How a change in thinking might change the inevitability in disasters

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INTRODUCTION

It is not possible to solve a catastrophe, nor is it possible to avoid natural disaster events that produce them. But it is possible for us to better prepare for, respond to and recover from them, and to reduce their individual and collective impact.

The purpose of this paper is to explain why we should approach catastrophic disasters more comprehensively; not from the perspective of spending significant amounts of extra time, money and resources to mitigate their effects, but to approach the problem differently by changing the way we think about them.

Conceptualising the environment of natural disasters

Australia's ability to reduce the risks associated with natural hazards has improved immeasurably over the past 100 years. As our regional populations have increased, so too our economies have grown, our technology advanced and our knowledge base increased. This has enabled us to increase our risk treatment effectiveness from low/moderate events at the beginning of the 20th Century through to severe events in 2015.

As our capability to treat risks has increased, the consequences of impact (loss of life, economic, social, built and natural impacts) have decreased. We do, however, reach a point where the effectiveness of our capability reaches its limit and the intensity of the event surpasses that capability and produces a significant and unacceptable consequence.

In the past 12 years we have seen our capacity tested by the 2003 Canberra bushfires, the 2009 Victorian bushfires, the 2010-11 Queensland floods (including *Cyclone Yasi*), the 2011 Victorian floods, the 2012 Perth Hills bushfires, the 2013 Tasmanian and Blue Mountains bushfires and the 2013 ex-tropical *Cyclone Oswald* in Queensland; all severe to catastrophic events. It's time to change our thinking.

In order to consider severe to catastrophic disasters more fully, there is a need to conceptualise them by explaining the correlation between risk, consequence and intensity. Figure 1 explains this correlation.

(A) Level of consequence

The level of consequence arising from any given hazard can be broken into two elements: the 'potential' and the 'actual' consequence.

Potential consequence explains what would otherwise occur if a risk treatment action was not effectively implemented to mitigate the potential effects of a hazard. For example, if a bushfire started and there was no response from fire services, no previous hazard reduction carried out, no understanding by the community of the fire's potential, and no action by any individual to prepare for such a fire, then the full potential damage of that hazard would be realised.

Actual consequence explains what actually happened despite all that was done to mitigate the potential effects. Actual consequence is another way of describing what results from 'residual risk' – that is to say, the portion of a hazard's effects that could not be effectively treated.

(B) Intensity of event

The way a hazard's intensity is measured depends on its nature. For example, riverine flooding is measured as minor, moderate and major. Bushfires are measured as low/moderate, high, very high, severe, extreme and catastrophic. Cyclones are measured and rated between categories one to five. Currently, there is no single way in which to correlate intensity across all natural hazards. This fact notwithstanding (for the purpose of gauging where we appear to reach the limitation of our risk treatment effectiveness) the Fire Danger Rating Scale of low/moderate, high, very high, severe, extreme and catastrophic may be loosely correlated against all natural hazards.

