Measuring community awareness and preparedness for emergencies

by Jessica Enders,
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Introduction

A key corporate objective of the Victorian Government is that 'Victorian communities are safe and people feel justifiably confident about their safety'. This is an objective shared by the various public and private agencies which, whether within or outside the Justice Portfolio, are part of Victoria's emergency management arrangements.

Within the context of emergencies, the safety of the community is somewhat determined by the effectiveness of emergency management and services, which are primarily supplied or controlled by the public sector. However, another important component of safety is that individuals, organisations, industries etc. are aware of the risks they are exposed to and have taken actions to mitigate and/or prepare for such emergencies.

Historically, communities were seen as passive entities whose involvement in emergency management was only as receivers of assistance when emergencies occurred. Government and its agencies were seen as the sole entity responsible for managing such emergencies. It has been increasingly recognised that this historical model of Government emergency management is no longer appropriate (Neilsen & Lidstone 1998; Hodges 1999; Reinholtd 1999; Rhodes & Reinholtd 1999). Emergency management agencies do not have the resources to comprehensively deal with all emergencies protecting every home and every life. Moreover, the impact of emergencies can be significantly reduced with the involvement of the community in planning, mitigation and preparation. Emergency management agencies can develop, in consultation with the community, the most appropriate and effective ways to manage emergency risks.

The second part of the Victorian Justice Portfolio objective refers to feelings of confidence in the community about its safety. In an emergency management context, this translates into community members feeling that they have (or have access to) the information, resources and support that they desire and/or need to ensure their safety, despite the risks with which they live.

Currently some information is available on the effectiveness of services provided by the emergency management sector, such as incident and response time data. There is comparatively little information on awareness and preparedness of the community for emergencies[1] and it is recognised that such data is needed. Research questions include:

- how aware is the community of emergency risks?
- what steps have members of the community taken to maximise their safety?
- and how confident do they feel about emergency issues?

Collecting data to answer such research questions will lead to a greater understanding of the context within which emergency management occurs. In the long term, there is also the possibility that measurement will lead to the ability to ***predict*** how people will respond to emergencies.

Focus on outcomes

There is no denying that the process of measuring emergency awareness and preparedness of the community will be complex. It may be clear that some sort of survey is needed, but what should go in such a survey and to whom should it be administered? To answer these questions the model shown in ***Figure 1*** is useful. This model, utilised by the Australian Bureau of Statistics for their surveys, outlines the steps to be taken when a research issue is identified and a process for addressing that issue is required. Following the model from right to left describes the process of going from a desire to obtain information about an topic, to determining what sort of processes are needed to produce that information. Working through the model from left to right describes the process of data collection and utilisation of the resulting data.

Therefore, the key steps in developing a data collection process are to:

1. Define both the broad and detailed outcomes that are desired;
2. Determine what outputs (ie data) would describe the extent to which outcomes are being met; and
3. Construct processes to collect the data defined in Step 2.

For this topic, defining desired outcomes as per Step 1 will include determining:

- what is meant by 'community' eg individuals versus organisations
- what is included in the definition of an 'emergency'
- what type of emergencies over what geographic area are in-scope
- what is it that emergency managers want the community to be 'aware' of, and how 'prepared' does the community need to be.

Behaviour change

Essentially, the task of increasing community preparedness for emergencies is one of effecting behaviour change. Hence there is a need to consider frameworks for how individuals move through the behaviour change process. That is, how do people:

- receive information about emergency risks
- perceive those risks
- behave in relation to the risks.

Previously it was believed that once an individual had the information they needed, they would act appropriately. It is now recognised that there are several steps between an individual receiving information and them changing their behaviour (Boura 1998; Nielsen & Lidstone 1998; Johnston et al 1999; Rhodes & Reinholtd 1999). Moreover, different individuals will have different levels of resistance to change, regardless of the change mechanisms applied (Hill et al 1996).

