



OHS Risk and Decision-making

Core Body of Knowledge for the
Generalist OHS Professional



**Safety Institute
of Australia Ltd**



**Australian OHS Education
Accreditation Board**

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Topic Specific Technical Panel and authors

The members of the Topic Specific Technical Panel and the authors were selected on the basis of their demonstrated, specialist expertise. Panel members and authors were not remunerated; they provided input and wrote the chapter as part of their contributions to the OHS profession and to workplace health and safety.



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Synopsis of the OHS Body of Knowledge

Background

A defined body of knowledge is required as a basis for professional certification and for accreditation of education programs giving entry to a profession. The lack of such a body of knowledge for OHS professionals was identified in reviews of OHS legislation and OHS education in Australia. After a 2009 scoping study, WorkSafe Victoria provided funding to support a national project to develop and implement a core body of knowledge for generalist OHS professionals in Australia.

Development

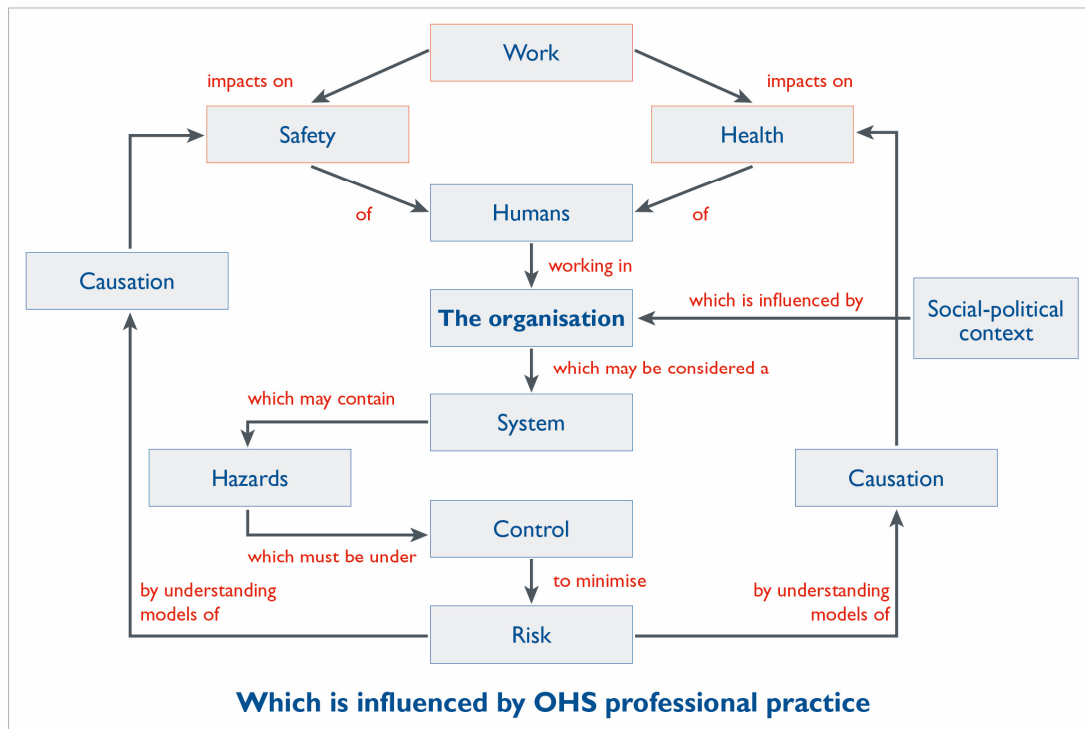
The process of developing and structuring the main content of this document was managed by a Technical Panel with representation from Victorian universities that teach OHS and from the Safety Institute of Australia, which is the main professional body for generalist OHS professionals in Australia. The Panel developed an initial conceptual framework, which was then amended in accord with feedback received from OHS tertiary-level educators throughout Australia and the wider OHS profession. Specialist authors were invited to contribute chapters, which were then subjected to peer review and editing. It is anticipated that the OHS Body of Knowledge will be regularly amended and updated as people use it and as the evidence base expands.

Conceptual structure

The OHS Body of Knowledge takes a ‘conceptual’ approach. As concepts are abstract, the OHS professional needs to organise the concepts into a framework in order to solve a problem. The overall framework used to structure the OHS Body of Knowledge is that:

Work impacts on the **safety** and **health** of humans who work in **organisations**. Organisations are influenced by the **socio-political context**. Organisations may be considered a **system** which may contain **hazards** which must be under control to minimise **risk**. This can be achieved by understanding **models causation** for safety and for health which will result in improvement in the safety and health of people at work. The OHS professional applies **professional practice** to influence the organisation to being about this improvement.

This can be represented as:



Audience

The OHS Body of Knowledge provides a basis for accreditation of OHS professional education programs and certification of individual OHS professionals. It provides guidance for OHS educators in course development, and for OHS professionals and professional bodies in developing continuing professional development activities. Also, OHS regulators, employers and recruiters may find it useful for benchmarking OHS professional practice.

Application

Importantly, the OHS Body of Knowledge is neither a textbook nor a curriculum; rather it describes the key concepts, core theories and related evidence that should be shared by Australian generalist OHS professionals. This knowledge will be gained through a combination of education and experience.