(C) Risk treatment effectiveness

In simple terms, risk treatment effectiveness is our ability to ameliorate, mitigate, or if possible, negate the potential risk to life, property or the environment. Of course, we must keep in mind that not all risks can be
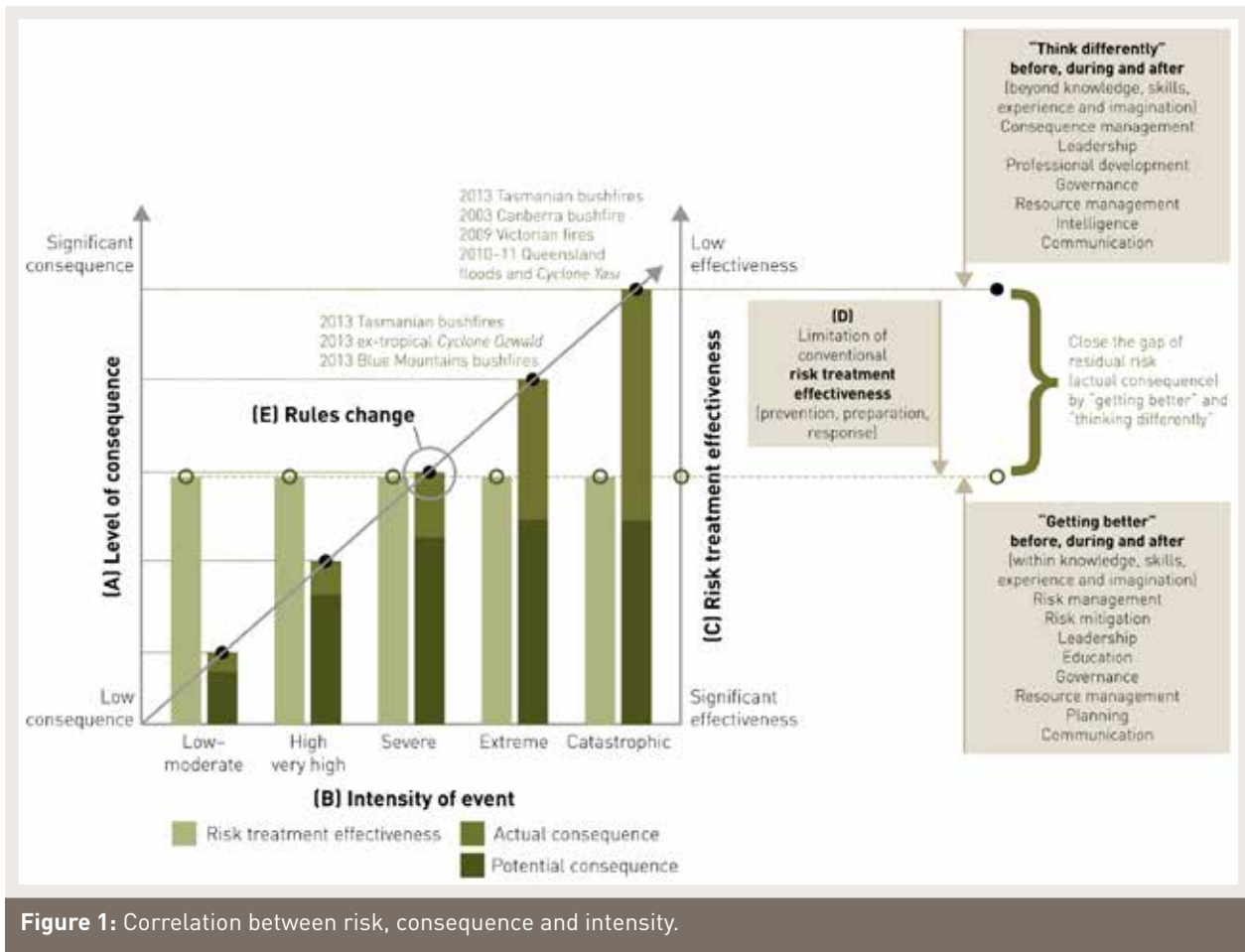
Figure 1: Correlation between risk, consequence and intensity.

negated as, for nearly all hazards, a level of residual risk remains.

Risk treatment effectiveness is achieved by undertaking risk treatment actions. These actions include the following as examples:

- land use planning and development controls

- emergency management planning

- construction standards

- community awareness, education and engagement

- landscape modification (flood levee banks/ prescribed burning/hazard reduction)

- response resources (police/fire/ambulance/state emergency services)

- research and education

- communication

- intelligence.

Implementing these risk treatment actions reduces consequence; however the extent largely depends on their effectiveness individually and collectively enacted against a potential hazard's intensity.

(D) Limitation of risk treatment effectiveness

As effective as they are at mitigating risk, all risk treatment actions have limitations to their effectiveness. Examples include:

- Flood levies of eight metres work for floods up to that level, but fail during floods peaking at 8.2 metres.

- Bushfire hazard reduction awareness is at its most effective the day after mitigating actions (clearing fuel for example), however effectiveness progressively deteriorates thereafter.

- Understanding national construction standards does not always account for regional environments and hazard-influenced weather anomalies. For example, application of the Wind Code[1] works for buildings to withstand a wind load impact up to the point of maximum wind strength as identified for a region within the Code. But the Code does not account for cyclonic winds in NSW or Victoria because they do not occur in these regions of Australia. However, cyclonic-strength winds are produced by pyrocumulonimbus cloud formations that arise out of catastrophic fire conditions as evidenced in Canberra in 2003 and Victoria in 2009.

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1 Australian Standard: Wind loads for housing AS: 4055–2012. At: www.standards.org.au/OurOrganisation/News/Pages/Wind-loads-for-housing.aspx.