Assuming an individual has been exposed to some sort of emergency related information, they can then be viewed as a 'consumer' of that information, 'exercising a right to choose' to use it or

Notes

1. Some excellent work has been done by the Victorian Country Fire Authority
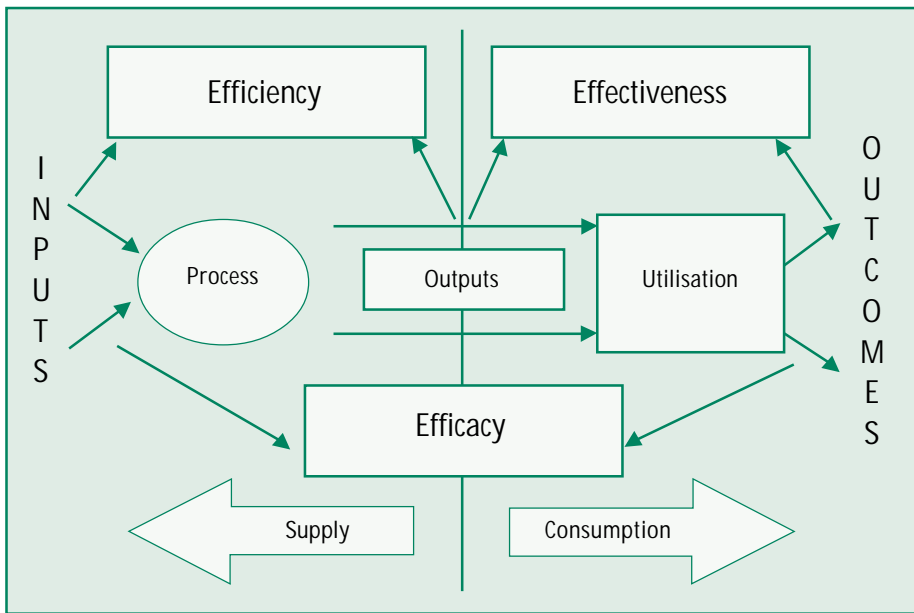
Figure 1: steps to be taken when a research issue is identified and a process for addressing that issue is required.

not (Twigg 1998). Factors that may influence the decision are given by Mulilis (1998):

- 'source of the communication—credibility, trustworthiness, attractiveness, liking, similarity, power
- message characteristics—style, clarity, forcefulness, speed, ordering, amount of material, repetition, number of arguments, extremity of position
- channel variables—media type (such as television, radio, newspapers, face-to-face communication), verbal versus non-verbal communication, context of the channel
- receiver variables—age, intelligence, gender, self-esteem, level of active participation, incentives for participation
- target or destination variables—attitudes versus behaviour, decay of induced change, delayed-action effects, resistance to persuasion'.

Eiser et al (1994) also note that attitudes are self-sustaining in that not only do they 'adapt themselves to new information, but influence the kind of information that is sought and remembered, and the manner in which it is understood'. This makes understanding how individuals 'become' aware even more complex.

Rohrmann (1998) proposes the model shown in ***Figure 2*** that indicates a number of forces working on the individual in the risk communication process. The model acknowledges that 'risk-reducing behaviour regarding a hazard is determined not just by the communicated messages of the information/education program but the result of a complex [personal] evaluation process including

prior attitudes, and influenced by personal characteristics and manifold context factors' (Rohrmann 1998). This reinforces a very important point: the actual communication of scientifically quantified risk is only one aspect of the awareness and behaviour change process. Economic and societal factors, as well as personal experiences, can also significantly impact on individual attitudes and whether 'ideal' behaviours are adopted.

An alternative adopted by some researchers is to focus on examining the ***factors*** associated with preparedness. For example, Johnston et al (1999) discuss previous literature which relates preparedness to factors such as:

- perceived risk
- amount of relevant information

Figure 2: Rohrmann's Risk Communication Framework

- level of past damage from a similar emergency
- salience of hazard
- level of knowledge about the threat.

Factors found by Russell et al (1995) include:

- socio-economic and demographic variables (such as income, presence of school-aged children in the household, home ownership)
- personality traits (such as anxiety)
- hazard related variables (such as previous experience with the hazard, perceptions about personal vulnerability).

Russell et al (1995) also discuss how some of these variables can be interpreted as measures of 'community involvement' or alternatively of 'willingness to accept responsibility'.

Given all these factors, what can we deduce about a model for behaviour change? Rhodes and Reinholtd (1999) propose the framework in ***Figure 3***.

