-screen instructions. The analysis was conducted with a 2x2 factorial design: Social influence (no influence / social influence), trip completed (25% / 75%). The analyses were conducted using independent samples t-tests, and two-way Chi-square contingency tables.

FIGURE 2. Vehicle options for landslide with and without social influence.

**You are in your car deciding what to do. Traffic starts backing up behind you. Other people are still in their vehicles. One lane is still free on the other side of the road. You have several options.**

**Which of the following are you most likely to do?**

*Click on each option to show the action. Only the last option you select will be recorded.*

**How long do you expect it will take to travel the remaining 0.28 km home from here?**

Hours  Minutes

*Type time here*

Control condition

**You are in your car deciding what to do. Traffic starts backing up behind you. Other people are still in their vehicles. One lane is still free on the other side of the road. You have several options.**

**Which of the following are you most likely to do?**

*Click on each option to show the action. Only the last option you select will be recorded.*

**How long do you expect it will take to travel the remaining 0.28 km home from here?**

Hours  Minutes

*Type time here*

Social influence condition



**TABLE 1.** Driver abandonment behaviour across social influence condition.

Behaviour	Social influence condition					
	Control		Social influence		Overall	
	%	n	%	n	%	n
Try and drive over landslide	1.4*	1	11.9*	7	6.2	8
Abandon vehicle and walk	42.9	30	55.9	33	48.8	63
Turn around and find another route	40.0*	28	20.3*	12	31.0	40
Wait in vehicle	15.7	11	11.9	7	14.0	18
<b>Total</b>	<b>100</b>	<b>70</b>	<b>100</b>	<b>59</b>	<b>100</b>	<b>129</b>

**TABLE 2.** Abandonment behaviour across distance from home.

Behaviour	Percentage of trip complete			
	25%		75%	
	%	n	%	n
Try and drive over landslide	3.1	2	9.2	6
Abandon vehicle and walk	46.9	30	50.8	33
Turn around and find another route	35.9	23	26.2	17
Wait in vehicle	14.1	9	13.8	9
<b>Total</b>	<b>100.0</b>	<b>64</b>	<b>100.0</b>	<b>65</b>

## Results

### Manipulation checks

To ensure that the experimental manipulations were successful, several basic checks were carried out. First, it was necessary to ensure that the trip completion distance manipulation was effective. As expected, trip distances were significantly larger for the 25% trip completion condition ( $M = 12.33$  km) than the 75% condition ( $M = 4.59$  km),  $t(130) = 6.02$ ,  $p < .001$ . Second, the distance,  $t(64) = -.13$ , n.s., and the social interaction,  $t(64) = .48$ , n.s., conditions were found to be independent, ensuring that changes observed across one condition could not be attributed to a change in the other. Third, it was necessary to establish that the landslide image manipulated to included people walking over the slip was equally believable as the unaltered image. As expected, no significant differences were observed between judgements of realism of the manipulated ( $M = 6.34$ ) and unaltered images ( $M = 6.69$ ),  $t(102) = .53$ , n.s.

### Mode choice

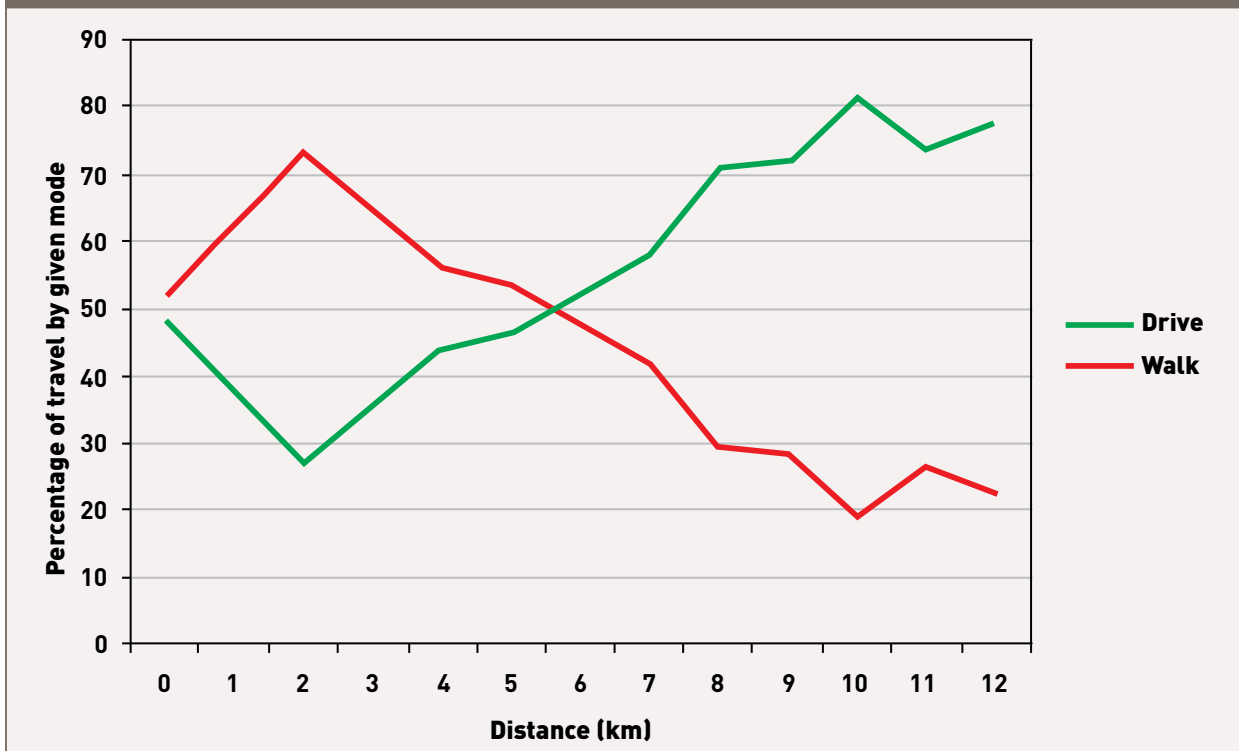
In reaction to the simulated earthquake event, nearly two-thirds of participants chose to drive home (65.4%), and the remaining third chose to walk home (34.6%),  $\chi^2(1, N = 207) = 19.36$ ,  $p < .001$ . Participants who chose to drive were significantly older ( $M = 40.3$  years) than people who chose to walk ( $M = 35.0$  years), Mann-Whitney  $U = 3182.0$ ,  $p < .01$ , and also had significantly

more children with them than people who chose to walk, Mann-Whitney  $U = 2877.0$ ,  $p < .001$ . Participants from the Wellington region were significantly less likely to drive (60.2%) than people from other parts of New Zealand (87.2%),  $\chi^2(2, N = 205) = 10.12$ ,  $p < .01$ . Vehicle type,  $\chi^2(4, N = 205) = 6.3$ , n.s., ownership of the vehicle  $\chi^2(3, N = 205) = 4.0$ , n.s., and gender,  $\chi^2(1, N = 205) = 1.2$ , n.s., all had no effect on the likelihood of walking or driving.

Participants who chose to walk home were significantly more likely to agree that driving was the 'wrong' way to travel ( $M = 89.9\%$ ), than people who chose to drive ( $M = 20.8\%$ ), Mann-Whitney  $U = 1056.5$ ,  $p < .001$ . Further, participants who chose to walk were significantly more likely to agree that the way they chose to travel would not affect other peoples' ability to travel ( $M = 31.9\%$ ) compared with people that chose to drive ( $M = 15.4\%$ ), Mann-Whitney  $U = 3287.0$ ,  $p < .01$ .

Overall, the likelihood of driving increased as trip distance increased, and the reverse relationship was observed for walking, presented in Figure 3. Walking was more likely up to a cut point of 6.25 km, after which driving became more likely. The crossover point was 46.1% of the average trip distance ( $M = 13.6$  km,  $SD = 12.3$ ). For trips that had a distance of less than 1 km, driving was more likely than walking. However, this is likely due to the very small sample size at that point ( $n = 4$ ).

FIGURE 3. Likelihood of walking and driving across trip distance.



**Social Influence**

Social influence was found to significantly affect abandonment behaviour,  $\chi^2(3, N = 129) = 11.07, p < .05$ , shown in Table 1. Participants were 2.6 times more likely to abandon their vehicle and walk, than turn around find an alternative route when they observed other people walking over the landslide, compared with the control condition, Mantel-Haenszel (1, N = 103) = 4.07,  $p < .05$  [95% CI from 1.1 to 5.9]. When participants saw other people walking over the landslide, they were more likely to drive over the landslide, and with no social influence, they were more likely to turn around and find a way around the landslide.

Participants who did not abandon their vehicle were more likely to judge that it would take too long for the landslide to be cleared when in the social influence condition ( $M = 2.62$ ) than in the control condition ( $M = 1.88$ ),  $t(64) = -2.76, p < .01$ . Participants who abandoned their vehicles were more likely to report that they would not be able to walk the distance home under no social influence ( $M = 4.24$ ) than those in the social influence condition ( $M = 3.81$ ),  $t(59) = 2.2, p < .05$ .

**Distance**

Abandonment behaviour across distance from home is shown in Table 2. The distance from home (25% vs. 75%) had no effect on the four options presented at the landslide,  $\chi^2(3, N = 129) = 3.0, n.s.$  When the four options were collapsed into abandon vehicle and stay with vehicle, no effect was observed across distance home,  $\chi^2(3, N = 129) = 3.04, n.s.$

**Discussion**

This study used an experimental methodology to examine individuals' likely vehicle abandonment behaviours during post-earthquake travel on a disrupted transport network. People have been found to over rely on private motor vehicles for transport after both simulated (Walton & Lamb, 2009) and real earthquake events (Lamb & Walton, 2009; Mikami & Ikeda, 1985; Mileti & Nigg, 1984; Takuma, 1978). Our research supports these findings, as motor vehicle was the primary mode choice after the simulated earthquake (65.4%) followed by walking (33%), supporting hypothesis one.