- Response resources such as fire appliances and fire-bombing aircraft can suppress and extinguish fires up to certain intensities, but at the severe to catastrophic level they are generally unable to enter fire grounds due to the extreme danger and, therefore, there is little if any effect on the fire's intensity, direction or rate of spread.

- Emergency workers and managers develop significant knowledge, skills and experience over many years by attending and managing many lesser intensity events. Since severe to catastrophic events produce effects that not only exceed all of that knowledge, skills and experience attained over many years but also exceed the imagination of people involved, they are often stranded without readily accessible alternatives to manage such complexity.

In essence, all risk treatment actions have an individual and collective limitation to their effectiveness, which results in residual risk. This residual risk becomes realised as actual consequence when an event occurs and, in addition, it exposes the 'point of limitation' of our capacity and capability to mitigate effectively.

(E) Rules change

When actual consequence far exceeds the limits of risk treatment effectiveness the rules change. That is, the point at which those things that work for lesser intense events (i.e. risk treatment actions) no longer work for the more intense events. This results in a significant increase in actual consequence suggesting that the problems arising from these scenarios and their solutions must be managed differently. A fundamental change in our mental experience also occurs at this threshold.

Within 'knowledge, skills, experience and imagination'

Knowledge, skills, experience and imagination is a way of describing some important internal resources of our minds that we rely on to manage disasters. In essence, knowledge comes to us through learning, skills through acquiring, experience by participating or being in action, and imagination by bringing forward in our minds things not present to our senses. We rely on these and other attributes every day in every circumstance that presents before us. For the purposes of this discussion, we could call it part of our 'internal capability', noting that there are many other attributes of our minds that would also apply.

Generally speaking, our collective knowledge, skills, experience and imagination is well equipped for low to very high intensity events. Of these events, this is to say that:

- due to their relative high frequency and relative moderate complexity, scientific and industry-based knowledge is well understood about their causes and effects. We have extant skills to manage them with a reasonable efficacy (wide array of knowledge and skills)

- they are, at any location, reasonably common events and most of us with experience have been through at least one (reasonable experience)

- they produce effects that are reasonably evident and foreseeable with little, if any, downstream consequences (within imagination).

Beyond 'knowledge, skills, experience and imagination'

When the rules change our capability rapidly loses its effectiveness and our experience changes as well. Severe to catastrophic events go beyond most people's knowledge, skills, experience and imagination of these events. This is to say that:

- due to their rarity and complexity, scientific and industry-based knowledge is limited about their more complex causes and effects and therefore we lack the necessary skills to manage them effectively (lack of knowledge and skills)

- they are, at any point on the landscape, very rare events and therefore most of us have never actually been through one before (lack of experience)

- they tend to produce effects or consequences, particularly downstream consequences, that are not evident at the lower scale of events and appear very difficult to foresee (beyond imagination).

The distinction between 'within' and 'beyond' knowledge, skills, experience and imagination is critical to understand. Where we hit the limits of our current thinking is the starting point for developing initiatives to help us progress beyond those barriers.

Closing the gap of residual risk by 'getting better' and 'thinking differently'

To close the gap in residual risk, there are two principles worth considering; 'getting better' and 'thinking differently'.

Getting better

A philosophy of 'getting better' prescribes to maintaining and improving capabilities that have been developed by engaging with events within our knowledge, skills, experiences and imagination over many years.

Substantial financial investment (in the billions of dollars), time, effort, experience (often bitter), resources, research, education and sheer determination has been worthwhile and should continue. By constantly applying effort to increase our risk treatment effectiveness, we reduce the potential consequence and, by extension, the result is a diminished actual consequence.

Getting better at mitigating and managing frequent events is highly beneficial to society economically, physically and mentally. As the causes and conditions

that produce these events evolve and change (such as changes in climate, land use, societal attitudes, and values and socio-economic status), so too must our treatments adapt to new conditions. Here, the application of imagination, creativity and innovation plays an important role in improving capability over time and needs to be encouraged.

From a risk perspective, low to very high risk events are certainly much more common than severe to catastrophic ones. As a result, if not individually then certainly collectively, we have developed considerable knowledge, skills and experience about them and our capability development has been very much aligned to substantially mitigate the potential consequences of these more frequent and better understood events.

In addition, most low to very high risk events align with our expectation. That is, to a reasonable degree they align with how we would imagine them to be. This does not make them any more pleasurable to experience, but does allow us to prepare for, respond to, and recover from them quite effectively. Relative to the rarer but more severe events, we are not forced to stretch our thinking too far to achieve success.