Accessing and using the OHS Body of Knowledge for generalist OHS professionals

The OHS Body of Knowledge is published electronically. Each chapter can be downloaded separately. Users are advised to read the Introduction, which provides background to the information in individual chapters. They should note the copyright requirements and the disclaimer before using or acting on the information.

OHS Risk and Decision-making

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Core Body of Knowledge for the Generalist OHS Professional

OHS Risk and Decision-making

Abstract

Risk management is part of organisational decision-making with poor decision-making about risk being a factor in workplace fatality, injury, disease and ill-health. Generalist Occupational Health and Safety (OHS) professionals can influence decision-makers to make informed choices about risk. To do so they need to understand the nature of risk and its inherent uncertainty and how decisions are made in organisations and by individuals, and the factors influencing such decisions. This chapter examines decision-making theory, types of organisational decisions and factors influencing decisions about risk. It considers risk communication, legal and ethical issues, and the limitations of risk assessments. The chapter concludes with an examination of the role of the OHS professional in influencing risk-based decision-making, and presentation of a model to inform OHS professional practice.

Keywords

risk, risk management, decisions, decision-making, influence, uncertainty, occupational health and safety, OHS, risk information, risk communication

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1 Introduction

Modern organisations operate in a rapidly changing environment and are constantly required to make choices and take action – or decide not to act. Poor quality risk assessment and risk management, and poor decision-making about risk, have been identified as contributing factors in workplace fatality, injury, disease and ill-health and in many major disasters (Dekker, 2011; Melick, 2007).

The 2010 San Bruno gas transmission pipeline rupture analysed by Hayes and Hopkins (2014) shows how poor decisions at all levels of an organisation can contribute to disaster. In this case:

- The Board decided to cut spending on maintenance and inspection of the pipeline network in order to increase profits
- Over decades, integrity management engineers decided on inspection programs that failed to reveal a serious construction defect from 1956
- The regulators found some problems with the integrity management system but decided not to intervene
- One day in 2010, maintenance personnel decided to go ahead with planned work without considering the potential impact on the pipeline network
- Operations staff decided to let the network continue to operate even when the pressure in the system rose to high levels.

As a result, a faulty weld made in 1956 ruptured more than 5 decades later. The subsequent explosion and fire killed 8 people and destroyed a suburb of San Francisco. Eliminating any of these factors could have prevented this disaster. This example shows vividly the power that OHS professionals can have if they are able to promote better safety decisions at various levels of an organisation, and over an extended period of time, to keep workers, and even the public, safer.

Most decisions impacting OHS outcomes are not made by OHS professionals themselves, but by others at all levels of an organisation. In addition, OHS decisions are rarely made in isolation of other business imperatives such as cost, production scheduling and environmental performance. OHS professionals need to be able to influence safety and business outcomes by ensuring that OHS issues are appropriately considered. Thus the focus of this chapter is understanding how decisions are made to facilitate appropriate decision-making in managing OHS risk.

Understanding and managing risk is central to achieving the outcomes and targets of the *Australian Work Health and Safety Strategy 2012-2022* (SWA, 2012). The strategy proposes a vision of healthy, safe and productive working lives and achievement of this vision through:

Effective systematic management of risks result[ing] in improved worker health and safety and productivity by:

- preventing and reducing the number and severity of injuries and illnesses and associated costs
- promoting worker health, wellbeing and capacity to work, and
- fostering innovation, quality and efficiency through continuous improvement (SWA, 2012, p. 5).

A risk management framework is detailed in *AS/NZS ISO 31000 Risk Management – Principles and Guidelines* (SA/SNZ, 2009). One of the principles underlying this Standard – which defines risk as the “effect of uncertainty on objectives” – is that risk management is part of decision-making. The Occupational Health and Safety (OHS) professional can influence decision-makers to make informed choices, prioritise actions and distinguish among alternative courses of action when there is uncertainty by understanding decision-making processes and factors affecting decisions.

The *OHS Body of Knowledge* chapter ‘Risk’ (Cross, 2012) emphasised the importance of understanding the nature and extent of risks in order to control them effectively. Every day, organisations make decisions that involve managing multiple goals of safety and production or cost. These often involve trade-offs between different types of risks and organisational objectives. Risk decisions involve judgements about the required standard of control in terms of hazards to health and safety whilst considering the flow-on financial aspects to the organisation. Consideration of OHS risks in organisational decision-making will vary depending on the perceived risk of the situation and the OHS drivers for the organisation. The *OHS Body of Knowledge* chapter ‘The Organisation’ (Hopkins, Toohey, Else et. al., 2012) identified potential OHS drivers for discussion in organisations with high risk hazards and those where risks are lower.

The objective of this chapter is to build on the OHS Body of Knowledge chapter *Risk* to provide generalist OHS professionals with an understanding of risk and decision-making that will equip them to work with managers and other decision-makers to identify and acknowledge perceptions, biases and other factors to effectively integrate OHS risk into decision-making at both organisational and operational levels. The chapter begins by defining different types of decisions and the legal, moral and ethical issues associated with decisions about risk. It reviews the theory of decision-making and the research examining the factors influencing decisions about risk. The chapter concludes by presenting a model to inform such decision-making and discussing the implications for OHS practice.

1.1 Chapter development

This chapter was developed through a consultative process with a range of OHS professionals, researchers and decision-makers.