In this model, the way people choose to respond to an identified hazard is 'dependent upon their knowledge, expectations, perceptions [of the hazard]… along with a range of other influences' (Rhodes & Reinholtd 1999). The authors also note that 'importantly, each stage [of the model] does not represent a level of preparedness in itself. Rather, the level of preparedness is reflected by the position people occupy within each of the stages at any one point in time' (Rhodes & Reinholtd 1999).

Rohrmann (1996) also discusses a related model for persuasion and attitude change which has been 'identified by social psychologists such as Eagly & Chaiken (1993) and McGuire (1985)'.
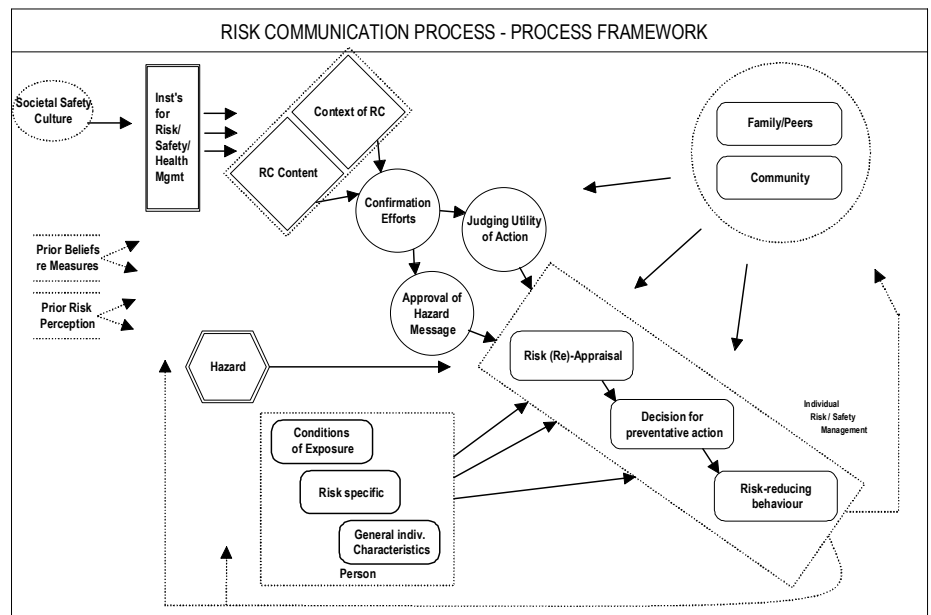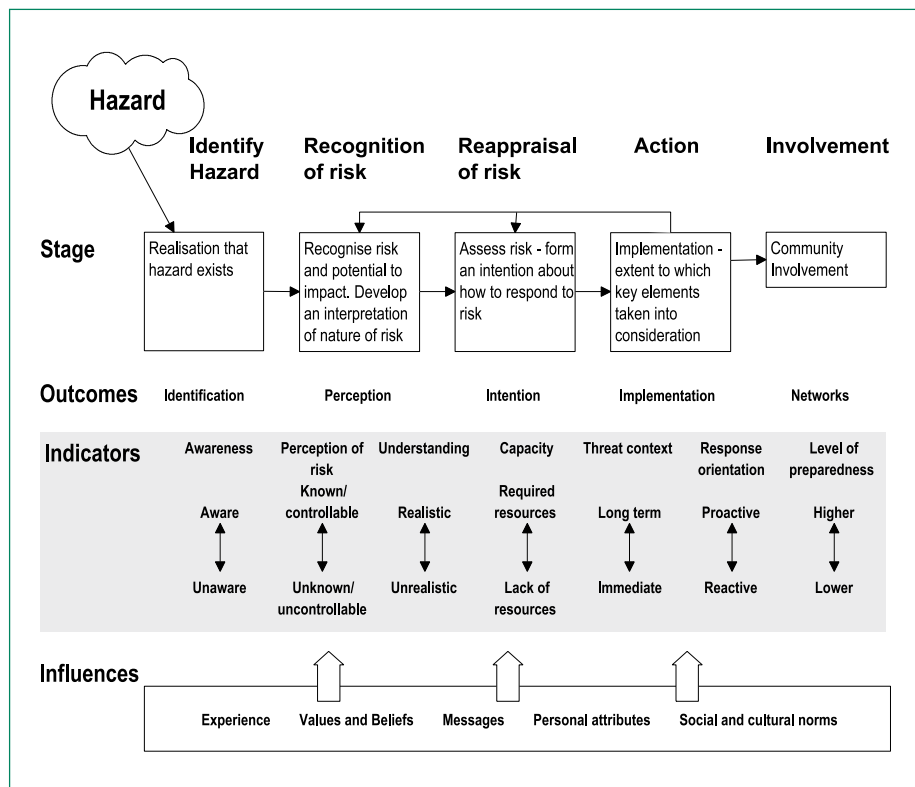
Figure 3: Preparedness model from Rhodes & Reinholtd