Walking was more likely for distances up to 6.25 km, after which driving became more likely, compared with a threshold of 3.25 km, found by Walton and Lamb (2009). However, the cut-point as a proportion of mean trip distance, was comparable for both studies; 46.1% for this study and 37.4% for Walton and Lamb (2009). This accounts for the longer average trip distances in this study, as the exhibition drew people from greater distances than the normal weekday travel examined Walton and Lamb (2009). The similarity of these proportions indicates that there is a relationship between average trip distance and the threshold walking distance.

Mode choice was also influenced by demographic factors. Individuals with children may have been more likely to drive because children are less able to walk long distances. Alternatively, parents may believe their children would be safer travelling by motor vehicle. The increased likelihood of driving for those who live outside the region is unclear. It is possible that they

have a greater attachment to their vehicle because they need it to be able to travel home, whereas locals are relatively less reliant on vehicles. Respondents who drove were less aware that they are contributing to a potential overload of the transport network than those who chose to walk. Whether the choice to drive reflects a lack of understanding of the effects of their behaviours, or a deliberate decision to travel in despite the consequences for others, is unclear.

Behaviour in disasters has been shown to be rational (Mileti and Nigg, 1984; Quarantelli and Dynes, 1976; Ramachandran, 1990), although it is typically self-interested (Lamb & Walton, 2009; Walton & Lamb, 2009). Upon encountering the landslide, participants were most likely to abandon their vehicle and continue on foot (49%) followed by turning their vehicle around and attempting to find an alternative route (31%). This indicates that 32% of drivers adopted a strategy of minimising potential walking distance by driving as far as possible before abandoning their vehicle to walk, which contributes to congestion and increases the number of vehicles likely to be abandoned.

In ambiguous situations, or where individuals are unlikely to have previous experience, they tend to model their behaviour on others, referred to as informational influence (Deutsch, & Gerard, 1955; Kelly, 1952). In this study, when participants observed other people abandoning their vehicles and walking, they were 2.6 times more likely to mimic this behaviour than to stay in their vehicle and find an alternative route, supporting hypothesis two. Social influence affected not only their intended behaviour, but also their perception of the situation, such as judgements of walkable distances and landslide clearance times.

Distance from home did not affect abandonment behaviour, therefore hypothesis three was not supported. It may be that participants believed walking was inevitable because of the potential damage to the road network. Alternatively, people may be poor at judging distance, and distance does indeed have an effect on abandonment but this study failed to measure it.

## Limitations

While behavioural intentions has been shown to be a valid method of examining response behaviours in disaster scenarios (Kang, Lindell & Pratter, 2007; Lamb & Walton, 2009) these findings need to be compared to patterns of vehicle abandonment after an actual event. Given that distance had an effect on mode choice, it seems unlikely that distance from home would have no effect on the likelihood of abandonment. The distance manipulation might have been more effective if the distance from home was illustrated on a map to provide a more understandable context. Future studies could further investigate factors that influence abandonment, and examine the effectiveness of official advice to avoid travel and advance warning of damage to the network on the likelihood of choosing to drive.

## Conclusions

The overreliance on motor vehicles in earthquake events poses a key problem for emergency managers. A third of drivers attempted to drive as far as they can before they abandon their car and walk. This rational, but self-interested behaviour is characteristic of travel behaviour immediately after an earthquake. Observing other people abandoning their vehicles increased the likelihood of participants choosing to abandon their vehicles. It is theorised that this is because people are unsure what they should do in these situations and model their behaviours on those they observe.

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# Australia's first pandemic influenza mass vaccination clinic exercise

Hunter New England Area Health Service, NSW, Australia.

By Christine Carr, David Durrheim, Keith Eastwood, Peter Massey, Debbie Jagers, Meredith Caelli, Sonya Nicholl and Linda Winn.

## ABSTRACT

**In 2009 a novel influenza strain, pandemic influenza A H1N1 California 7/09 (pH1N1), "swine flu", emerged worldwide. Australia rapidly developed a pH1N1-specific vaccine which was distributed to public health services and general practices in September 2009. Should a second severe pandemic wave affect Australia there may be a need to rapidly deliver vaccine through mass vaccination clinics. Mass clinics must be efficient and safe. In 2008 a field exercise was undertaken to simulate a pandemic mass vaccination clinic using seasonal influenza vaccination in a rural community in the Hunter Valley using the New South Wales mass vaccination clinic response protocols. The exercise identified significant opportunities to streamline operations to increase clinic capacity, reduce client throughput time, enhance involvement of external agencies, and modify clinic roles, with a resulting revision of the State mass vaccination plan.**

## Introduction

In 2009 a novel influenza strain, A H1N1 California 7/09 (pH1N1), "swine flu", emerged in Mexico and rapidly spread worldwide. Although generally causing mild disease, pH1N1 resulted in severe illness in some individuals. On 11 June 2009 the WHO officially declared an influenza pandemic in recognition of the global impact of the novel strain. (World Health Organization, 2005; Bishop, J., 2009)

The Australian public health response to pH1N1 was aimed at protecting individuals and mitigating the impact on social function and the economy. (Australia Government Department of Health and Ageing, 2009)

Initially, containment phase plans in Australia were focussed on limiting transmission through social distancing measures and the widespread use of antiviral drugs for both prophylaxis and treatment. However, with the escalation of local transmission and evidence suggesting that disease was not as serious as initially believed, the containment measures were relaxed while awaiting the development of a tailored vaccine, focussing on early treatment of individuals with underlying high-risk conditions. (Eastwood, K., et al, 2009)

In Australia, following safety and efficacy trials, a pH1N1-specific vaccine was registered by the Therapeutic Goods Administration in September 2009. Health authorities agreed that given the decrease in pH1N1 disease activity the use of mass clinics was not immediately necessary and that the rollout could be achieved principally through general practices and existing public health services. Whilst stated willingness to accept the vaccine is reportedly high the actual uptake thus far is unlikely to achieve adequate 'herd immunity'. (Eastwood, K., et al, 2009) Should a second pandemic wave occur or mutation resulting in a strain with more serious health consequences, then mass vaccination delivery through community clinics will need to be considered.

Although real-time field exercises are considered the gold standard for evaluating disaster response capabilities, until now, no Australian State or Territory had tested the effectiveness of their mass vaccination plans by field exercise. (Aaby, K., et al, 2008) In this report we describe our experiences in conducting a large field exercise in March 2008 in which we provided seasonal influenza vaccine to a circumscribed rural community of 1800 people in the Hunter Valley, NSW, which included the town of Aberdeen. Our aim was to provide the current seasonal influenza vaccine rapidly and safely. Two key summary measures of mass clinic effectiveness are clinic capacity (the number of patients successfully vaccinated per hour) and throughput time (time spent by a patient in the clinic). (World Health Organization, 2008) The exercise tested the NSW pandemic influenza mass vaccination clinic response protocols. (New South Wales Health, 2005)

## Methods

The aim of this exercise was to evaluate and refine mass vaccination clinic plans under the NSW Health Interim Influenza Pandemic Action Plan. The exercise assessed the capacity of the existing Plan to efficiently and safely implement a local mass vaccination clinic operational plan and evaluate the capacity to deliver adequate and timely treatment of mass presentations. The Hunter New England Human Research Ethics Committee considered the exercise a quality assurance exercise and formal ethics approval was not required.

The coordinating group consulted extensively with Local Emergency Management Committee (LEMC) representatives, the Upper Hunter Shire Council, the local Division of General Practice, the town’s general practitioner, the local school which provided the venue, security contractors and local volunteer organisations. Additionally, local hospital staff and community nurses participated in the exercise.

The Philadelphia Health Department, USA, provided valuable advice from their previous experiences of mass drug distribution. (Philadelphia Department of Public Health Division of Disease Control, Bio-terrorism and Public Health Emergency Preparedness Consultants, 2005) For staff participating in the clinic, multi-agency training and briefings were conducted in the weeks prior to the exercise. The Chief Umpire was the Local Emergency Operations Controller (LEOCON), a senior officer from the local Police Command, who was supported by seven umpires/evaluators from NSW Health and three NSW Area Health Services.

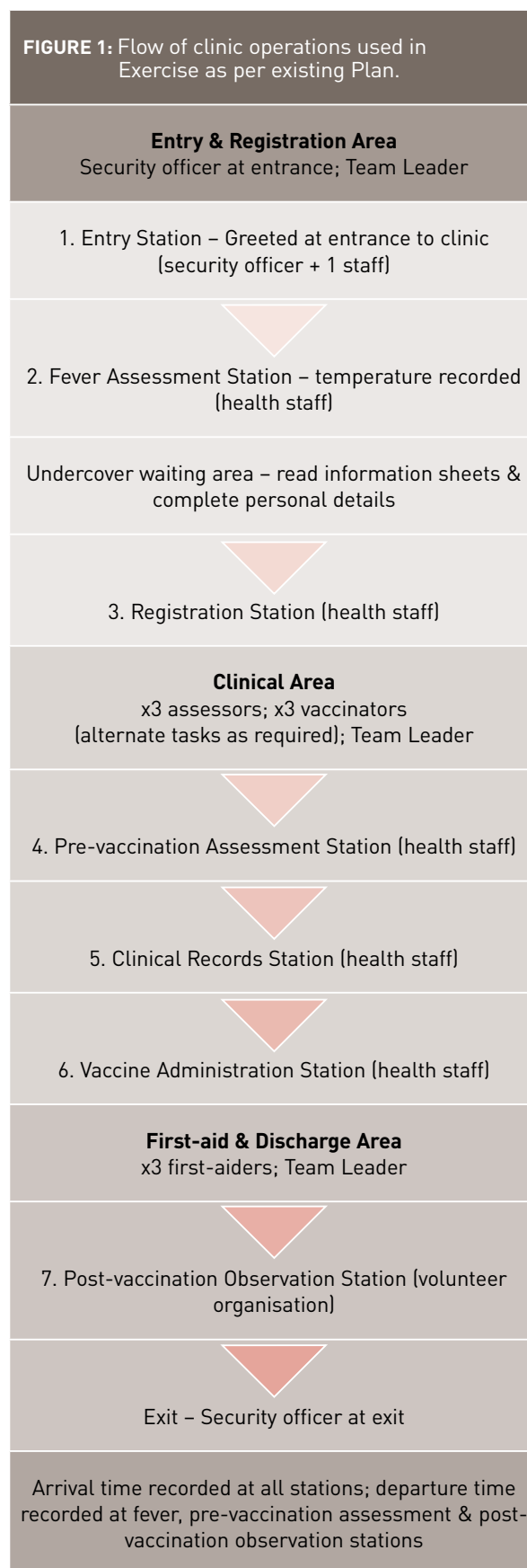
The target population was approximately 1800 individuals representing the entire postal code cohort of individuals aged greater than 6 months. Children aged 6 months to 9 years who had not received an influenza vaccine in previous years were offered a second influenza dose six weeks after the exercise.