In November 2013, the Minerals Industry Safety and Health Centre (MISHC) at the Sustainable Minerals Institute at the University of Queensland hosted a workshop (Appendix 1) designed to identify issues affecting risk and decision-making and to discuss how these issues can be managed by OHS professionals to ensure risk is considered in decisions. Workshop attendees (n=38) included representatives of State and Federal Government agencies, a range of industries, tertiary OHS education institutes and researchers, and private consultancies. The workshop identified significant issues to be addressed, recent research on decision-making and the practical aspects of risk and decision-making that impact the workplace. The outline for this chapter was developed based on the results of the workshop.

After completion of a draft chapter, a small number of workshop attendees were invited to participate in a focus group to refine the chapter content. This focus group met in October 2014 to provide feedback on the draft and develop the summary models. The chapter was then further peer reviewed and revised to arrive at the final version.

1.2 Types of decisions

Decisions are made at different levels in an organisation's hierarchy and may range from setting goals and targets for the entire business enterprise to regulating day-to-day activities. There are four types of risk-related decisions of interest to the OHS professional:

- Strategic decisions
- Tactical decisions
- Operational decisions
- Contingency decisions.

It is in the strategic and tactical decision-making that managers have the greatest potential to both satisfy the responsibilities placed on them by statutes and make a significant contribution towards the prevention of injury or ill health.

1.2.1 Strategic decisions

Strategic decisions, made at the higher levels of management, are major choices of actions that influence the whole or a major part of an enterprise or operation. They contribute directly to the achievement of organisational goals and have long-term implications for the enterprise

and its operation. New strategic decisions may involve a major departure from established practices and procedures and there may be a significant value associated with the decision either in terms of financial rewards/costs or OHS aspects.

1.2.2 Tactical decisions

Tactical decisions are usually taken by professional staff such as specialist engineers and middle management. They usually have a short to medium term impact. They operationalise strategic decisions and are directed towards developing plans, structuring workflows and establishing or acquiring resources such as people and materials. These decisions are made within constraints over which the decision-maker may have little or no control (e.g. cost and reliability). Recognition of these constraints is necessary for understanding why the decisions are made and in order to influence those decisions. In an OHS context these decisions are usually about 'doing things better', i.e. changes to technology or methods of work and possible and proposed changes to existing risk control measures.

1.2.3 Operational decisions

In many organisations there is a group of people who are responsible for day to day operations who are specialists in their field. As such they have a significant degree of autonomy, provided they operate within the constraints laid down by formal procedures. Paradoxically, complex operations may require more frequent decisions by operations personnel because it may be impractical to try to anticipate every eventuality and so provide procedures to cover them. These operational decisions may be time pressured (or at least strictly time bounded) as well as constrained by rules.

High reliability organisations (HROs) have been identified as organisations that are especially good at operational decision-making. In such organisations, not all decisions are made by those high on the organisational chart. There is an acknowledgement that some decisions need to be made by staff with particular expertise, with decision-making migrating to individuals with expertise irrespective of their hierarchical position within the organisation; that is, 'deference to expertise' (Weick & Sutcliffe, 2007).

OHS professionals are not expected to be experts in all operational areas, but rather to ensure that systems are in place to support experts in other fields when making decisions that have an OHS impact. Such advice may include the development of rules which define the boundaries within which choices may be made and advice to the organisation about the role, scope and limitations of a procedural approach.

1.2.4 Contingency decisions

These decisions are made under emergency situations, are driven by rapidly changing circumstances and are the realm of emergency response personnel as well as drivers, pilots and control room staff (when faced with an emergency and an excess of alarms). These decisions are not addressed in detail in this chapter.

2 Moral, ethical and legal issues

While legal issues have long been considered to influence organisational decision-making more recently ethical decision-making has been linked to corporate social responsibility (O'Donohue & Wickham, 2010) and the continuity of the 'licence to operate' for companies and operations. Jones (1991, p. 367) defines an ethical decision as "a decision that is both legal and morally acceptable to the larger community." While the terms 'ethical' and 'moral' may be used interchangeably moral aspects can be considered to relate to personal decision-making, while ethics relates to the social system, in this case often the organisation, in which the morals are applied and are often encapsulated in standards or codes of behaviour expected by the group to which the individual belongs.¹ Thus ethical decision-making within an organisation relies partly on the personal values (morals) of individuals but is also driven by the organisational culture (the ethics). In OHS risk-related decision-making the balance between legal, moral and ethical issues is complex and is influenced by the relationship between the decision-maker and those potentially experiencing the negative outcomes together with other factors such as any voluntary nature of assumption of risk and knowledge about the risk.

This section identifies whether legal, moral and ethical considerations exist for different scenarios and reviews the criteria for determining required standard of controls.

Viner (2015, p.122) describes four situations and their legal, moral and ethical obligations.

- | | |
|----------|---|
| Class 0: | This includes events such as a comet hitting the Earth where nothing about the risk, including exposure, can be changed and so there is no point in attempting any analysis. |
| Class I: | Consequences affect people or the environment. Acceptability is determined by comparing existing control measures with required standard of care. The standard of control is determined by legislation and how courts are likely to interpret the required standard of care and |

¹ As discussed at <http://www.wisegEEK.org/what-is-the-difference-between-ethics-and-morals.htm>.

control measures. Analysis focuses on what is the required standard of care.