This model stipulates:

- ***attention*** (having exposure to information), ***precedes***
- ***comprehension*** (understanding the meaning of the information), ***which precedes***
- ***interpretation*** (relating the information to one's own context), ***which precedes***
- ***confirmation*** (reconsidering the relevance of the information to one's own situation), ***which precedes***
- ***acceptance*** (deciding that the information does apply), ***which precedes***
- ***retention*** (becoming part of one's own thoughts and belief system), ***which finally precedes***
- ***behaviour change***.

These models illustrate that awareness and preparedness are only part of a continuum from information attainment to behaviour change. It can be tempting to only measure those parts of the process that are of interest, or are easily accessible. However, there is a danger associated with only measuring part of a process, as recognised by Waldersee (1999), who notes a tendency for things to 'become measures because they are available, not because they are key indicators'. Waldersee (1999) also observes that some measurement can be more dangerous than no measurement, because it can give a distorted view of the situation. This in turn can lead to misallocation of resources. Hence, agencies should strive to

measure ***all*** the variables involved in the behaviour change process, and avoid ignoring potential factors because they are difficult to measure.

The models also demonstrate that an individual's accumulation of knowledge about an emergency risk and actioning of appropriate behaviours is a complex process that is influenced by factors beyond education about emergencies. Johnston et al (1999) note that the 'assumption that threat and risk perceptions can be measured in absolute terms and in isolation from other societal pressures' limits our conclusions. This suggests that measures of awareness and preparedness examined over time should not be used as the sole proxy for measuring success or failure of public education campaigns.
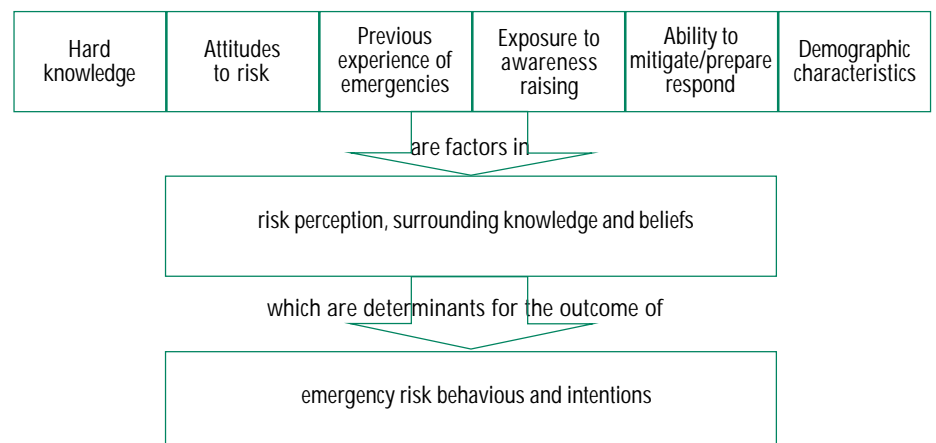
A holistic framework for looking at awareness and preparedness of individuals

Figure 4 (below) gives a proposed framework for looking at awareness and preparedness of individuals. This framework is consistent with the models for behaviour change discussed above. The aim of the framework is to clarify the range of factors that need to be considered in order to appropriately conceptualise the issues relating to awareness and preparedness. Specific ***relationships*** between variables or factors in this model are not proscribed.

This framework can be directly used to design the data collection process. The intention of the framework is to contain the complete set of factors that may influence the outcome of interest, which is an individual's emergency risk behaviour and intentions. The factors are the individual's:

- hazard knowledge
- attitudes to risk
- previous experience of emergencies
- exposure to awareness raising
- ability to mitigate/prepare/respond
- demographic characteristics.

The aim is for ***all*** factors that may have an impact on outcomes to be measured. This will enable analysis to go beyond correlating exposure to public education campaigns with behaviours (real and intended) to correlating ***all*** change items with behaviours. This is a more holistic (and therefore appropriate) analysis of the emergency awareness and preparedness issue.