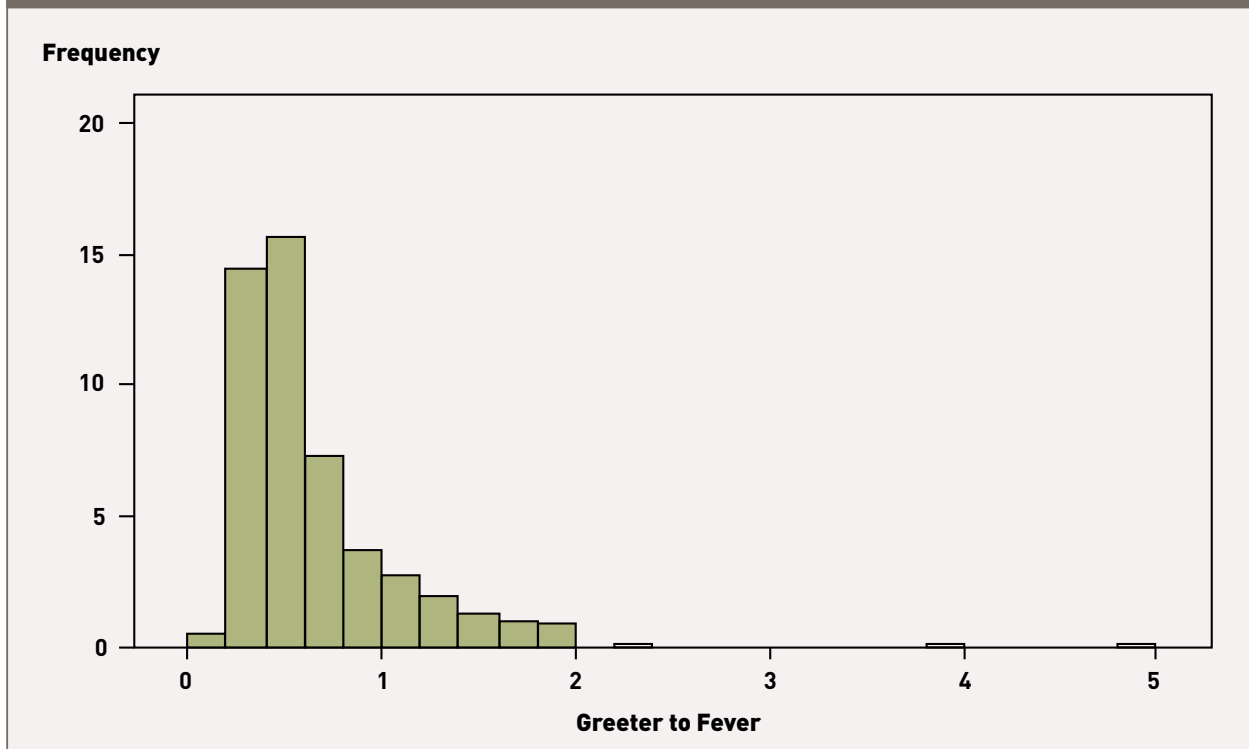
After Action Reviews (AARs) were convened immediately following the exercise to solicit key points of impact in the running of the exercise. A strategic consultative meeting with NSW Health’s Biopreparedness and Immunisation Units was convened two months following the exercise to agree on protocol changes identified by exercise findings.

## Clinic operations

A community advertising campaign was initiated three weeks prior to the clinic through all local print and electronic media. It was clearly stated that besides being an opportunity to obtain free and current seasonal influenza vaccine the participants would also be involved in an exercise to test pandemic plans. The vaccination clinic was conducted on 11 March 2008 at the local high school between 14h00 and 20h00. The clinic framework utilised a reproducible pod (small team unit) structure to enable the expansion of the response to meet increasing numbers of community presentations. The school front

**FIGURE 1:** Flow of clinic operations used in Exercise as per existing Plan.



**FIGURE 2.** Time (in minutes) by each individual between Greeter and Fever Assessor.

entrance was used as the clinic entry point and each individual was directed and timed through seven stations as per the State Plan: (1) greet, (2) fever assessment, (3) registration, (4) pre-vaccination assessment, (5) clinical administration station, (6) vaccine administration and (7) post-vaccination observation and exit.

The clinic was staffed by nurse immunisers and other personnel from local rural health services, and members of local volunteer organisations. (Figure 1) Registered nurses rotated between the roles of vaccinator and pre-vaccination assessor to alleviate the repetitive nature of tasks and to maximise proficiency. Vaccines were provided in pre-filled syringes and were transported from the State Vaccine Centre to local vaccine storage facilities through the state's existing vaccine transportation system which provides for specifically trained personnel to receive, store and monitor vaccines. Vaccines were monitored from point of dispatch to vaccine administration, to ensure cold-chain acceptability.

### Exercise evaluation

Three key aspects of the current Plan – effectiveness, safety, and client participation – were evaluated by seven evaluators who rotated through clinic stations hourly, using a standardised reporting tool for recording observations. Evaluators reviewed each clinic function against the effectiveness and efficiency of each position as described in pre-prepared Job Action Sheets.

Client satisfaction data were obtained using a semi-structured self-administered survey which was completed during the post-vaccination observation

period. Exercise situation reports and briefings from the AARs captured data from the staff and volunteers involved in the exercise. Detailed time and flow analysis data were collected from each of the seven clinic stations using calibrated clocks to standardise arrival and departure times.

### Statistical analysis

Quantitative data were analysed with Microsoft Excel and SPSS version 12 (IBM, 2005) Analysis included calculation of flow rates through specific vaccination stations and the conducting of a cohort analysis to identify “flow bottlenecks”.

## Results

### Effectiveness

Four hundred and ninety eight clients were vaccinated at the clinic over the six hour period. The greatest number of presentations was seen in the first hour of the clinic (n=108) and an increase of adults was also noted between 17h00 and 19h00 coinciding with the end of shifts at local businesses and local news media coverage.

Standardised observations by umpires and AARs indicated that the chain of command and communication channels as described in the Plan were strictly adhered to by all staff during the clinic.

**TABLE 1:** Time (in minutes) through clinic stations.

Time (minutes)	Station 1-2 Greeter to Fever Assessment	Station 2-3 Fever Assessment to Registration	Station 3-4 Registration to Pre-Vaccination	Station 4 Pre-Vaccination to Vaccination	Station 5-6 Vaccination to Post-observation	Station 1-6 Greeter to Post-observation
Median	5	7	4	1	4	22
IQR	4	5	4	0	3	12
Range	49	26	15	7	16	78
Maximum	50	26	15	7	16	82

The current Team Leaders' Job Action Sheets however did not adequately reflect the leadership role required to effectively manage the clinic operations and client flow. Umpires reported that client flow was managed in accordance with safe operational plans and that a school facility had the necessary infrastructure required for successful mass clinic deployment.

There was considerable variation in the movement through the various stages of the clinic which resulted in periodic bottle-necks during high throughput periods

(Table 1). Although all transition times were positively skewed this was particularly pronounced for the time taken from greeter to fever assessor, which was the least actively shepherded transition (Figure 2).

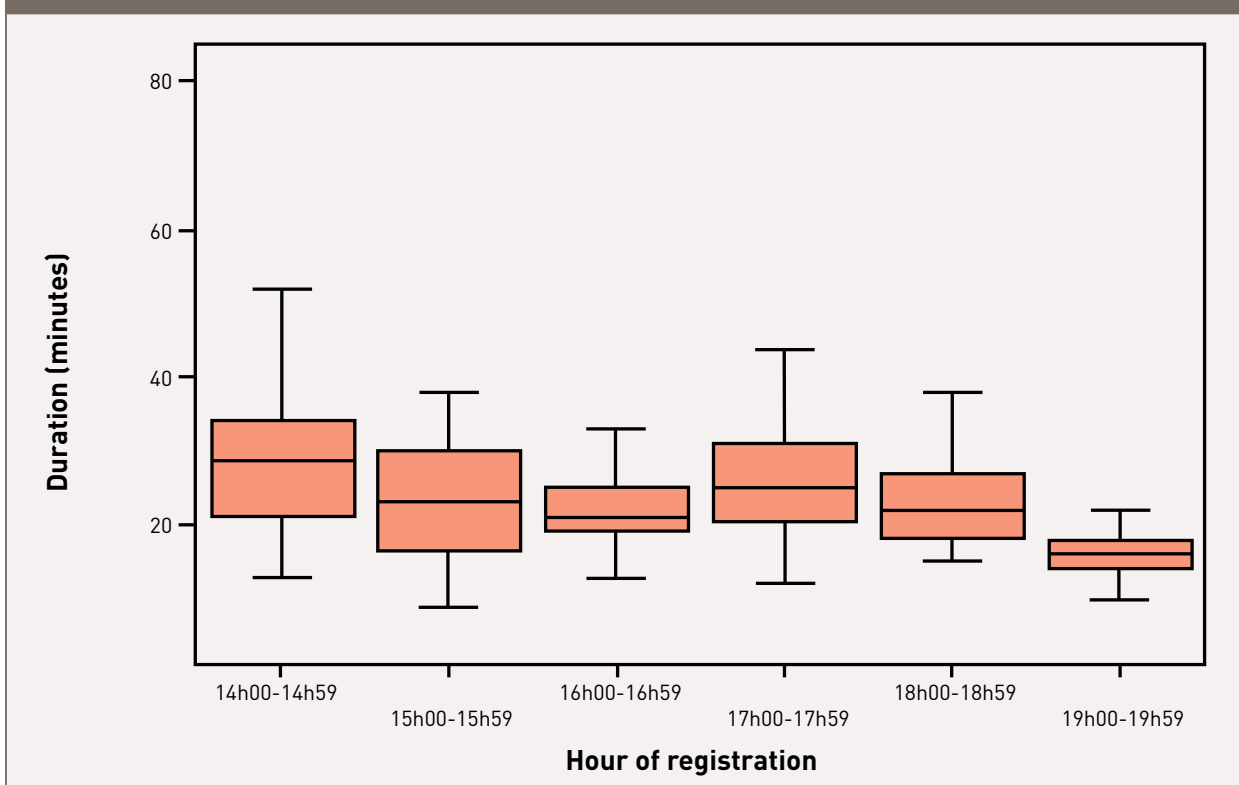
Analysis of variance demonstrated statistically significant differences in median times between most stations during the clinic. The pre-vaccination assessment station was the most efficient. Of the 498 clients vaccinated at the clinic over the six hour period 81.1% (404) spent less than two minutes at the pre-vaccination station and 97.4% (485) spent less than three minutes. A third of clients (162) failed to leave after the appointed fifteen minutes post-vaccination observation period despite experiencing no vaccine adverse effects. Although there was an overall improvement in median time taken through the clinic for clients during the exercise there was still considerable variation (Figure 3).