What situations are must do; should do; could do? How rapidly can changes be funded? How much can the organization afford?

- | | |
|-----------|--|
| Class IIa | Property damage. There are no moral and ethical obligations (or they are ignored). The standard of care is about whether the degree of risk is acceptable to the person or the organization. i.e. What level of risk is tolerable? |
| Class IIb | No moral or ethical obligations with decision-making focusing on cost effectiveness of improvements to reduce risk. How does the law of diminishing returns apply? |

In what Viner calls Class I evaluations, the moral and ethical obligations depend on the relationship between the body responsible for the risk and the people or environment potentially suffering the risk. These relationships may be: employer-worker; company-client; company-public; company-environment; government-public. The focus of this chapter is company-based decisions including those as an employer.

Viner provides criteria for further classifying his Class I situations as either: ‘must do’ (covered by regulation or considered reasonably practicable); ‘should do’ (covered by code of practice) or ‘could do’ (where financial justification is appropriate). (See section 6.2.3 for a discussion on financial justification.)

From a legal perspective practicability is important in determining ‘must do’ situations. The OHS Body of Knowledge Chapter on *Principles of OHS Law* (Foster, Sherriff, Windholz et. al., (2014) provides a discussion on the definition and application of the ‘reasonably practicable’ requirement.

What is reasonably practicable must be identified in relation to the particular circumstances existing at the particular time. This must be done by assessing all relevant matters to determine what is reasonably able to be done. Matters that must be weighed up include:

- (a) the likelihood of the hazard or the risk concerned occurring; and
- (b) the degree of harm that might result from the hazard or the risk; and
- (c) what the person concerned knows, or ought reasonably to know, about:
 - (i) the hazard or the risk; and
 - (ii) ways of eliminating or minimising the risk; and
- (d) the availability and suitability of ways to eliminate or minimise the risk; and
- (e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk (WHS Act, s 18; see also OHS Act 2004 (Vic), s 20).

What is reasonably able to be done has two elements – what *can* be done and whether it is *reasonable* to do less (and if so, what) than that which will achieve the highest level of protection that is possible. Elements (a), (b) and (e) above relate to the question of reasonableness, while elements (c) and (d)

relate to what can be done. Also, control is a factor relevant to determining what can be done by the duty holder. Consideration of cost is not limited to circumstances where the cost of achieving further minimisation of risk is grossly disproportionate to the risk. It also may be relevant to deciding between risk controls or combinations of controls that will achieve an equivalent level of risk minimisation. (Foster, et al., 2014. p.13)

Thus, from a legal perspective, as Viner (2015, p.140) points out for Class I situations, decision-making is not about a ‘tolerable level of risk’, ‘risk appetite’ nor about notionally achieving a point on a risk assessment matrix; rather, it is about achieving the required *standard of control suited to the situation*. In this context, the OHS professional needs to be aware of the distinction between the meaning and application of the ideas of best practical technology (cost and functional inconvenience may be considered) and best available technology (cost and functional inconvenience may have only a small influence in the decision) (p.130).

OHS risk-related decisions always have an ethical and moral aspect, as decisions are made about situations in which injury and ill health is possible and the decision-maker is not necessarily the same person as the at-risk person and those who are at risk may not be personally known to the decision-maker. Rowe (1977, p.127) provides a valuable discussion of the ideas of value discounting in both space (emotional distance) and discounting in time (since the last experience or the likely number of years into the future before an experience occurs). More care is taken in decision-making when the likely victim is known to the decision-maker and especially (and in decreasing weight) if they are a members of the decision-maker’s own family, social group, community, nation etc. Managers who have no personal relationship with the at-risk group on whose behalf they are making a decision to improve (or not improve) risk controls may well be more inclined to weigh the humanitarian aspects of the decision more lightly than the financial. The need to improve may also not be accepted if there have been no injuries from the risk in the remembered past or they cannot be imagined in the future.

As summarised by Viner, the urge to improve risk control standards is high for an at-risk person as the consequence is personal (I could be injured) and the cost of reducing the risk is borne by the organisation. On the other hand the urge to improve risk controls is low for the decision-maker as typically the risk is not personal to them (discounting in space), the cost of making the change is seen as immediate but the adverse consequence may not happen at all, or at least not for some time, especially if it has not yet happened (discounting in time). The truth of this can be seen in the numerous examples of negative or delayed decisions suddenly reversed after a fatality. The Piper Alpha incident (1988) gives an example of discounting in space and time. Subsea isolation valves on offshore pipelines were seen as an unnecessary

cost until the uncontrolled pipeline fire under the Piper Alpha platform revealed the consequences of not installing such valves.

Other factors which may influence the mental model of those making decisions about risk and have an ethical and moral component are that the situation is perceived differently depending on: whether the risk is imposed voluntarily or not; whether there is a direct benefit for running the risk; and whether knowledge of the risk exists or is withheld (Rowe, 1977, p.120.) Decision-makers may feel there is no need to improve risk controls because people accept similar risks or risks perceived to be of similar significance in their personal lives, for example in recreational activities. However, in situations where there is a duty of care to workers and others this is irrelevant.

