



Sculpting fog: attempting to define “acceptable risk” in emergency services

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There is currently no consensus as to how “acceptable risk” should be defined in emergency service response. Attempts to address this have relied upon the assumption that a probabilistic model of risk can be calculated and that acceptable levels of risk can be determined. Examples of this process can be seen in a number of emergency services, e.g. dynamic risk assessment utilised by a number of fire services.

We argue that it is an inherently flawed enterprise to try to define and calculate “acceptable risk” in emergency response. Due to the dynamic nature of emergency response few rules are likely to be applicable to all situations when defining risk. We report results of a number of research projects, which show that judgements of risk vary enormously depending upon individual characteristics, making consensus unlikely. This variability between individuals will only be compounded once the task of judging acceptable risk involves multi-agency response (as would be required in the event of terrorism). With competing objectives and priorities of different agencies there is potential for competition rather than consensus. Any attempt to define “acceptable risk” within emergency services must acknowledge the contribution of both individual and organisational values in determining what an acceptable risk is.

Introduction

The notion of “acceptable risk” is grappled with across many industries;

however the dynamic nature of the emergency response environment makes the definition of “acceptable risk” problematic. Understanding what risk is and the implications of competing multi-agency priorities are of fundamental importance for emergency service organisations (ESOs) in order to increase safety performance. Whilst attempting to answer the question “what is acceptable risk?” provides challenges akin to attempting to sculpt fog, it is the authors’ intent to provide a guide to the complexities of the topic in the environment of multi-agency emergency response.

There is currently no consensus among emergency services as to what constitutes an “acceptable risk” in dealing with emergency situations and in most emergency service texts it is difficult to find even any discussion on the topic. Past focus has been on issues such as high risk tactics, risk taking, risk accountability, risk assumption and risk perception, but this discussion has failed to consider the issue of acceptable risk (Dunn, (1992), Dunn, (1999), Kipp & Lofin, (1996), Wilder, (1997)).

Some efforts have been made by fire services to institute dynamic risk assessment procedures whereby individual firefighters are encouraged to perform risk assessments that balance the likelihood of risk versus consequences in pursuing a particular course of action. Most of these models are based on probabilistic calculations of the statistical likelihood of a risk occurring. Applying this approach in an operational environment relies on emergency responders retrieving experience-based mental models and assessing risks as a mental function, rather than using a specific technical formula. The problem with attempting to define risk in terms of statistical probability is that when the odds are not, beaten results can be 100% disastrous, examples of this type of failure are the South Canyon Fire in the USA where 13 firefighters died (McLean, 1999), the Linton fire in Victoria in 1998 with 5 firefighter fatalities (Johnstone, 2002) and the 9/11 disaster in the USA (Smith, 2002).

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The problem with attempting to define risk

Risk in itself is a subjective topic and in order to attempt to determine an acceptable level of risk one must first look at the construct of risk itself. Adams (1995) suggests that “Everyone is a true risk expert in the original sense of the word” (p.1). This belief is based on our ability as humans to learn from our experiences. As we go through life we learn lessons about risk (e.g. touching a hotplate burns) and build mental models that help us avoid dangerous situations.

The challenge facing ESOs is that we all have different life experiences both as individuals and also as agencies. Research among volunteer fire fighters shows considerable individual variation in concepts of risk (Clancy, 2005), therefore we could well ask the question of whose concept is right and whose is wrong? Often after something goes wrong we judge that someone failed to identify a risk adequately. Hindsight may be a wonderful way

of identifying where a problem occurred, however it can hardly be seen as a useful tool for defining what constitutes an acceptable risk. Research with firefighters has found significant variation in how risk is perceived (Clancy, 2005), significant subjectivity in the use of risk assessment tools (Clancy & Holgate, 2005) and variation in perception of risk based on how information is framed (Holgate & Clancy, 2005).

The literature provides as many definitions of acceptable risk as it does of what risk is itself. Fischhoff et al (1981) define acceptable risk as the “*risk associated with the most acceptable option in a particular decision problem*” (p.3). Fischhoff et al (1981) argue that “*Strictly speaking, one does not accept risks. One accepts options that entail some level of risk among their consequences.*” (p.3) The key question becomes “*how safe is safe enough?*” (Slovic, 2000, p.80) Traditionally in emergency response risk has been managed through highly trained,

procedure-based approaches that rely on standardised performance by the emergency responder. We argue that risk will never be adequately managed, however, without addressing the impact of human factors and cognitive psychology in emergency response.

Variations in the situation

The dynamic nature of emergency situations necessarily means that unique variables need to be factored into calculations on a situation-by-situation basis. The risk that a sniper will shoot (which is presumably governed by psychological factors) is different to the risk of an explosion of a gas tank (which is governed by the laws of physics), which are different to the risk of a wildfire overrunning a township. This means that it is not possible to develop heuristics (rules of thumb) for risk calculation that will cover all possible emergency scenarios. Rather emergency responders need to be trained to be as risk aware as possible.

Variation between individuals

The variation in risk perception between individuals is accounted for by both characteristics of the individual, such as age, education and previous experience (Williams & Narendan, 1992, Slovic, 2000, Clancy, 2005, Clancy and Holgate, 2005) and also characteristics of the situation, such as how information has been presented (Holgate and Clancy, 2005).

Experience in emergency response is often seen as a measure of the competence of a person; however, there are many variables that may affect the impact of experience on risk perception. For example 2 people with 20 years experience are highly unlikely to have had the same experiences. Simple length of service appears to be a poor indicator of an individual's ability to size-up a situation (Clancy, 2005). Variety of experience, rather than simple frequency, has been found to broaden individual's perception of risk (Clancy, 2005).