Evaluators reported that clinic staff effectively activated the contingency plan for resource utilisation and surge staff when a need was identified, and staff members were effectively re-deployed to other tasks to meet changes in demand at specific stations.

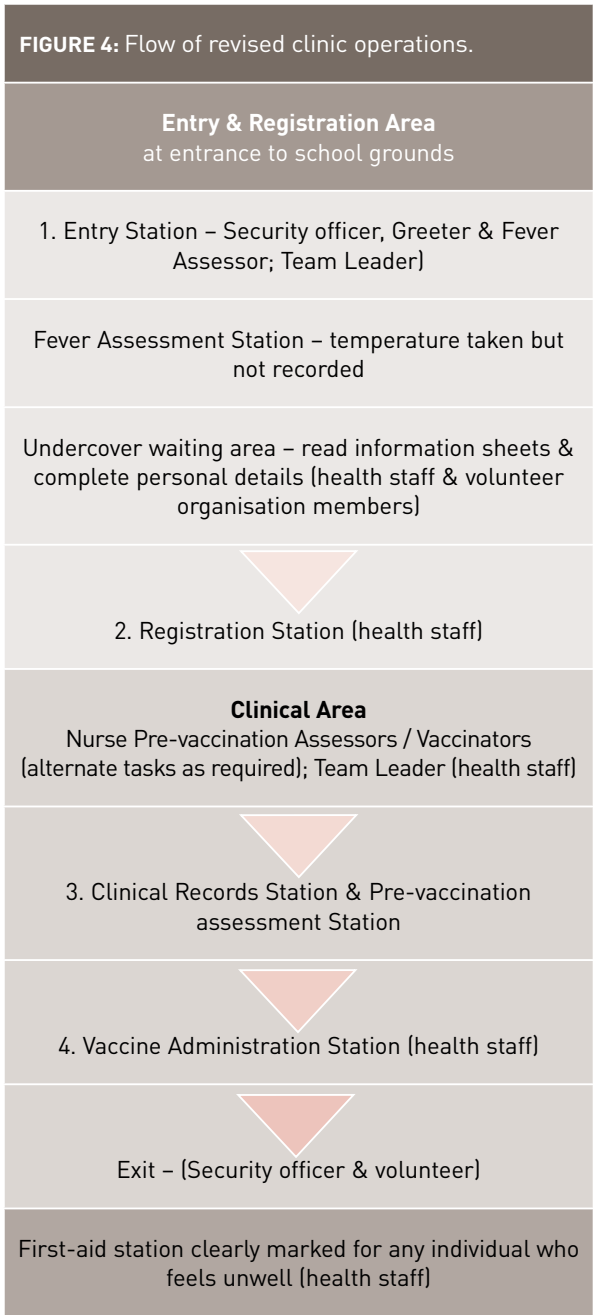
**Safety**

No significant adverse event following vaccination and no safety incidents were reported during the exercise. One mild reaction following vaccination was self-limiting and required no treatment. Licensed security officers stationed at the entrance were observed to provide support to those clinic staff members who were isolated from the main clinic stations. Vaccinators were initially seated but after the first hour were requested

**FIGURE 3.** Time (in minutes) from Greeter to arrival at Post-vaccination Observation.







by their Team Leader to stand in order to increase the throughput of their station. Some vaccinators subsequently reported leg and back strain after continual bending to sign vaccination record cards and service records.

Vaccine temperatures were observed by evaluators to be under continuous monitoring and were documented as satisfactory prior to and during clinic operations.

**Client Participation**

The self-administered satisfaction survey showed a high level of acceptance (98-99%) in all categories assessed: method of communication, clinic management, influenza and vaccine information, answers to questions posed by clients, treatment of clients by clinic staff, and waiting times. Ninety-nine percent of clients

rated overall clinic management as excellent or good (482/489). Ninety-eight percent (472/484) of clients rated the information sheet provided on influenza as excellent or good, while 98% (479/488) of clients also rated information provided on influenza vaccination as excellent or good. Ninety-nine percent (482/485) of respondents regarded staff responses to their questions and concerns regarding the clinic, the vaccine or the disease, as excellent or good. Ninety-nine percent of participants (485/488) rated treatment by clinic staff as excellent or good. Most respondents indicated high satisfaction with waiting times, with 97% (472/488) considering this aspect as excellent or good.

**Discussion**

The exercise proved valuable in evaluating the existing Mass Vaccination Clinic Plan and identifying opportunities to improve it. The exercise demonstrated that although the existing Plan could be operationalised safely there was considerable scope for improving efficiency. Streamlining the existing structure, functions, procedures and communications to enhance client flow, and enhancing the involvement of other agencies and volunteers, were identified as essential for improved throughput at future mass clinics. The school proved an ideal venue for deploying a mass clinic. Reducing the number of stations as described in Figure 4, limiting the physical distance between stations, and employing more rigorous marshalling of individuals to prevent straying, would improve efficiency and throughput.

The high level of client compliance and satisfaction with the clinic process and waiting times may not be reflected in a pandemic situation when community anxiety is heightened, therefore in pandemic situations, enhanced queuing management, improved clinic signage outside and within the clinic building, and movable physical barriers to match demand, would improve clinic management and assist clients to move swiftly through the stations.

Following the AAR, Job Action Sheets for team leaders were modified to highlight their leadership role, specifically regarding enhancing communications and managing emerging situations. The consent and registration process should be streamlined by dispensing with documentation by both clients (written consent) and vaccinators (signing vaccination records).

Volunteers could effectively replace health staff for all but clinical roles (pre-vaccination assessors and vaccinators) which would minimise the burden on health services during a pandemic. Having the ability to re-deploy staff within the clinic to meet surge at particular stations positively impacted on client flow during the Exercise.

The short time spent in the pre-vaccination assessment station by most vaccinees suggests that the information sheet effectively addressed community concerns about the disease and the vaccine. The importance of ensuring that the community is well informed about pandemic influenza and the risks and benefits (including safety concerns) of a tailored pandemic vaccine cannot be overstated.

To further improve through-put, vaccinators' role should be limited to vaccinating. Dispensing with the vaccinator's requirement to document (date/batch numbers) and to sign record cards, would also reduce the occupational risk of back and limb fatigue for vaccinators.

With only one mild reaction following vaccination, together with the overwhelming evidence of the low incidence of immediate adverse events following vaccination in Australia over the past decade, it is reasonable to replace the observation station with a first-aid point for anyone feeling unwell. (Australian Government Department of Health and Ageing, 2008) This would increase the clinic's capacity by preventing bottle-necks post-vaccination, while simultaneously reducing the risk of contact with undiagnosed cases of pandemic influenza.

## Conclusions

This field exercise demonstrated inefficiencies in the current Mass Vaccination Plan. Key issues included the number and location of stations, formal consent and vaccinator documentation requirements, the lengthy post-vaccination observation period and the need for surge capacity that can be rapidly deployed to maintain clinic flow. The Exercise provided us with the opportunity to streamline existing plans and procedures after a practical evaluation. The lessons from this field exercise, the first of its kind in Australia, have the potential to improve future application of the mass vaccination clinic model should a second wave of pH1N1 occur or in the event of a large-scale public health response requiring mass administration of medications. (Durrheim, D., Ferson, M., 2006; Ferguson, N., et al, 2006)

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# Development of Resilient Australia: enhancing the PPRR approach with anticipation, assessment and registration of risks

By Peter Rogers, Macquarie University.

## ABSTRACT

This paper will draw on current research to suggest that a more resilient way to Safeguard Australia is best served by enhancing, rather than replacing, the PPRR model. The established model of PPRR does not have to be thrown out, but rather extended to include the anticipation and assessment of threats. This would allow for a working document following the UK model of a National Risk Register to be developed. By building on established best practice and a growing sense of the importance of anticipation and assessment of risks as an integrated element of the disaster cycle then the foundations of National Security Statement (2008), the National Disaster Resilience Framework (2008-09) and the Critical Infrastructure Resilience Strategy (2010), along with the forthcoming National Disaster Resilience Strategy (2010), can offer a more integrated model for emergency management and enhance strategic awareness of risks. However, if this is not coordinated with lessons from international best practice then the risk of embedding vulnerability in the new model will remain, to the detriment of an integrated emergency management model for sustainable national resilience.