Clegg et al., (2007) assert that management's task in relation to ethical decision-making is to enhance and maintain structures that promote understanding of risk and uncertainty as opportunities and responsibilities. The importance of 'license to operate' as a critical success factor for many companies reflects the growing understanding of the salience of effective risk management. Decision-making entails choosing amongst possibilities, and ethical decision-making includes taking responsibility for the consequences of decisions made.

The following criteria have been suggested to ensure organisational decisions encompass ethical considerations (Decision Innovation, 2014):

- Compliance – with company values and legal requirements
- Promotion of good and reduction of harm
- Responsibilities as individuals and good corporate citizens
- Respect and preservation of rights – individual and organisational
- Promotion of trust
- Building of reputation.

3 The theory of decision-making

Research on decision-making as both an individual process and a management process in organisational settings has a long history and has been taken up by a wide range of academic disciplines, including economics, management and cognitive psychology. Understanding the theoretical basis of decision-making as it applies to the type of decision will assist OHS professionals understand how risk is or can be incorporated into such processes.

This section draws on work included in the National Research Centre for OHS Regulation Working Paper 74 (Hayes, 2010) and Hayes's (2013) *Operational Decision-making in High-hazard Organizations*.

3.1 Classical decision-making

Many of the aids and training programs presented to management to improve decision-making use the 'classical decision method' involving rational analysis of a range of options in order to make an optimal choice. This traditional theoretical approach to decision-making as described in much of the economics and management literature takes a cognitive approach, dividing all decision-making into four generic steps as described by Flin (1996):

1. Identify the problem
2. Generate a set of options or possible solutions
3. Evaluate each option (using a wide range of strategies)
4. Select and implement the best option.

This approach is the cornerstone of decades of decision-making research and is generally known as *rational choice theory*. Decision-makers are seen as 'rational actors'; that is, individuals who make choices based on logical analysis of all available options. Much of the research has focused on steps three and four; that is, how best to evaluate the available options and which of these should be defined as 'best.' A common application of rational choice theory involves identification of a set of criteria that represents all the different features of the listed options and development of a weighting for each criterion; each option is rated against each criterion and total scores are based on the cumulative total of rating multiplied by weighting for all criteria for each option, allowing selection of the best option. The most well-known example of classical decision making in practice is the Kepner Tregoe method where decision making options are evaluated by being scored against a set of weighted criteria generated by the decision maker.

Research indicates that in many situations people follow classical decision theory in only the most approximate fashion. Researchers in this traditional mode of decision-making see the four-step approach described above as normative with observed variations due to the cognitive complexity of the evaluation required.

If there are several options available to the decision-maker and each has a range of advantages and disadvantages, then the mental assessment required to determine the best option using the rational choice method quickly exceeds an individual's capacity. Possession of insufficient cognitive capacity to assemble and evaluate all the necessary facts in the case of complex decisions is known as 'bounded rationality' (Simon, 1956). Consequently,

individuals develop rules of thumb that shortcut the process. While such rules may be cognitively economical, they are seen as approximations that may be biased.

Significant factors biasing the decision-making process were identified by Tversky and Kahneman (1974), who described the simplified shortcuts of intuitive thinking, or heuristics, and explained some 20 biases as manifestations of these heuristics. Three biases relevant to this discussion are availability bias, representativeness bias and confirmation bias.²

Availability bias (Fiske & Taylor, 1984; Nisbett & Ross, 1980; Tversky & Kahneman, 1974) is a tendency, in making a judgement about the likely frequency of an event, to give increased weight to items that are readily ‘available’ to our thought processes; that is, those things that spring readily to mind. For example, after purchasing a new car, suddenly there seem to be more of that particular model on the road. Direct experience can be a fairly accurate estimate of the frequency of an object or event, but if the event or object is rare and/or experience is not representative in some other way, the availability bias can lead to significant errors in judgements about frequency.

Representative bias involves comparing an unfamiliar event or situation to an existing prototype that already exists in our mind that is considered the most relevant or typical example. Thus judgements are made based on the ‘fit’ of the particular event or situation into a given category based on previous experience which can result in bypassing logical analysis to make judgments such as men in suits are likely to be managers. (Fiske & Taylor, 1984; Nisbett & Ross, 1980; Tversky & Kahneman, 1974).

Confirmation bias is often demonstrated in decisions regarding OHS risk. It is the tendency for people to favour information that confirms their preconceptions and beliefs. (Fiske & Taylor, 1984; Nisbett & Ross, 1980; Tversky & Kahneman, 1974). This bias impacts on how information is gathered and processed to make it fit what we want to believe (This can lead decision-makers to rationalise away information that is problematic, unclear, ambiguous or conflicting.)

Many researchers in decision-making (e.g. Tversky & Kahneman, 1974) see the rational choice model as generating a result based solely on logic and analysis. Critics of this model (and there are many – see for example Carroll, 1993; Klein, 1998, 2003; Reed, 1991; Turner, 1990) point out that in reality the decision-maker is required to make many small decisions to generate a range of options to consider, a list of evaluation criteria and their relative

² See also section 5.3, *OHS BoK Principles of Psychology*.

weightings, and the scores of the individual options. A single judgement on a large scale has been replaced by many smaller-scale judgements.

Studies that resulted in development of rational choice methods were based on experimental method with participants observed while undertaking specifically created tasks. In the experimental method, the researcher and/or decision-maker has a high degree of control over the task and the resultant theories tend to assume that the processes take place in isolation. In most organisational contexts this is not the case and decisions are made as part of the overall socio-technical system.