'Getting better' is a very broad philosophy and could easily be applied to just about any aspect of emergency management. There are, however, certain 'lenses' we can look through to focus our efforts. These lenses are usually identified by the themes arising from major inquiries and commissions. Inquiries seek to find out what actually happened and recommend changes to minimise either the event itself or the impact of a similar future event. Lenses also come into view after sustained research, a lessons-identified process, and shared community experiences via theatre, music, poetry and other artistic examples.

The *National Strategy for Disaster Resilience* and its various strategic elements is also critical in ensuring that we collectively 'get better' in a range of ways underpinned by best practice in risk management.

'Getting better' is an important philosophical principle that requires ongoing investments of time, funding, resources and effort. This ensures collective operational gains made over many years through our collective 'knowledge, skills, experience and imagination' of the many events of lesser intensity and occasional events of high intensity are not lost or lessened. To do so would subsequently increase the actual consequence of disaster events.

Thinking differently

The philosophy of 'thinking differently' develops our ability to advance our present knowledge, skill, experience and imagination. This is a much more challenging space to contemplate than simply getting better. Going beyond our limits therefore is effectively a new frontier that requires sustained commitment and courage.

There is no singular approach to this challenge. There are many imaginative, creative and innovative ways of thinking differently. The following suggestions are ways of enacting this philosophy of thinking differently. To perceive and manage severe to catastrophic disasters, we need to:

- understand and accept the inevitability of natural disasters

- change the way we think about residual risk

- implement practical measures

- establish an ethical premise for leadership.

Understanding and accepting the inevitability of natural disasters

Changing how we think about these events must start with our accepting, as a principle, their inevitability. Any community in Australia will have a natural hazard profile evidenced by history, observation and science. This data tells us that a range of events has occurred, that they are happening now, and that they will occur again.

All natural disaster events are a result of immense climatic or geological energies involving earth, wind, fire and water, none of which we have absolute control over. All are produced from highly complex natural systems and interactions between the climate, its resultant weather, the landscape, the manner in which we use the land, and the minds that we bring to these events before, during and after.

While the frequencies and intensities of these events vary considerably, all events are part of a continuum within our environment. Predicting when they'll reach a maximum potential remains an unknown, but averages of 50, 100 or even 10 000 years are frequently proffered. Nonetheless, at some point in the future when the right causes and conditions arise, major events will manifest, and when they do, we will have no choice but to confront them.

Antecedent conditions leading up to these events are, broadly speaking, overt. That is, there is little surprise in their arrival but considerable complexity in their resultant effects. Climate outlooks, weather forecasts, landscape conditions, land use, and presenting conditions all tell us what is broadly about to happen. How this information translates into impact and consequence minutiae (immediate and downstream) is hard to foreshadow, but not impossible.

Simply put, these events are inevitable (varying frequencies and intensities over time and varying impacts), beyond our ability to choose them, reasonably foreseeable in broad terms, infinitely complex and unpredictable in specific terms. While we are unable to choose them, we do get choice in how we prepare for, respond to, and recover from them.

Shifting our thinking to accept inevitability simplifies our approach to the problem. We no longer need to weigh up whether we *think* a severe event will happen or not. We accept that it will at a time not of our choosing, and we avail ourselves the opportunity to rethink how we will prepare well before they occur.

We have the opportunity to look at the whole problem, not just the more *likely* problem. Then, methodically, we may work through how to find appropriate solutions. We must open a philosophical doorway to rationally and reasonably consider what an event might look like and to properly consider not only what we might do when it occurs, but what we might do differently; or perhaps more importantly, we might choose to do nothing at all.

Changing the way we think about residual risk

To do this we identify the hazards, contemplate both the likelihood of their manifestation and the consequence of the effects, then decide how best to allocate limited and competing resources. This process is influenced by our ability to reasonably prevent, mitigate or ameliorate their effects—economically, socially, politically, technologically, legally and environmentally.

It is eminently sensible to balance what is reasonably likely to occur, how much we are prepared to invest (money, time, resources, effort) and what level of residual consequence we are prepared to accept, *provided that* residual risks are properly understood.