## Introduction

In recent years there has been a great growth in interest on the meaning and use of 'resilience' in the fields of security and emergency management. No definitive definition of resilience currently operates across all areas of expertise. Internationally discussion may emphasise crisis management (see for example

Regester & Larkin, 2008; Boin, 2005), integrated emergency management (see for example Coaffee et al, 2009) or disaster risk reduction (see for example Thomalla et al, 2006) to name but a few. All of these terms are focussed on variations of a similar set of concerns. For the purpose of this discussion, which focuses on specifically on the Australian literature and policy context rather than wider international debate, a broad definition of resilience encompasses all actions that mitigate the cycle of a disastrous event. Resilience is as such a metaphor that is used to draw together policy and practice. It is also a framework which includes every action undertaken to ensure a swift return to an equilibrium that is more stable than that existing prior to perturbation.

This paper will summarise some key messages that can be gleaned from the growth of resilience as an influential policy metaphor in an Australian context; it will then offer a perspective on the current state of play in the approaches to Australian emergency management before concluding with a brief comparison with the treatment of the disaster cycle in UK resilience, highlighting the uses of anticipation and assessment for the creation of a National Risk Register. This discussion will particularly emphasise the framework of the 'disaster cycle' as a complete area of management requiring the treatment of the disastrous event holistically. This is not to say that the event itself is a discreet area that must be understood in its totality, in isolation from the management process, but that (a) the management process itself must acknowledge the potential vulnerabilities of the existing system in a clear and concise way, and (b) the implementation of resilience as more than a metaphor but as a strategic framework for policy and practice must thus draw on the disaster cycle stage by stage as an integrated emergency management process. This paper presents the case that PPRR should be extended to include anticipation and assessment in a more clearly articulated way as part of the disaster cycle, and that a more formal articulation of these elements through a National Risk Register is required to enhance the smooth implementation of emerging strategy for increasing Australian national resilience.

## Context of the Australian approach

The Australian approach to emergency management has been undergoing a period of intense scrutiny in recent years. Disaster events are becoming more frequent, particularly with regard to natural disaster events and the threat of terrorist attacks. The first National Security Statement in 2008 by the then Prime Minister Kevin Rudd outlined the broad new principles and priorities of national security, alongside five key objectives for (1) maintaining territorial and border integrity of Australia, (2) promoting political sovereignty at home (3) alongside a stable, peaceful and prosperous international environment in the Asia-Pacific region, (4) preserving social cohesion, resilience and economic strength, and (5) protecting Australians and Australian interests around the world.

By establishing the National Disaster Resilience Framework in 2008 a more integrated relationship between national security agencies and those tasked with emergency management continued to open up across the federated states. In 2009 the Council of Australian Governments (COAG) undertook an agreement for a whole-of-nation resilience-based approach to disaster management, establishing a National Emergency Management Committee (NEMC) with a mandate to offer centralised leadership in the development of new national policy frameworks in security and emergency management, to enhance the *shared understanding* of disaster risk, its context, and responsibility for its management. This comprehensive and nationally integrated approach was to result in the creation of a series of supporting strategic documents, including the National Disaster Resilience Strategy (in December 2010), and a clearer articulation of the structural framework for emergency management at local (district), regional (state) and national (federal) levels, for example through the National Disaster Resilience Program (NDRP) and National Partnerships Agreement (NPA).

Alongside this clarification of the strategy and structural framework the increased professionalization of the security industry in Australia over the last decade through initiatives like the Research Network for a Secure Australia (RNSA), the Australian Council of Security Professionals (ACSP) and associated conferences, such as the annual Safeguarding Australia gathering, are continuing to embed best practice in operational networks of expertise. There is now a general acceptance of the incremental shift in understanding security and emergency that seeks to find applied solutions through integrated approaches to the management of risks in a far more holistic appreciation of the disaster cycle – inclusive of actions taken before, during and after any potential event. However there is also a sense that whilst resilience means enhancing business and citizen ability to make informed and responsible decisions at local levels there also needs to be a collaborative effort by government to meet changing public and private expectations of its statutory obligations. This in and of itself creates new requirements. Of particular concern is the need to balance the implementation of local operational requirements and solutions alongside the collaborative implementation of federal policy or quality standards

across the established, and sometimes entrenched, boundaries between agencies, sectors and levels of operation (Wilkins, 2010). Key for this is the step by step process whereby strategic documents set the broad template for change, strong leadership at each level allows national priorities to feed into, and receive feedback from local and regional levels, a an awareness of the national hazard or threat priorities to complement local and regional threats, hazards or risks.

## Developing the Australian approach

There are underpinning the holistic view four key approaches to Emergency Management at the heart of the Australian context. These are:

- The Comprehensive approach
- The All Hazards approach
- The All Agencies approach
- The Prepared Community (EMA, 2010)

The *comprehensive approach* is in and of itself the longest standing of these four in Australian practice and itself is made up of four key areas of operation. These are (1) Preparing for Emergencies, (2) Preventing Emergencies, (3) Responding to Emergencies, (4) Recovering from Emergencies, when combined referred to as PPRR. This model is widely used as the benchmark for practice in emergency management in Australia but has recently received some criticism in the treatment of anticipation and assessment. Anticipation and assessment alongside preparation and prevention are *pre-emergency* event aspects of resilience. Anticipation in this sense can be defined broadly as a complementary process to assessment. Anticipation is horizon scanning to identify potential dangers, registering those in a formal typology and recognition of the changing nature of risks that need to be continually identified and re-assessed. Assessment is also an ongoing process, the specific definition being relevant only insofar as it is applied to a given set of contextual criteria. In this case the broad definition of assessment is linked to *risk* assessment on the one hand and *capability* assessment on the other. The former being a discreet process of risk calculation (as opposed to risk identification) and the latter being the assessment of the capability of all actors to mitigate the potential danger. PPRR is somewhat limited in its understanding and inclusion of the early stages of threat identification of dangers in formal register that draws out of anticipation as horizon scanning (Rogers, 2009). Risk assessment and the anticipation of threats can be seen in PPRR to come as a precursor of mitigation, leaving PPRR as able only to 'categorise available emergency treatments rather than describe a continuum or cycle of events' (Cronstedt, 2010: 11).

The *all-hazards approach* can be seen as one way of moving past this problem, and is also gaining in weight in policy and practitioner circles, as emphasised in the national security statement:

*'The Government has adopted an 'all-hazards' approach to national security which brings together*



*the policy, capability and response areas for natural and man-made disasters.* (Rudd, 2008)

This approach helps to dispel to some extent that simplistic notion of all-hazards as being prepared for any and all potential events, but in a more meaningful sense suggests that plans across the disaster cycle should recognise the commonalities in situational response mechanisms, and that these commonalities across all emergencies can be translated into operational standards and best-practice used across all-hazards (see for example Alexander, 2005). The Australian approach to all-hazards has widened the Natural Disaster Relief and Recovery Arrangements (NDRRA) to incorporate both terrorist events and natural disasters within the same funding support framework. However it has also been noted that there is a lack of willingness amongst many of the core agencies, at the policy level, to incorporate the public and wider society in this approach which fundamentally undermines the objectives of increasing 'resilience' (Templeman and Bergin, 2008). All-hazards approaches seek to bring together all areas of understanding and expertise in multi-agency collaborative structures, but at the heart of all-hazards is the need for a clear identification and strong assessment of risk, threat and hazard. Once strategy has been developed and structure reviewed the importance of a coherent working document that offers a formal typology, taxonomy or register of the salient threats are cannot be understated. Without clear and consistent understanding and review of registered risk, threats and hazards it is difficult to implement consistent and interoperable standards across federal, regional, local government and public and private partners. This is a key challenge to rolling out the all-hazards approach to national resilience in Australia, which currently lacks a national, regional or local register within the wider treatment of risk and the disaster cycle.

A register of risks would greatly enhance the consistency of information across strategic partnerships which are more and more important to increasingly resilient practices. There have been moves towards more collaboration between State and Territory emergency management organisations and key Federal Government agencies, but also local governments, community based organisations, volunteers, academia and researchers, businesses, and industry bodies. However the extent and form of these engagements is highly varied and strategic planning tends to be the focus of collaborative arrangements between government (AG department), lead emergency agencies (AFP & EMA) and emergency management stakeholders (Clarke & Rowlands, 2009), with strategic partnerships between civil agencies, emergency services, NGO's and private enterprise a focus for state and local networks. A common working document for registration of risks at national level can also provide a template for the regional and local identification of which risks, hazards or threats may be locally specific priorities. This approach may in fact help to build on existing capabilities in local areas and provide common best practice from those on the front line in each community:

'A fundamental shift is required... in moving from a 'need-to-know' national security culture to a 'need-to-share' resilience culture to get the community fully engaged in understanding what our actual state of preparedness is and asking the community to be better prepared.' (Templeman & Bergin, 2009: 6)

As Templeman and Bergin here highlight, these implementation plans must to engage the general public as well as the local emergency planning and relief agencies in those local communities. The role of partnership between agencies is a central one for the development of successfully integrated emergency management arrangements, and is one of differing levels of success. In the Australian context there is a much more fully developed sense of the importance of volunteer organisations at a much earlier point than in the development of resilience in the UK. This is particularly telling through the vital role of the State Emergency Services (SES) in disaster response and recovery, despite tensions between expectations and obligations between government and volunteers (Fahey, 2003) the value of these services remains high (McLennan, 2008) and offers lessons to be learned for many other countries in engaging with the community. These tensions are present around the world, and the role of the public is often not one central to the efficient development of structures and policy for emergency management and operational security as a form of resilience (Coaffee, Murakami-Wood & Rogers, 2009). This is a condition where in many cases public participation and especially public education as a part of the emergency management are often weaker elements of the wider set of activities (Paton & Johnston, 2001). There is a tendency in the development of integrated emergency management as a form of embedded resilience to focus first and foremost on critical infrastructural and operation goals, at the expense of wider community resilience, public education and public participation in these practices. Whilst in the throes of wide-spread structural reform and culture change in professional circles, or the required development and implementation of controlled change through policy and embedding the requirements of new standards for best-practice such conditions are to be expected. However as the structures begin to take on more embedded operational efficiency as they are rolled-out then the operational remit of integrated emergency management requires a consolidated effort to engage with, educate and involve the public. Such endeavours as the Australian Safer Communities Awards are a start to proactive engagement but a wider sense of participation as well as a more passive model of public information will enhance the broader impact of resilience engagement in the longer term.