3.2 Naturalistic decision-making

Naturalistic decision-making (NDM) has evolved to address many of the weaknesses of the classical, rational approach (Klein, 1998, 2003; Lipshitz et al., 2001a,b; Salas & Klein, 2001). The underlying assumption of NDM is that decision-making can be best understood and improved by studying ‘expert’ decision-makers in naturalistic settings; that is, people doing their jobs rather than people completing an artificial task in an experimental setting.

Naturalistic decision-making research has shown that experienced people under pressure in complex situations do not generally use the classical approach to decision-making (Klein, 1998). Under these circumstances, people tend to operate in a manner depicted by the recognition-primed decision (RPD) model (Klein, 1998). RPD model development evolved from field observations and interviews with fire fighters, neo-natal intensive care nurses, surgeons, weather forecasters, military field commanders and pilots. Thus the context for the research was situations which are circumstance-dependent and may be subject to rapid change.

In the RPD model (Figure 1), decision-making is not a ‘once-through’ process of searching for the best option, but rather a cyclic process where the aim is to choose an acceptable option and then improve upon it based on the observed system performance. As described by Klein (2003), the process involves a decision-maker noticing situation-generated cues, recognising patterns formed by the cues (based on experience), focussing on a potential solution or ‘action script,’ and imagining potential outcomes of action implementation. The latter involves experience again in the form of the decision-maker’s mental model of the overall operations. If the imagined outcome is ‘good enough,’ then the action is implemented.

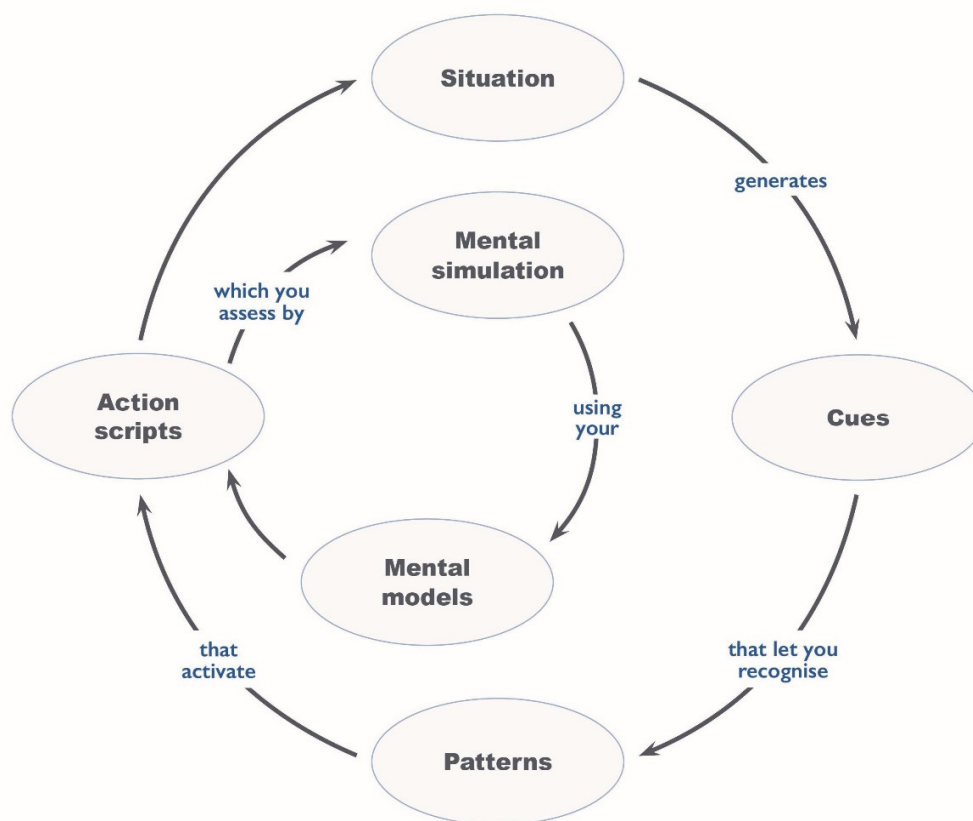


Figure 1: Recognition-primed decision model (Klein, 2003, p. 26)

The process becomes cyclic as the situation changes, either as a result of the action taken or due to external influences. If the situation change is due to the action taken, then the change may confirm or challenge aspects of the decision-maker's mental model. The process by which a decision-maker updates their mental model can be described as 'sensemaking' (section 3.3).

Mental models pervade RPD in a way that is not reflected by the single circle in Figure 1. This includes recognising patterns of cues, their links to possible actions ('action scripts') as well as the likely effects of the actions. In a practical sense, the normative value of the RPD model is in emphasising the importance of mental models. Improving the breadth and validity of mental models then becomes the practical strategy for improvements to decision-making. While Klein (1998, 2003) emphasises the differences between the RPD model and classical decision theory (primarily that the RPD model does not involve comparison of options), there are some similarities. Each model starts with problem recognition and definition, then moves through selection and implementation of a course of action. The action is chosen consciously

by analysis in classical models and subconsciously based on expertise in the RPD model. Some decision researchers claim that the idea of decision-making in itself is a social construction and that this step occurs after the action has taken place to justify and make sense of our organisational experience. This is discussed further in section 3.3.