Factors

The factors in this framework will be briefly discussed.

'Hazard knowledge' refers to awareness, effectively in terms of a sliding scale ranging from not being cognisant that a hazard exists to fully 'understanding' the

Figure 4: A framework for investigating emergency awareness and preparedness

hazard. Note that the framework allows for the possibility of a two-way relationship between 'hazard knowledge' and 'attitudes to risk', namely that hazard knowledge can affect attitudes to risk, and risk attitudes can impact on the level of hazard knowledge.

'Attitudes to risk' incorporates individual risk perceptions, awareness of the scientific assessment of risk and perceptions of that scientific assessment.

'Previous experience of emergencies' covers a range of concepts such as the impact on the individual from the experience of an emergency and how removed the individual was from the emergency itself. This latter factor is included because it has been recognised that it is not easy to define 'experience' of an emergency and the links between the emergency and the individual do not even have to be strictly direct. For example, Bennett (1999) discusses a case in Port Talbot, UK, where community groups became concerned about emergency risks in their local chemical plant only after a similar plant elsewhere in the British Isles experienced an emergency.

The concept of 'exposure to awareness raising' encapsulates factors involved in whether the individual personally, or someone they know, has been exposed to awareness raising efforts about emergencies. This concept looks at issues such as whether the individual has attended a public education program, whether the program was relevant and timely, whether the individual has obtained information from other sources, etc. The purpose of including this factor is to provide an overview of an individual's experience with awareness raising.

'Ability to mitigate/prepare/respond' covers perceived as well as actual ability to behave appropriately in a given emergency risk situation. This concept includes factors such as access to resources, feelings of responsibility and vulnerability and connectedness with the community. That is, it is recognised that social support is an important factor in an individual's ability to behave appropriately (Hill et al 1996).

Finally 'demographic characteristics' includes socio-economic and other descriptive factors about the individual and their situation. These are factors such as age, sex, location, employment status and mobility.

Outcomes

The outcome being influenced by the above factors is 'emergency risk behaviour and intentions'. This outcome

incorporates concepts such as actual mitigatory/preparatory steps taken by the individual, reasons for taking such steps, whether the individual feels they have prepared enough and what an individual would do in a range of emergency situations.

It should be noted that the individual's perceived preparedness is included, as it can be different from preparedness from an 'expert' point of view. This is evidenced by Russell et al's 1995 study. This study is a case for measuring **both** concepts, as perceived preparedness is likely to be a factor in why people do or do not adopt certain behaviours.

Statistical issues

Research questions for a data collection
The framework above can be directly translated into a set of research questions that can in turn be transformed into a data collection tool. **Table 1** (overleaf) gives a set of possible data items for such a tool given this framework and assuming a target population of individuals in households. The list is generic in the sense that it doesn't refer to particular types of emergencies. Moreover, the items are not presented in any particular order.

Type of data collection
There are two main approaches to data collection: quantitative and qualitative. Quantitative data is numerical or categorical, whereas qualitative data is less measurable and tells us more about **what** we are measuring than just how much it occurs.

Quantitative approaches allow data users to make inferences about the frequency of certain events or items in the wider population. In the context of awareness and preparedness, for example, it is important to know how many people are adopting different attitudes or behaviours. The shortcoming of quantitative data is that it provides limited information on **why** people feel or behave the way they do, or the particular **circumstances** influencing people. This is where qualitative data can be useful: it can provide an expansion — or caveats — to quantitative results. As Rohrmann (1998) notes, 'quantitative and qualitative approaches provide different kinds of evidence, and thus are complementary'.

The typical way to gather quantitative data is via surveys. Qualitative data can be collected through mechanisms such as focus groups and in-depth interviews with individuals. The advantages and disadvantages of each of these data collection methodologies are the advantages and

disadvantages of quantitative and qualitative data themselves. For example, surveys — whether sample surveys or censuses — allow inferences to be made for the whole population, provided they are conducted properly. Focus groups, on the other hand, do not, as they are not standardised assessments of a random population selected with a certain, measurable probability. However, surveys can be resource intensive to conduct, whereas focus groups are can be less resource intensive.