The overview of national resilience is showing great forward movement with regard to Safeguarding Australia, and the national disaster resilience strategy, scheduled for release in December 2010 is expected to offer a strategic umbrella for many of the ongoing work streams in enhancing national security resilience policy and capability in for building better and more integrated emergency management. An over-arching strategy for enhancing the resilient 'ways of doing' in process and

best-practice of actors and agencies also allows the characteristics and traits of resilience organisations to become more embedded in day to day working, but many challenges remain in finding consistent implementation of this emergent knowledge across all levels of operation.

### Strengthening what we have: towards a Risk Register

It is clear that there is an increasing agreement in the field, despite the diversity of definitions, that the best policy metaphor for strategic planning in national security and emergency management is one of resilience. Alongside this there is a much deeper understanding that the PPRR approach has become less useful in the framework of disaster resilience practice than it has been in the past (Gabriel, 2003). Nonetheless it remains the framework with which many are familiar, it remains a central part of the visible policy and it is well established as a standard for a more reactive form of Emergency Management. In reassessing PPRR for alignment with the more disaster resilience-based approach we must be careful not to 'throw the baby out with the bath water' when advocating change. PPRR is overly focussed on reactive considerations, this is now widely accepted. It is also accepted that assessing risk needs to be formally acknowledged as a more significant part of the resilient approach to the disaster cycle. There are a number of areas I would like to bring into this discussion but cannot here for the sake of space and offering a focussed discussion. For example, a deeper examination of how various the existing disaster response strategies in Australia bridge the different levels of community, town, region and state would help to demonstrate how the metaphor of resilience is being practically drawn out in practice.<sup>1</sup> An international focus could also give a different perspective to the Australian context offered here. However the goal of this paper has been to (a) briefly summarise some of the challenges being addressed by the policy metaphor of resilience, (b) highlight that the front end or pre-emergency elements of this process need to be formally acknowledged (c) suggest that a formal register of risks can help in implementing resilience strategy in practice. To this end I advocate proactive inclusion of both the anticipation of hazards and threats alongside comprehensive risk assessments, which can be used to extend the existing strategic framework rather than a wholesale replacement of the PPRR model. Finally a formal typology of risks can be registered and implemented at national, regional and local levels. This not only provides a common frame of reference for all partners but can help to identify threats, capabilities and potential vulnerabilities in the existing system. This is thus an approach that is building proactive anticipation and risk assessment but also strengthening the adaptive capacity that is built into a holistic approach to resilience.

### Conclusion: extending the case for AA-PP-RR

A good way to underline this is thorough comparison with an example of the UK Resilience strategy. This offers a good example of how the pre-emergency part of the process can play a role in strengthening resilience overall. It is substantially present in the six stages of Integrated Emergency Management (IEM):

*'Integrated emergency management (IEM) comprises six related activities: **anticipation, assessment, prevention, preparation, response and recovery**' (UK Resilience, 2010, emphasis added)*

One can certainly argue that where this has been most useful is through the uses of horizon scanning strategy to create a broad typology of potential risks that informed the development of the UK National Risk Register of 2008, reviewed in 2010 (Cabinet Office, 2010), used to focus local expertise, enhance discussion in the local and regional resilience forums and enhance the local risk registers on specific priorities, thus enhancing the implementation of the wider resilience framework across diverse public and private partners. AA-PP-RR widens the resilient and integrated approach to the disaster cycle. Anticipation brings the role of 'horizon scanning' into a central focus as a key part of identifying potential threats and formalising this in a risk register. The creation of a typology of risks at national, regional and local levels improves (a) the identification of vulnerabilities, (b) the targeting of risk assessment resources, (c) enhances the implementation of resilience as more than a metaphor but as a meaningful strategy and a formative framework for best practice.

Once threats on the horizon have been identified and formally registered they can be drawn through the accredited risk assessment procedures and fed further into preparation and prevention through proactive activity along the existing structures of PPRR. What is most promising in many ways is, in the first instance, that the majority of these elements are already in place in the Australian context or are at least implicit in the approaches discussed here, and in the second, the broader strategic level documents that are increasingly steering the direction of development are moving into a more holistic appreciation of the disaster cycle as an integrated system with need of integrated collaborative and adaptive structures at all levels. The problem with the current approach as seen in this review of standing policy is in a lack of clearly articulated pre-emptive and proactive procedure within the long-standing PPRR model. This implies a lack of adaptive capacity in the processes underpinning the Australian strategic framework for mitigating the disaster cycle in a holistic way. If this is the case then resilience remains only a metaphor and doesn't carry the weight of a strategic framework for collaboration and building more resilience capabilities. It should not be taken from this discussion that anticipation and assessment are separate from resilience, as it has been suggested drawing a stark distinction between these does not

<sup>1</sup> This research is currently being conducted at Macquarie university with a focus on New South Wales and the Sydney local emergency districts. Future research collaborations on these themes seek to roll out such research at a state and national level.

further the goal of improving our policy or practice in this area (Hutter, 2010). Anticipation and assessment are a part of the treatment of a disaster cycle as a whole, formal acknowledgement of their importance as a part of the whole can only help to improve the focus of change in this area into the future.

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## (Endnote)

1. This research is currently being conducted at Macquarie university with a focus on New South Wales and the Sydney local emergency districts. Future research collaborations on these themes seek to roll out such research at a state and national level.

# National Awards

## 2010 Australian Safer Community Awards

The Commonwealth Attorney-General, Robert McClelland, congratulates the following national award recipients. To find out more, read the 2010 Australian Safer Communities Awards Booklet located on the Attorney-General's Department website at [www.ag.gov.au](http://www.ag.gov.au)

### State and Territory Government

Department of Families and Communities,  
State Emergency Service, Bureau  
of Meteorology, SA Health

#### SA Extreme Heat Response Plan



#### WINNER

Roger Wilkins AO with Vernon Carr,  
Pauline Cole, John Nairn, Graeme  
Wynwood, Val Smyth, Christine  
Andrews and Tracey Siebert.

NSW Police Force, NSW National  
Parks and Wildlife Service

#### Think Before You Trek Bush Safety campaign



#### HIGHLY COMMENDED

Roger Wilkins AO with Deputy Commander  
Dave Owens APM – NSW Police and  
Glenn Meade – NSW DECC.

### Volunteer

Strathewen Community Renewal  
Association Inc

#### Renewin' Strathewen – A community led recovery after bushfire



#### WINNER

Roger Wilkins AO with Malcolm Hackett,  
Diana Robertson, Steve Pascoe, Mary Avola  
– Strathewen Community Renewal.

Fire and Emergency Services  
Authority of WA

#### State Alert community warning system



#### HIGHLY COMMENDED

Roger Wilkins AO with Mike Klenner, FESA.

Emergency Management  
Queensland and Red Cross

#### Emergency REDiPlan: Household preparedness for people with a disability, their families and carers



#### HIGHLY COMMENDED

Roger Wilkins AO with Carolyn Parsons –  
ARC and Nicola Moore – EMQ.

Australian Red Cross

#### Emergency REDiPlan Community Speakers



#### HIGHLY COMMENDED

Roger Wilkins AO with John Richardson and  
Andrew Coghlan – Australian Red Cross.



# 2010 Australian Safer Community Awards

# Awards

Continued

## Nationally Significant

Office of the Emergency Services Commissioner

**Emergency Alert**



**WINNER**

Roger Wilkins AO with Joe Buffone – Office of the Emergency Services Commissioner.

Australian Red Cross

**After the Emergency Youth Resources**



**HIGHLY COMMENDED**

Roger Wilkins AO with Kate Brady and Loren Hackett – Australian Red Cross.

## Private Sector

ENERGEX

**Real Dangers – ENERGEX summer safety campaign**



**WINNER**

Roger Wilkins AO with Kath Ryan and Nathan Hatch – ENERGEX Ltd.

St John Ambulance Australia

**St John Ambulance Australia First Aid iPhone Apps**



**HIGHLY COMMENDED**

Roger Wilkins AO with Shay McAuley and Peter Le Cornu – St John Ambulance Australia.

NSW Fire Brigades

**Triple Zero Kids' Challenge**



**HIGHLY COMMENDED**

Roger Wilkins AO with Mark Whybro – NSW Fire Brigades, Wayne Debernardi – Emergency Services Telecommunications Authority of Victoria.

SECUREcorp

**360 Degree CCTV patrol vehicles**



**HIGHLY COMMENDED**

Roger Wilkins AO with Craig Harwood and Alan Myall – SECUREcorp.



## Local Government

Yarra Ranges Council

**Emergency management without borders – the development of a regional model for delivery of Emergency Relief Centres**



**WINNER**

Roger Wilkins AO with Alison Cran and Simon O'Callaghan – Shire of Yarra Ranges.

Darwin City Council

**Guardian on duty in Darwin**



**HIGHLY COMMENDED**

Roger Wilkins AO with Lord Mayor Graeme Sawyer.

## Education and Training

Queensland Fire and Rescue Service (QFRS) Rural Operations

**Flexible Learning for Volunteers: taking us into the future**



**WINNER**

Roger Wilkins AO with Helen Keen-Dyer and Steve Rothwell – Queensland Fire and Rescue Service.

Redland City Council

**Senior's Emergency Preparedness Project**



**HIGHLY COMMENDED**

Roger Wilkins AO with Jennifer Schoof and Mayor Melva Hobson – Redland City Council.

Launceston City Council and Launceston Flood Authority

**Flood Education Kit – Tips to protect you, your family, pets and property**



**HIGHLY COMMENDED**

Roger Wilkins AO with Bev Allen and Steve Ratcliffe – Launceston City Council.