The fieldwork on which the RPD model is based has been carried out in an environment where feedback on the effectiveness of the decision is available in a fairly short (but not too short) time frame. The model assumes that adjustments to the course of action chosen are possible based on feedback received. This means that further information must be available to the decision-maker in time to adjust the chosen ‘good enough’ course of action and hence to improve the overall outcome. However, if operations are tightly coupled (i.e. where events can escalate rapidly from the initial cues to an irreversible outcome), there may be no opportunity to improve upon an initial decision that was judged to be ‘good enough’.

While there are some important differences between NDM models and classical decision-making, both view decisions as discrete events that can be studied in isolation of the organisational circumstances within which choices are made. Reason’s (1997) Swiss Cheese model reminds us that organisational factors are the ultimate cause of choices made (both good and bad) by those lower in the organisational hierarchy. Another body of research that frames actions of an individual as resulting from their organisational context and experience is sensemaking theory.

3.3 Sensemaking

A different view of the process of decision-making is offered by the literature on sensemaking, which is “about the interplay of action and interpretation rather than the influence of evaluation on choice” (Weick, Sutcliffe & Obstfeld, 2005, p. 409).

The process of sensemaking is triggered by an unexpected or incongruous event. People literally ‘make sense’ of events and come to a conclusion about appropriate action. Sensemaking has much in common with the concept of mental models, but focuses on the process by which such models are continually formed and refined. This focus on process rather than outcome emphasises the transient nature of sensemaking and the fluid nature of event interpretation. A decision-maker therefore no longer makes a choice, but acts deterministically as a result of the sense that has been made of the situation at the instant in time that action is initiated.³

³ For an in-depth discussion of sensemaking see Weick, K.E. (1995) *Sensemaking in organisations*. Thousand Oaks. CA Sage Publications.

Snook (2000) used sensemaking as a frame for his analysis of the accidental shoot-down of US Blackhawks over northern Iraq (which resulted in 26 ‘friendly fire’ fatalities):

“I could have asked, “Why did they decide to shoot?” However such a framing puts us squarely on a path that leads straight back to the individual decision maker, away from potentially powerful contextual features and right back into the jaws of the fundamental attribution error. “Why did they decide to shoot?” quickly becomes “Why did they make the wrong decision?” Hence, the attribution falls squarely onto the shoulders of the decision maker and away from potent situational factors that influence action. Framing the individual-level puzzle as a question of meaning rather than deciding shifts the emphasis away from individual decision makers toward a point somewhere “out there” where context and individual action overlap. Individual responsibility is not ignored. However, by viewing the fateful actions of TIGERS 01 and 02 as the behaviours of actors struggling to make sense, rather than rational attempts to decide, we level the analytical playing field toward a more complete and balanced accounting of all relevant factors, not just individual judgement.” (pp. 206-207)

From a sensemaking perspective, decision-making becomes a retrospective process. Situational interpretation leads to action, which is then rationalised and described with hindsight as a process of decision-making. Laroche (1995) takes this view further by suggesting that decision-making is a social representation developed by managers who wish to take a heroic view of their own behaviour. He contends that decision research fails to recognise the basic assumption that decisions and decision-making processes are realities, and advocates that an ‘action perspective’ is a more valid view of the reality of organisations, and that decisions and decision-making should be studied as social representations that influence behaviour and understanding.

Sensemaking provides a useful conceptual link between the individual and organisational processes. Klein’s (1998, 2003) work (described in section 3.2) focuses on the experience of the individual as the determining factor in action selection. Other models (such as Reason’s Swiss Cheese Model of incident causality) portray individuals as strongly influenced by their organisational circumstances. The concept of sensemaking allows both aspects to be integrated into individual decision-making.

Although the sensemaking perspective is non-rational in that the decision-maker’s actions are not seen as only based on logic and analysis, it provides a framework that accommodates both rational and non-rational elements. By combining individual and organisational, and rational and non-rational elements into a single descriptive framework, the sensemaking perspective can provide a useful guide to thinking about safety decision-making involving conflicting goals.

3.4 Efficiency – Thoroughness Trade- Off (ETTO)

Hollnagel (2009) also found that the classical decision-making process where the decision-maker is completely informed, infinitely sensitive and rational requires more than most

decision-makers are capable of and time that may not be available. He offers another perspective on decision-making based on observations that humans habitually make a trade-off between efficiency and thoroughness.

Hollnagel describes this Efficiency Thoroughness Trade-Off or ETTO principle:

In its simplest possible form, it can be stated as follows: in their daily activities, people routinely make a choice between being efficient and being thorough, since it rarely is possible to be both at the same time. If demands for productivity or performance are high, thoroughness is reduced until the productivity goals are met. If demands for safety are high, efficiency is reduced until the safety goals are met. (Hollnagel, 2009, p. 15)

The ETTO principle is a common feature of human performance at the level of both the individual and the organisation. Hollnagel lists a number of reasons why an efficiency-thoroughness trade-off can occur including:

- Limited availability of resources, especially time
- The natural tendency for humans not to use more effort than needed
- Social pressures from managers, colleagues or subordinates, for instance to do things a certain way by a certain time
- Organisational pressures where there may be conflicting official priorities ('safety first') and actual practice ('be ready in time')
- Individual priorities, habits of work, ambition, etc. (Hollnagel, 2007).