A problem that arises is that we tend to trade off in our minds any serious contemplation that severe to catastrophic events will *actually* occur, given their rarity. We also tend to develop false optimism; that if we implement all of the identified risk treatments for a particular hazard we will be okay. This is a reasonable assumption for low risk events, but for severe to catastrophic events, this is rarely true.

In other words, by focusing most of our effort on risk treatments and the resultant benefits, we often do not turn our minds to sufficiently acknowledge residual risk. It is the residual risk resulting from a severe to catastrophic event that causes the greatest consequence to society.

Viewing severe to catastrophic disasters as the *least* likely but *most* consequential establishes a paradox:

'Least likely' implies not needing to spend too much time thinking about the problem.' Most consequential' implies the exact opposite.

Closing the gap in residual risk is not intended to be a push for more funding, resources or a re-prioritisation of public policy objectives. As previously stated, risk management frameworks should identify a threshold of risk treatment actions that reduce risk to an acceptable level versus over-commitment to a rare event at the expense of unrelated risks with a high-priority community need.

For example, within the *National Emergency Risk Assessment Guidelines*[2], an event that has potential for catastrophic consequence and a likelihood (frequency) ranging from rare (between 101 to 1 000 years), very rare (between 1 001 and 10 000 years), or extremely rare (once per 100 000 years) produces a risk rating of high, not extreme. While the severity of consequence is important, the likelihood of an event is equally important in applying levels of risk, determining extent to which those risks can be mitigated and, in this particular case, how the event's rarity both reduces risk and influences our response.

Providing that the residual risk is properly understood and considered, a reiteration that this sensible approach—decision-making based on limited resources and community priorities—is warranted; no fundamental need to alter the course is required.

However, we must remember that frequency has no bearing on the intensity of an event or its potential consequence. Potential consequence is unaffected by rarity. When an event manifests its potential impact on society will necessarily have both immediate and downstream consequences.

Therefore, reduction of risk potential for any given hazard from, say, extreme down to high on the basis of likelihood rather than a reduction in consequence magnitude (not possible, as this input is driven by nature), makes good sense providing that the residual risk is properly understood in terms of:

- its potential consequence (immediate and downstream)

- the limitations of existing risk treatment actions against potential consequence

- the gaps in capability that arise from those limitations

- the manner in which a community will manage immediate and downstream consequences when the event occurs.

Implementing practical measures

To better understand residual risk we must develop methodologies to guide people through the immeasurable complexities that severe to catastrophic disasters produce. These methods should be enacted well before an event's arrival in a sensible, planned, systematic and rational manner to identify gaps in capability and how they can be closed.

One way to achieve this is to consider a simple four-step process that helps determine what residual risk could look like and how it might be managed effectively. The steps are (principally and metaphorically):

- paint the picture

- tell the story

- find the problems

- propose the solutions.

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2   National Emergency Risk Assessment Guidelines. At: www.em.gov.au/Publications/Program%20publications/Pages/NationalEmergencyRiskAssessmentGuidelines.aspx.

Paint the picture

Paint the picture is a metaphor for a process that:

- implements principles of risk management in accordance with ISO 31000:2009 (or similar) to:

  - look at the historic hazards and the resultant disasters in a community to understand what has happened previously (including long term, rare, very rare and extremely rare)

  - look at the current potentiality of those hazards and risks

  - look at the future potentiality of those hazards and risks (what is science saying about the hazard and its risk potential in the future?)

  - look at how the landscape is currently being used and what is planned for the future

  - apply data from historical events, modify it based on current science, and overlay them onto present and planned land-use

  - prescribes risk treatment actions to override the potential consequences of the identified risks

  - ascertains an agreed residual risk profile informed by risk treatment actions

- applies appropriate modelling to the treated and residual risk profile based upon a severe to catastrophic hazard intensity that can be evidenced in history and/or science

- produces an image (static or dynamic) that indicates what an event may look like if it occurred now or in the near future.

The intent of this picture is not to foresee every minute detail and complexity of what an event may produce. Rather, it is about establishing a point of analysis in spatial form well ahead of the event, and what key challenges—strategic, operational, tactical, political, social, technological, economic, legal and environmental—can be gleaned from it.

A similar process is typically done by operational planners as an event occurs. The problems with this are many and include inadequate situational awareness to inform strategy, time to consider the potential impact and develop ameliorating tactics is scarce, and even fewer hours remain to engage contingencies, use existing capabilities differently or concurrently develop new capability to stave effects of severe to catastrophic disasters.