Ambulance Victoria

**Rural Sponsored Degree Paramedic (RSDP) program**



**HIGHLY COMMENDED**

Roger Wilkins AO with Tina Ivanov and Robyn Cameron – Ambulance Victoria.

## Malcolm Hackett's acceptance speech on behalf of all of the award recipients

"As a community member caught up in the 2009 Victorian bushfires, I'm grateful to live in a country that has the capacity and the resources to respond to disasters.

That said, and as the Royal Commissioners have pointed out, we've still got a lot to learn about improving both our preparedness and also implementing our emergency plans and I'm sure that these Australian Safer Communities Awards have an important role to play in stimulating that process.

I've watched disasters in other countries, as you have, as they unfold on a television, and we are fortunate in Australia that we can turn to both skilled professionals and committed volunteers in terms of emergency.

In fact, I feel very proud to live in a country where so many volunteers have rallied to support their fellow citizens in the aftermath of the bushfires and on behalf of the award nominees.

I thank the Australian Government, Attorney-General's Department and the State and Territories for conducting these awards.

In closing, I'd like to congratulate all the award nominees and the winners in the categories on their outstanding efforts in making Australian communities safer places.

Thank you."



**Australian Government**  
**Attorney-General's Department**  
**Australian Emergency**  
**Management Institute**

# Australian Emergency Management Institute

A centre of excellence – building resilience through education, collaboration and innovation

- Providing nationally accredited education and training
- Providing professional development
- Undertaking applied research
- Conducting strategic activities
- Promoting community awareness and resilience

## Courses at AEMI: March – June 2011

- Exercise management
- Undertake emergency planning
- Coordinate resources within a multi-agency emergency response
- Facilitate emergency risk management
- Liaise with organisations and Promote the organisation's missions & services
- Business continuity management
- Manage recovery functions and services

## Events at AEMI: March – June 2011

### **Connect!**

Community resilience, emergency management and new media workshop 14-15 April 2011

### **Australasian Libraries in the Emergency Sector conference**

19-21 April 2011

### **Volunteer leadership program**

18-21 March 2011 & 13-16 May 2011

### **Engaged and resilient communities workshop**

17-19 May 2011

Community consultation and public participation in disaster management provide tangible benefits. However, despite recognition of their importance, effective implementation is a challenge for the emergency management sector.

AEMI's Engaged and Resilient Communities: *Workshop on Community Engagement for Emergency Management* will bring the emergency management sector and community engagement experts together to explore the big questions about community engagement; the challenges and the implications for disaster resilience.

The *Engaged and Resilient Communities* workshop will be held at the Australian Emergency Management Institute at Mt Macedon Victoria on 17 – 19 May, 2011.

# Opinion: Preparing worldviews for uncertainty

By Dr Robert Kay, University of Technology Sydney.



## Introduction

The greatest challenge to our resilience is the worldview through which we think about and approach uncertainty. Most people would say they have never had a lesson or course on what their worldview is or what an appropriate worldview should be in relation to uncertainty. Perhaps some tertiary courses on philosophy or the arts are about as close as most of us will get. However this assumption would be wrong. For most of us raised within a Western education system, we have been given twelve to thirteen years of worldview training in the reductionist paradigm – a paradigm, that has brought many advances, but it will be argued is inappropriate for dealing with the uncertainty associated with issues of national security. This paper explores what an alternative system would require.

## What is a worldview?

By worldview I'm referring to the multitude of filters and assumptions that drive our day to day decision-making. It is a function of both our make-up and experience, and it impacts everything we do. In the literature it has variously been described in terms of cognitive styles (Cotgrove, 1982., Miller, 1985), personality types (Myers, 1980), constructs (Kelly, 1955), and paradigms (Kuhn, 1970., Guba, 1990).

At a high level, the underpinning assumption that drives the Western educational model is reductionism. Reductionism presupposes that the best way to solve a problem is by breaking it down into its component pieces and that by then understanding the nature of the parts the problem will be solved. Taken a step

further we draw hypotheses about the behaviour of the parts which are tested, and if the results bear out, the knowledge has been validated and becomes a truth.

Science of course is based upon this assumption and in general humanity has done pretty well out of it – depending upon your particular values about quality of life and the future of the planet. So it is only natural that a systematic model of education should follow this approach. Organised education is only another form of human organisation after all, and in the Western world has largely mirrored the industrial revolution and the Taylorist models that underpinned it when developing its education systems.

Over twelve or so years of schooling, our minds are gently conditioned to think in terms of the parts, to focus on the parts as a natural way of doing things, to structure knowledge into discrete bits that can be transferred. Consistent with this worldview is the development of distinct disciplines to the study of different things—specialisation. This specialisation, particularly within academia has been done so effectively that the notion of multi-disciplinarity has become a discipline in itself! (Brocklesby, 1996).

National security and disaster management has naturally followed this path and the worldview associated with it. On one level this is ok, particularly as it relates to less complex risks/threats, where there is little uncertainty involved, however for larger scale problems a more holistic/systemic approach is required.

## Educating for uncertainty

It is interesting to think about where the word emergency actually comes from. It is drawn from the Latin Emergens (Anon, 2010). This is the same root as for the word 'Emergence'. The study of emergence however comes out of a completely different paradigm—that of systems theory and complexity. The underlying paradigm here is that the whole is greater than the sum of its parts, and that only by looking at the whole can we understand the problem properly. This is interesting in terms of educating for uncertainty.

Firstly, if the study of emergence is more relevant to an understanding of uncertainty and emergencies, then training and development programs for emergency and disaster recovery need to support the development of a systemic not a reductionist worldview.

Secondly, how do you design development programs to facilitate the development of a more systemic worldview, whilst still providing the necessary content? Most people would suggest that they learn the most about their profession either through real world experience or through exercises & scenarios. From a curriculum development point of view they are describing problem-based or experiential learning models—nothing out of the ordinary here. What is often not discussed, however, is the design of educational experiences where the learning outcomes are not limited to procedures, rules and actions associated with the process of response and recovery, but to the actual worldviews of the participants.

William Perry's (1968) study of graduate students remains one of the most significant pieces of research in this space. Perry observed that students move through 3 broad phases involving 9 stages of change to their worldview and learning approach when the learning environment that is provided, challenges their existing assumptions.

In short Perry observed that most students begin with a worldview that is largely black and white, there is a right and wrong way to do things (which varies little from context to context). Furthermore the key source of truth about an issue is the teacher/authority figure. Perry termed this phase dualism.

As the student experiences progressively more unstructured complex problems, where their right or wrong view of the world doesn't work quite so well, they are left searching for direction. They reach out to the teacher (as the key source of authority) for more structure and they begin to lose motivation. This manifests itself in a kind of learned helplessness attitude to their project and continuous recourse back to the teacher for more detail about what they should be doing to solve the problem. Unfortunately, from a learning point of view, many educators respond to this need by providing the desired structure because it actually forms an important part of their own identity as a teacher—they need to teach. What the student needs, however, is facilitation.

Over time, and increasingly complex unstructured experiences, the student reaches a point where it's fairly clear that their current worldview is not up to the job. The world is not the neatly structured environment they thought it was when they started out on their journey. They realise that there are alternative truths to the ones that they hold onto. They realise there are multiple versions of the truth but don't yet know how to select the most appropriate one. Perry terms this second phase 'multiplicity'. The teacher doesn't have all the answers and has been found wanting on multiple occasions.

For the student, this phase is not pleasant and in fact is both demoralising and stressful. Many students suffer from a lack of motivation and begin to drift. Coming to the conclusion your worldview doesn't work is not a happy place to be. Psychologists call this cognitive dissonance. This is a time of great indecision. Do you let go of the worldview that on one level has served

you well, knowing that things will never be the same, or do you stick with what you know, even though deep down you know it won't work for the problem you're dealing with? The ability to facilitate students through their cognitive dissonance is actually critical to the effectiveness of the educational program as it relates to the ability of graduates to manage in uncertain circumstances. This is not something that can be faked through the teaching process, "the student must have the opportunity to experience the epistemological dilemmas that characterise each stage [of Perry's model] as his or her own personal dilemmas." (Salner, 1986. p.231). Unfortunately, to my knowledge, educational programs rarely if ever talk about this dimension of education, let alone have programs in place to help the teaching staff develop their ability to facilitate it.

Significantly, Perry observed that most students leave tertiary education without reaching the third phase of his model, or what he termed a 'contextually relativistic' view. From a contextually relativistic position students no longer consider all views as equal and base their decisions on evidence rather than the 'gut feel' of the multiplistic position (Culver & Hackos, 1982).

## Conclusion

The significance of Perry's observations in terms of educating for uncertainty are profound. Firstly, they suggest a significant movement towards experiential education models as a way of providing students with the necessary complexity of experience through which to challenge their incumbent worldview. Secondly, they highlight the challenges for teaching staff, in terms of a new set of skills in which they are typically not trained.

Lastly, they raise concerns about the recruitment of key roles in national security and disaster management. Not all people make the shift towards a more systemic view, and as such will continue to operate with inappropriate paradigm.

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**Australian Government**  
**Attorney-General's Department**  
**Australian Emergency Management Institute**

## 2011 Emergency Management Volunteers Summit 30-31 MAY 2011

### RYDGES LAKESIDE HOTEL, CANBERRA

The Attorney-General's Department, with the support of the Australian Taxation Office and in partnership with the Australian Emergency Management Volunteer Forum, is holding the third Emergency Management Volunteers Summit on 30-31 May 2011.

Up to 450 emergency management volunteers from across Australia will attend the Summit, which will be held at the Rydges Lakeside Hotel in Canberra, and will coincide with the United Nations *International Year of the Volunteer Plus 10*.

The Summit will:

- showcase and discuss best practice in the national emergency management volunteer sector
- demonstrate Australian government and non-government support for the emergency management volunteer sector
- discuss/update key issues affecting the Australian emergency management volunteer sector, and
- update on the progress of the National Volunteer Action Plan for the Attraction, Support and Retention of emergency management volunteers.