The experience of an adverse situation or 'near miss', where a person felt that their safety had been significantly compromised, has also been found to be associated with a significantly broader and increased perception of risk among firefighters (Clancy, 2005). This provides both a warning and a lesson to ESO's as it suggests that the best way of training people to appreciate risk is actually to expose them to risk. The key to managing risk is in providing as realistic training as possible without overly compromising the safety of emergency service workers in training.

Variation between agencies

In any large emergency situation numerous agencies and stakeholders are typically involved in coordinating a response (e.g. fire services, medical services, law enforcement agencies) as well as community stakeholders such as local, State and Federal government and representatives of the communities affected. Each of these stakeholders is likely to have different objectives and priorities in coordinating a response to a disaster. Even emergency services are likely to have differing and possibly competing priorities.

The ESSO Gas Plant explosion at Longford (1998) provides a good example of differing interests and competing priorities between agencies.

Naturally fire services were primarily motivated to respond in a cautious manner, which prioritised the safety of fire crews responding to an extremely volatile incident. This meant that they were motivated to keep the gas supply shut off for as long as was necessary to ensure safety. The priority of politicians was to minimise the economic impact of the explosions and to restore the gas supply to the State as quickly as possible. Both of these priorities are understandable from the point of view of the stakeholders, however these priorities necessarily compete (Hopkins, 2000).

The management of the Melbourne Commonwealth Games (2006) provides another example where some stakeholders were motivated to ensure national security against the possibility of a terrorist attack whereas other stakeholders were motivated to ensure "safe and green" games, which showcased Melbourne as a tourist destination.

These examples suggest that, with different agencies having legitimate but competing objectives, the possibility of achieving consensus of what constitutes an acceptable risk in a multi-agency emergency situation is remote.

An interesting mental exercise is to consider the ESSO gas plant explosion from the perspective of different stakeholders. If you were the Premier of Victoria how would you weight the possible risk of losing the lives of firefighters against the economic impact of keeping the gas off? At what level would the relative risks become acceptable?

Unified command

The concept of unified command aims to seek a consistent approach to managing emergencies. Terwilliger (2004) defines unified command as "a unified team effort that allows all agencies with responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing or abdicating agency authority, responsibility, or accountability." (pg.111)

Tactical objectives may be subject to change through the progress of an incident however the key aim of protecting life and property remains constant (Reardon, 2005) and is unlikely to vary between organisations or incidents. However competing objectives have potential to cause conflict.



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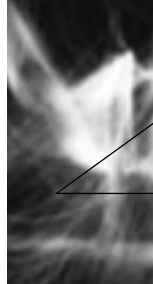
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Reardon (2005) offers the example that “police agencies will not be overly concerned with overhaul and salvage... operations as with evidence preservation and investigation” (pg.75). He describes the advantages of unified command as “...being that concerns, duties, and responsibilities can be expressed and explained during a good round table of representatives”, but he cautions that, “... we need to listen to others and respect their roles.” (p.77) An acknowledgement of differing objectives may be the first step toward understanding why the definition of acceptable risk in an emergency situation may vary between agencies.

We argue that attempting to define acceptable risk becomes an impossible task in emergency services when there is so much variability in the situation; and between the individuals within the situation and the agencies responding to the situation. There are differing levels of risk knowledge and risk exposure between agencies and even within agencies. A front line firefighter will be exposed to different risk to that of a fire ground controller who has responsibility for large numbers of resources. The immediacy of a negative impact on a firefighter on the front line will influence how acceptable risk is perceived, the fire controller however, who is not subject to the same environmental factors is likely to have a different perception.

What is the future?

Co-operative training exercises between agencies are likely to promote greater understanding of the perspectives and roles and needs of each agency among emergency responders. However, even the value of co-operative training may be compromised by the security needs of agencies so that levels of knowledge are not shared. Training and the manner in which it is conducted will be an important component. This needs to be balanced, and through the application of realistic training scenarios emergency workers will gain a heightened level of understanding of potential risks.

Conclusion

Due to the dynamic and unpredictable nature of emergencies, ESO's are faced with a difficult task when trying to manage and reduce the impact of risks. Personnel at all levels in an emergency, from those in charge to the personnel on the front line all have

some contribution to make to the topic. Individual perceptions, however, will complicate the basis of any judgement made. As discussed by Fischhoff et al (1981) it is unlikely that an “acceptable risk” can be determined, rather we are left with “accepting options” that are perceived to have the least amount of risk. This approach is not dissimilar to that of developing an incident action plan that has an “options analysis” completed which evaluates a number of alternative actions and nominates which option is considered the safest.

Ultimately acceptable risk can only be defined by individuals and organisations considering the questions of “what do I get out of it?” and “what's in it for me?” In simplistic terms defining acceptable risk is an exercise in cost/benefit analysis. If the benefits are high enough, for example saving your own child's life, then people will be prepared to bear enormous costs.

Personnel within each ESO need to understand the objectives of the other agencies involved, and then work together in order to prioritise those

objectives. This approach requires a balancing act and will be affected by both the strength of the agencies and its individuals. Unified command seeks to achieve this cooperation between agencies, it will however be incident driven, based on the nature of the emergency. Reliance upon training in the use of tools such as “dynamic risk assessment” and failure to fully understand the human contribution to the risk assessment process will result in approach of individuals being flawed.

We suggest that ensuring safety at a large incident needs to start with an acknowledgement and clear identification of the objectives of each agency involved. Greater work needs to be done in formally identifying where competing priorities exist and discussing how these will be managed. Rather than ignoring the effect of human factors in the vain hope that everything will be all right on the day, improved risk management in emergency response can only take place if they are considered at the planning stage.

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