Comparability and benchmarking
If the data collected is going to form a baseline indicator to be tracked over time, then the data collection methodology needs to be relatively comparable from one period to the next. Amongst other things, this often means keeping survey questions the same. Alternatively, the collection may comprise a set of core fixed questions complemented by modules of questions that may differ over time. If such an approach is adopted, there is a need to test any questionnaires each time for context effects. Context effects refer to the phenomena where responses to questions are affected by the responses to previous questions.

Awareness and preparedness levels as measured in a survey cannot be analysed in isolation. For them to have any meaning (particularly as they will probably be presented in some sort of numerical fashion), it is crucial that they are benchmarked against 'minimum' or 'ideal' levels of awareness and preparedness. Benchmarking against scientifically predicted risk might also be informative.

Benchmarks would ideally be identified by emergency management agencies **before** embarking on the collection of data. This is about relating statistics to the objectives of the measurement process and emergency management in general. Note that data about current levels of awareness and preparedness (ie a baseline indicator) could be used in the process of developing benchmarks for future awareness and preparedness levels.

Questionnaire design
For any survey careful consideration needs to be given to the design of the questionnaire used. This is particularly the case for the topic of emergency awareness and preparedness.

One questionnaire design issue that may be a particular factor in the success or otherwise of the data collection process is terminology. The terminology used can significantly influence the type and quality of response obtained. In this

Factor	Data items
Hazard knowledge	• knowledge of the pre-emptive conditions necessary for a given emergency to occur • knowledge of the early warning signs of a given emergency • knowledge of the behaviour of a given emergency • knowledge of personal activities that can increase likelihood of a given emergency occurring • knowledge of the appropriate steps for responding to a given emergency (need to be careful with how this interacts with measuring behaviours and intentions) • whether personally involved in emergency management in the field of the hazard of interest • whether personally involved in emergency management in another field to the hazard of interest • whether a family member involved in emergency management in the field of the hazard of interest • whether a family member involved in emergency management in another field to the hazard of interest
Attitudes to risk	• perceived likelihood of emergency occurring in a given time frame • perceived likelihood of emergency of interest compared with other risks • perceived consequences to personal health of emergency occurring • perceived consequences to personal resources of emergency occurring • perceived consequences to family of emergency occurring • perceived consequences to community of emergency occurring • perceived consequences to economy of emergency occurring • perceived consequences of emergency of interest compared with other risks • perceived time frame of next emergency of a given magnitude occurring • awareness of the statistical assessment of risk for a given hazard (is also 'exposure to awareness raising') • belief in statistical assessment of risk • whether consider assessors of statistical risk knowledgable • whether consider assessors of statistical risk trustworthy
Previous experience of emergencies	• type of last emergency experience • timing of last emergency experience • degree of personal (ie to that individual) physical impact • degree of personal (ie to that individual) psychological impact • degree of personal (ie to that individual) resource impact • whether impacted on someone they knew • whether impacted on known persons geographically close • whether impacted on unknown persons geographically close • whether impacted on unknown persons geographically distant but in a similar situation • actions taken during last emergency experience (may include: did they request assistance from an emergency response service) • perceived degree of involvement of emergency services in last emergency experience • experience of a warning which was not followed by predicted emergency • total number of emergency experiences
Exposure to awareness raising	• length of time living in the area in absolute terms (eg period in months) • length of time living in the area in relation to last disaster (there/not there) • whether previous place of residence was prone to the emergency risk of interest • time frame since personally attending an education program on emergency risk of interest (eg never, a long time ago or recently) • time frame since personally attending an education program on other emergency risks (eg never, a long time ago or recently) • time frame since a family member attended an education program on emergency risk of interest (eg never, long time ago or recently) and whether the family member was a child or adult • time frame since a family member attended an education program on other emergency risks (eg never, long time ago or recently) and whether the family member was a child or adult • whether any of these programs motivated them to intend to undertake an actual behaviour • whether any of these programs motivated them to actually undertake a behaviour • whether have sought out any information on emergency risks within a given time period • whether can recall recently hearing/seeing a message about emergency risk of interest • source of message about emergency risk of interest • content of message about emergency risk of interest • whether this information motivated them to intend to actually undertake a behaviour • whether this information motivated them to undertake an actual behaviour
Ability to mitigate/ prepare/ respond	• access to financial resources • access to information and organisations who can help (knowledge of appropriate organisation and how to find out contact details) • access to family and friends (eg nearby, easy to get in touch with) • feelings of personal responsibility for preparing for an emergency • feelings of personal responsibility for preventing emergencies • feelings of control over things that happen to them • feelings of self reliance • feelings of vulnerability • connectedness to community
Demographic characteristics	• age • sex • family type, including marital status • education • employment status and occupation • geographic location (must be measured in a way that can be translated into location in relation to mapped risk) • dwelling type • language background, eg Non-English Speaking Background or not • tenure type (also 'ability to mitigate/prepare/respond') • income (also 'ability to mitigate/prepare/respond') • mobility (also 'ability to mitigate/prepare/respond')