A copy of the program with information on how to nominate to attend the Summit will become available January 2011 at [www.ema.gov.au/volunteers](http://www.ema.gov.au/volunteers).



# Opinion: The future – beyond our control

By John S. Bircham, Bircham-Global Limited, New Zealand.



An Ernst & Young sponsored 2008 survey<sup>1</sup> of the world's largest banks identified, what is self-evident truth to all SMEs and sole traders, that *Liquidity is King*. But it was the other lessons learned that interest me, amongst them being the need to:

- Institutionalise a risk culture;
- Stay attuned to what is going on in the industry;
- Not forget the capability and importance of people;
- Prepare for the unexpected.

The Ernst & Young report notes that an overwhelming majority (90%) of respondents cited an *over-reliance on short-term funding*, that growth was “king” and that liquidity was just not factored into the equation. Nearly three quarters (73%) of them considered it essential to *institutionalise a risk culture... that goes beyond a narrow compliance focus*. And over half (60%) of the respondents expressed the view that their organisation had been *lulled into complacency by the benign market environment and the flow of new product offerings*. A view expressed by a significant number (40%) of respondents was their *underestimation of the importance of the human factor in managing risk*, that human judgment, insight and experience should be more highly valued and utilized. And finally, 35% expressed the view that the banking industry as a whole had *adopted a reactive, compliance-driven approach, rather than a forward-looking stance to risk management*.

Equally applicable to business, non-profit and government organisations, these lessons bear repeating. Indeed, they should echo in our ears because I suspect that many organisations have found themselves belatedly learning the same lessons!

## Uncertainty

Of particular interest to me was the failure of the banking industry across the board to prudently factor uncertainty into business strategy, management process and decision-making. Donald Rumsfeld<sup>2</sup> in his infamous response to a question at a Nato press conference inadvertently (or so it seemed at the time) classified uncertainty very simply into: *Known Knowns*, *Known Unknowns* and *Unknown Unknowns*.

As Rumsfeld correctly observed, we discover *Unknown Unknowns* (cf. the banks lesson learned – prepare for the unexpected) as they are discovered or they reveal themselves.

The prevailing ethos of business and government is understandably to attempt to control *Known Knowns* and *Known Unknowns*; and, that compliance is evidence of control – *that all is well*. Indeed, if you dare to challenge this assumption, that compliance is evidence of control, you face being ostracised – sent to Coventry. To again quote Donald Rumsfeld:

*Simply because you do not have evidence that something exists, does not mean that you have evidence that it doesn't exist.*

But as the largest, seemingly untouchable and impregnable organisations (including governments) continue to falter, management's and indeed society's reliance upon control through compliance needs to be questioned – revisited.

## Compliance and control

Compliance-based control frameworks are based upon policy and procedure, and the assumption, maybe

<sup>1</sup> Navigating the crisis. A survey of the world's largest banks. Ernst & Young December 2008. Source: [http://www2.eycom.ch/publications/items/200812\\_navigating\\_the\\_crisis/200812\\_ey\\_navigating\\_the\\_crisis.pdf](http://www2.eycom.ch/publications/items/200812_navigating_the_crisis/200812_ey_navigating_the_crisis.pdf) Source: [http://www2.eycom.ch/publications/items/200812\\_navigating\\_the\\_crisis/200812\\_ey\\_navigating\\_the\\_crisis.pdf](http://www2.eycom.ch/publications/items/200812_navigating_the_crisis/200812_ey_navigating_the_crisis.pdf).

<sup>2</sup> Donald Rumsfeld (United States Secretary of Defence) Nato Press Conference, June 6, 2002. Source: <http://www.nato.int/docu/speech/2002/s020606g.htm>

even presumption, that the recipient of compliance information (...? Yes/No) is capable of accurately interpreting this information – that they have a full understanding of the environment and the circumstance of the respondent. Let's attempt to put the above into context.

*Suppose, for example that an employee's bonus is tied to performance, which is not uncommon. Further suppose, that in response to market pressure, management is demanding greater productivity i.e. increased output with fewer resources and in shorter timeframes – sound familiar. And to complete our picture, the employee's pragmatic reality that the only way that management's expectations can be met is by short cutting procedure – by not doing something that should be done – is expected to be done, that perhaps regulation demands be done.*

Failure to meet performance KPIs (key performance indicators) will in all likelihood prejudice the bonuses of both management and employees. So long as nothing untoward happens and expectations continue to be met, both management and employee have a vested interest in maintaining the status quo because bonuses are dependent upon it. Employees tell management what they want to hear and management doesn't inquire because they don't want to know. The illusion is complete and the attribution made, that all is well because the controls are working as evidenced by compliance assessments.

Our belief in compliance and control goes beyond today's activities to the achievement of future objectives based upon what we have done in the past – a fallacy which has historically left armies decimated and nations all but bankrupt. *Unknown Unknowns* cannot and are not included in the compliance managed control frameworks that society relies upon, yet they are real and exist in the uncertainty of our futures.

## There is a choice

Organisations have the choice, *to know or not to know* what is going on internal to and external to their environments. Internally, to engage with their people, to value their insight and judgment or to ignore them and prefer instead to use policy and procedure based upon the past encapsulated in compliance managed control frameworks or computer software. Neither such frameworks nor computer software are of themselves capable of articulating a potential future, of formulating a strategy that embraces such a future. Yet until the *financial crunch*, that has been and unfortunately continues to be, the belief of many.

We can continue to take on the chin, so to speak, the consequences – the logical out-workings of compliance and control as circumstances unfold before us in a seemingly random manner or we can choose to seek out uncertainty, to attempt to shine light on what may or may not be and in doing so increase not only our awareness, but also our preparedness. The question then is:

*Can we encapsulate this awareness in a compliance managed control framework?*

The short answer is *no* – we can't.

Awareness is often tacit in nature, remaining uncoded until an event or circumstance facilitates its recognition and then possibly, its codification. The banking industry has apparently recognized the importance of the *people factor* (the repository of the tacit); something they had ignored for too long to their own detriment and to that of society as a whole. But I remain skeptical, as rarely does *espoused theory* match the *theory-in-use*.

Banks, indeed our own organisations will not survive if we fail to up our game and acknowledge the uncertainty, in which both risk and opportunity can be found. To survive, we need to embrace uncertainty – not be fearful of it because in uncertainty is the opportunity, the very essence of our future.

## Black swans – the Unknown Unknowns

In his book entitled *The Black Swan*<sup>3</sup>, the author Nassim Nicholas Taleb tells the story of how before the discovery of Australia, people in the Old World were convinced that all swans were white, an unassailable belief as it then seemed, confirmed without exception by empirical evidence. Yet, as those of us living in Australasia know, *black swans* do exist – in abundance. The people of the Old World had no reason to even consider the possibility that black swans could exist, just as before the advent of the *financial crunch* people (with short memories) had little cause to question the ethos of compliance managed control frameworks.

But now there is a reason. We can choose a mindset limited by the past or learn a new one – one that is unlimited, that does not seek to control the future but rather embraces its implicit uncertainty, unafraid and trusting in the human capability to change and adapt in truly novel and emergent ways.

*How can we know the future, given knowledge of the past; or, more generally, how can we figure out the properties of the (infinite) unknown based on the (finite) known? (Nassim Nicholas Taleb)*

## About the author

For the last 25 years **John Bircham** has run his own management systems development, risk management, learning & development and organisational governance consultancy practice. He consults to a wide range of organisations and regularly conducts advanced master-class workshops on a range of topics that reflect his eclectic background and experience: all aspects of organisational risk and resilience, leading and effecting organisational change – political savvy, creating and sustaining self-organising organisational culture, facilitating emergent capability and strategic leadership.

3 Nassim Nicholas Taleb (2007). *The Black Swan. The Impact of the Highly Improbable*. Allen Lane



# INTERESTING WEBSITES:

## AFAC's Li'l Safety Club

<http://www.lilclub.com/lilsafetyclub/home.html>

The Li'l Safety Club website provides an avenue to directly engage kids with the underlying safety messages, in a fun and identifiable way.

The site features educational, interactive games and activities, the Li'l Safety Club stories, a safety quiz, merchandise, safety tips and information.

The Li'l Safety Club aims to open discussion between parents and children about important subjects such as being prepared for emergencies.





**Australian Government**

**Attorney-General's Department**

**Australian Emergency  
Management Institute**

# Connect!

Workshop on community resilience,  
emergency management and new media

**14 – 15 APRIL 2011**

**AUSTRALIAN EMERGENCY MANAGEMENT INSTITUTE**

How do people learn to prepare for disaster and protect themselves, their families and their communities? Once they might have relied on the local emergency services or the mainstream media, but increasingly, they are likely to turn to social media sites such as Facebook or Twitter for information, getting their views from blogs or their favourite online communities.

The face of communication in Australia is changing. Communities not only want to hear from those charged with their safety, they want to talk back and be listened to. In recognition of this shift, all around Australia emergency management organisations; government and non-government, public and private are developing projects, publishing protocols and working with a whole web-full of new media tools to engage, inform and support Australia's communities to become more resilient to disaster.

For the emergency management sector new media offers the opportunity to build better connections, develop trusted relationships; share information and ideas and draw on the knowledge, experience and understanding of communities to assist us all to create a more engaged, better informed, better prepared and more resilient Australia.

*Connect!* will enable the emergency management sector to explore the way new media impacts how they work, communicate, engage and inform.

This workshop will bring people together to showcase projects; brainstorm the opportunities and challenges and develop shared values in using new media for building disaster resilience.

**The *Connect!* workshop will be held at the Australian Emergency Management Institute at Mt Macedon Victoria on 14 – 15 April, 2011.**

For further information on the workshop visit [www.ema.gov.au/aemi](http://www.ema.gov.au/aemi)  
email [aemi@ag.gov.au](mailto:aemi@ag.gov.au) or phone 03 5421 5100