Tell the story

Tell the story is a metaphor for describing how the potential event may affect a community. Given the intensity of a severe to catastrophic event (and complexity of its consequence) having the ability to methodically 'step through' an event as it unfolds with sufficient time and expertise becomes critical. Being able to describe how an event could affect a community facilitates a deeper understanding of its nature, its potential immediate consequence, how it could trigger downstream consequence, and what the potential extent of damage and impact might be. Using 'narrative techniques' to explain what might happen as the event unfolds is a very powerful way to 'tell the story'.

Find the problems

Having painted a picture and told the story of a potential event, the next logical step is to ascertain what challenges such circumstances may present. Find the problems is a metaphor for teasing out all points where conventional or existing capability hits its limitation. This includes limitations of risk treatment actions, effectiveness of response and recovery resources, and our collective knowledge, skills, experiences and imagination. Gaps begin to emerge when testing existing capability against the scenario.

Find the problems also identifies the social, economic, built and environmental vulnerabilities that exist within the residual risk attributed to a severe to catastrophic event that would not otherwise be exposed through the normal risk management process.

Propose the solutions

Propose the solution is about developing creative and innovative solutions to address identified gaps from the problems found. Considerations here include:

- using existing capabilities differently, more astutely and in response to the intensity of the hazard to achieve greater effectiveness and a more satisfactory outcome (minimised loss of life and property, and as little damage to the environment as possible)

- accessing wider community capabilities that may not be evident or required during events of less intensity

- developing new capabilities that meaningfully contribute to the full range of hazard intensities (low – catastrophic)

- changing or re-ordering strategic, operational and/or tactical priorities, including making decisions about what not to do as well as what to do

- reviewing and, where necessary, reshaping, public policy and community priorities (land use, funding allocation, and building design are examples) in a sensible way that respects the full potentiality of the hazard profile.

This process also creates an opportunity to design how we might recover—socially, economically, environmentally and physically (built environment)—prior to a severe to catastrophic event taking place. For example, by anticipating impact and consequence through a built environment lens we are afforded the opportunity to consider how best to either replace, relocate or redesign critical infrastructure, land use and public assets.

Considering these factors before an event occurs enables us to incorporate relevant decisions into asset management plans, town planning and construction standards/methods into our thinking. We're also able to build in additional mitigation measures that existing

infrastructure is incapable of incorporating due to cost, design or location constraints.

Significant work based upon this process is being undertaken in the United States, particularly the city of Seattle in Washington State and the city of Anchorage in Alaska, where they are modelling the impacts of maximum historical earthquakes against today's societies.

The city of Anchorage experienced a magnitude 9.2 earthquake in 1964 that shook for nearly five minutes. The impact was devastating then, and with 50 years of further land-use development, increases in population, greater reliance on technology, and substantially more infrastructure, not only are the potential consequences even more catastrophic, but the problems that arise in managing those consequences are significantly beyond the 'knowledge, skills, experience and imagination' of all concerned.

By trying to envisage such an event in a timely and methodical manner, they are making a significant contribution to 'closing the gap of residual risk' that will definitely change the outcome for the better.

Establishing an ethical premise for leadership

> *Thinking differently requires leadership. It also requires leadership to think differently.*

This may sound like another paradox (least likely—less thinking/most consequential—more thinking) but the distinction is important. Developing leadership competencies addressed in the more traditional disciplines is critical, yet leaders will require further vision. They will need to rely on an ethical basis in which to provide stewardship to those they are leading through the complex analysis of severe to catastrophic disasters, both ahead of time and when they occur.

Disasters are about people. They are also, of course, about things—roads, bridges, buildings, power, water—but only to an extent that damage to those things physically, mentally and emotionally affects people. Of these, how people 'feel' is as important to surviving disaster as what they 'think'. That is, disasters are more often a matter of the heart than the head.

An ethical premise must underpin a leader's thinking to respond to this reality. The purpose is not to judge others or to see ourselves as better, but rather to connect with the people who we will be called on to lead. If we judge ourselves as better than others we will achieve the exact opposite of the required connection. Instead, we will isolate and offend.