Table 1a: Factors in risk perception, surrounding knowledge and beliefs. Possible data item list.

Table 1b: Emergency risk behaviour and intentions (outcome). Possible data item list.

instance, it is worth noting:
- the words used to define a concept do not necessarily have to be the ones used in the data collection process; for example, one could use 'actions to reduce the impact of a disaster' instead of 'mitigation'
- one does not necessarily have to avoid replacing jargon or technical terms with longer descriptive-type references — questionnaire research has shown that the time spent thinking about and answering a question is correlated with question length and that 'longer questions typically provide more cues to stimulate the memory search and more time for the respondent to search their memories.' (Bradburn and Sudman 1991)
- generic terms should be replaced with specifics where possible; for example, rather than talking about 'emergencies' or 'disasters', the data collection process could refer to fires, floods and storms, or whatever particular emergencies are considered in-scope
- one should not assume terms that are familiar to the researcher are understood by the wider public, as one's own understanding is coloured by personal experience, hence testing of the questionnaire will be invaluable.

Another particularly relevant issue for measuring awareness and preparedness is the problems that can occur with self-reports and self-assessments. One technique that has been used in the past to measure awareness and preparedness in this context is asking the respondent to identify whether they have the information they need or have taken the appropriate steps, ie a self report or assessment. An example of such a question is: *'are you aware of the recommended*

procedure in case of a fire?' or *'would you say that you have enough information in order to prepare for a storm, or do you need more?'*

There are four main problems with using this approach to collecting data on *actual* preparedness:
- people often don't know what they don't know; for example, respondents frequently have difficulty saying why they haven't installed a smoke alarm
- there may be a bias involved in such questions, in that respondents may not feel comfortable indicating that they don't know something or haven't taken an action when it is perhaps clear that they should have
- this is an easy question for respondents to answer without really thinking about their response, as usually only a yes/no response is required, and, most importantly
- in such a question respondents will rate themselves in terms of internal criteria rather than the criteria that the researcher has defined; that is, the respondent assesses their knowledge or behaviour against their own beliefs of what it should be, which can be very different from what emergency management agencies believe it should be.

If *actual* preparedness and awareness is to be measured, an alternative to self-assessments is to ask respondents to report their understanding of a situation or the steps they have actually taken. This can then be matched to a set of 'ideal' knowledge and/or actions, to determine whether the respondent's situation is acceptable or not.

Interpreting results
Once data has been collected on awareness and preparedness for emergencies,

it will need to be carefully interpreted. Some points of note:
- intended behaviours in the case of an emergency may not be what individuals actually do in such circumstances (Rohrmann 1998)
- aggregation may hide or distort underlying differences or changes in data items
- estimates from sample surveys need to be examined in light of associated sample errors
- sample data should be weighted so that it is representative of the target population
- hidden variables may impact on the data items being measured.

Where to from here for emergency management agencies
Collection of data on emergency awareness and preparedness is not a replacement for current operations in this field of the emergency management agencies, but supplementary to them. It is hoped that this article, and the associated report on which it is based, provide a starting point for emergency managers. Probably the biggest single concern for measuring awareness and preparedness will be obtaining a balance between statistical depth and rigour, and the constraints imposed by limited resources and a large conceptual framework for which information is required. A compromise may be sought where the agencies attempt to ascertain *some* information with a study that meets minimum statistical requirements. What compromises are appropriate will be highly dependent on the final research questions and their relative priorities for emergency managers.

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Jessica is looking forward to continuing to work on information and statistical issues, such as behavioural change, for the emergency management sector.

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