We must establish a way to secure the trust and confidence of those we call to lead and protect, to unify them, to bring out the best in their collective 'knowledge, skills, experiences and imagination', to acknowledge the physical, mental and emotional impact on them, and to encourage them to replace

blame with learning and reflection. To achieve this, the following ethical principles may assist in establishing this premise:

Establish and maintain trust and confidence

Leaders must establish and maintain the trust and confidence of those they are called on to lead before, during and after severe to catastrophic events. We need to maintain our integrity at all times, ensuring our words and actions align. We need sufficient humility to acknowledge when we are wrong or have wronged others and to forgive ourselves or seek forgiveness from others. We need to exercise the courage to speak truthfully about a matter regardless of cost to our egos. Our thoughts, words and actions must be for the benefit of others. Our agendas, clear, unambiguous and open for all to see. Exhibiting exemplary behaviour is critical.

Our sense of self and ability to be a well-balanced, compassionate human beings must never be sidelined. We need to be accountable for our past, present and future results and we should use, to the fullest (and constantly improve) all of our inherent talents. The Australian community expects this and we should expect nothing less of ourselves.

Unite in the face of adversity

Natural disasters force collective action in a society to deal with effects. Not only are severe to catastrophic events inevitable, they are immeasurably complex in their science (their causes), behaviour (what they do), and their impacts (who and what they effect and how). We must humbly accept that they exceed our collective capabilities to mitigate them effectively.

It is only by engaging our collective physical resources, knowledge, skills, experience, creativity and innovation before, during and after an inevitable event that solutions to complex natural disasters form. Acknowledging this underpins our need for unity.

Exercise humility

Having the capacity to accept the inevitability and complexity of severe to catastrophic events, our individual and collective limitations externally and internally in dealing with them, and the need to unify in the face of such adversity requires all of us to exercise humility before, during and after a disaster.

Humility allows us to surrender our fixed views of the world, and presents opportunities to expand our thinking, to genuinely hear the contributions and suggestions made by others, and grant ourselves permission to say 'we don't know, but we'll find out'. Perhaps most importantly, humility shows a genuine vulnerability; one that fosters personal relationships.

Humility also assists us in using our collective imagination to bring to mind things that are not present to our senses, creativity to develop original ideas that have value, and innovation to put new ideas into practice. All this will be needed for us to move beyond

the limitations of our current individual and collective knowledge, skills, experience and imagination. The culmination of these attributes could be termed our 'collective wisdom' and will be essential as we prepare for severe to catastrophic events.

Show compassion

Disasters create significant physical, emotional and psychological suffering within our communities including those called to respond, lead, manage and report, as well as those who bear witness either first-hand or through the many forms of media.

Accepting that our industry's primary motivation is to do our very best within acknowledged limits and granting ourselves permission to emotionally reflect in the face of adversity, means we cannot help but have a deep sense of compassion with all of those who are touched in some way by these events. Compassion alleviates emotional distress, motivates us to think beyond our own suffering, and moves us to action for the benefit of others.

Grant forgiveness

We will all experience, to a greater or lesser degree, feelings such as regret, remorse, anger and frustration. Understanding that we could not choose the event, that its severity went beyond our internal and external resources and knowing, that we were motivated to do the best we could within these constraints, then we soon come to realise that there is so much more that we individually and collectively need to learn, but perhaps more importantly, that blame is futile.

In the face of such adversity most of us will reflect on our own perceived limitations and over time forgive ourselves for those things that we did or didn't think, did or didn't say, or did or didn't do. Having reached some sense of inner peace about our own perceived limitations we owe it to grant forgiveness to others for they have endured the same internal suffering.

There are other ethical considerations for leadership in challenging environments but, in any event, without ethics underpinning our leadership, we are likely to fall short of maximum proficiency and minimum harm.

In summary

Australia has significantly improved its ability to prepare for, respond to and recover from disasters. We have, however, reached a point of limitation in our capability to conventionally mitigate the consequences of severe to catastrophic events. Limitations exist in the physical world and also in our minds. Here is what we can do:

- accept the inevitability of disaster as a premise

- understand our points of limitation, both externally and internally, in managing severe to catastrophic effects

- get better at improving our existing capabilities by reflecting on and implementing the outcomes of inquiries and other processes

- change our approach to residual risk by understanding that rarity does not diminish consequence

- explore residual risk as manifested consequence to identify complex problems and develop innovative, creative solutions well ahead of the event

- better understand how critical ethical aspects of leadership are in responding to the emotional and psychological effects of disasters.

Opportunities to close gaps of residual risk are available now. We must take them.