Hollnagel (2009, p. 35, 36) provides a list of what he calls 'ETTO rules' which can be observed in all workplaces from the factory floor to the board room. Some examples of these rules are:

- "It looks fine" so there is no need to do anything or this step can be skipped.
- "It is normally OK, there no need to check" or "we have done this hundreds of times, it will be OK".
- "It will be checked later by someone else" so we can skip it now.
- "Doing it this way is quicker/more resource efficient".
- "We must get it done" (before the deadline/someone else beats us to it).

Hollnagel defines efficiency as being about getting something done in time or with little time to spare, even if it means being less precise; while thoroughness is about being as precise as possible even if it means running the risk of being short on time or unable to respond when something unexpected happens. Humans demonstrate a preference toward efficiency over thoroughness, as efficiency is seen to give a greater level of control. This preference towards

efficiency increases as the environment becomes more uncertain. Thus: as the work environment becomes more complex; the rate of change increases; performance demands increase (partly in response to technology); there is a greater pressure toward efficiency and so less possibility of thoroughness in decision-making.

3.5 Rules, procedures and decisions

Perhaps a useful way of linking the four approaches to decision-making is to consider the role of rules in decision making. As Hale and Borys (2013a,b) have described, rules can take three general forms:

- Rules that specify goals to be achieved
- Rules that define the process to be followed in order to decide on a course of action
- Rules that define a specific concrete action or system state.

Goal-based rules give the highest degree of freedom to the decision maker. This type of rule specifies only the general outcome required and leaves the details of how the goal is to be achieved unspecified.

Process-based rules describe the sequence of steps that the decision maker is required to complete before coming to a decision about the course of action required. In this case, the detailed outcome is not specified (although a general goal is usually inherent in the context of the prescribed process).

Action rules specify tightly the behaviour required of an individual and so almost eliminate the need for any decision making. They involve much less interpretation than the other types of rules. Examples are hard and fast requirements to wear specific protective clothing to undertake certain activities or requirements for staff to be licensed in order to carry out certain tasks. Detailed operating procedures are also mainly action rules.

Any real rule may include some features of each of these kinds of rules. It is the role of the OHS professional to assist in making sure the right types of rules are used for the right purpose – and that appropriate systems are in place to support the expertise of decision makers when they are required to exert their judgement in the form of a decision that has OHS implications.

4 Factors influencing decisions about risk

As discussed in section 2, decision-making about risk is, or should be within legal, ethical and moral constraints. In many cases there will also be actual or perceived cost/operational

constraints. Decision-making is also influenced by personal and contextual factors for the decision-maker. Thus risk-related decisions will be the result of a complex interplay of all these factors.

Decisions about risk will be influenced by how the risk is perceived by those making the decision. Risk perception is not fixed, but is constructed based on an individual's experience and situation characteristics. Whether the decisions are strategic, tactical, operational or contingency-related those involved in making the decision are influenced by personal and external factors that may develop from the situational, social or organisational context. The OHS professional must understand these influences in order to facilitate appropriate decision-making about risk.

This discussion on factors influencing decision-making about risk begins by recognising the role of mental models and risk communication. A model is then presented describing the internal and external contextual factors potentially impacting on decision-making. While these factors may apply to more than one type of decision, the section then makes some specific comments on operational and tactical/strategic decisions.

In contingency decision-making, the immediate nature of threatening circumstances and the requirement for a rapid response impacts on the decision-making process in a unique way. There is a considerable body of knowledge addressing such decision-making and this is not addressed in this chapter.

4.1 Mental models and knowledge

One view of human reasoning is that it depends on 'mental models' which are an individual's intuitive representation of how things work in the real world. Such models may be constructed from perception, imagination or the comprehension of discourse. (Johnson-Laird, 1983). Mental models are important in decision-making as people are more likely to infer that a conclusion is valid if it is consistent with their mental model.

All decision makers in organisations come to any particular decision with a mental model of the situation in mind. Mental models are built based on experience and knowledge and may be flexible. It is therefore critical that those making important OHS decisions are aware of their mental models, the possible limitations of such models and have sufficient expertise, or at least have expert advice available, to modify their mental models to take account of new information.

Investigations into major disasters often shown major flaws in the mental models of those involved. The Deepwater Horizon accident (Hopkins, 2012) was caused in part because those on the rig refused to believe evidence of well control problems. Instead, they created a spurious explanation (the so called ‘bladder effect’) to explain away the test results and so align what was happening with their mental model (which did not allow for the possibility of a well control problem). Those involved had apparently never seen such a thing, although it was not unknown in their industry.

Problems with mental models are not confined to operations personnel. In the case of the San Bruno pipeline failure, senior management apparently failed to understand the potential for a major disaster as a result of the cuts to inspection budgets that had taken place over several years prior to the accident. In this case, the Board members were all people with a background in business support functions such as finance and accounting with no Board member having any technical expertise in the high pressure gas pipeline sector. Again, their collective mental model of the impact of their decisions was flawed. (Hayes & Hopkins, 2014)

4.2 Communication

Both the development of mental models and subsequent decision-making will be influenced by communication about risk. There is a large body of literature on the subject of risk communication and why it succeeds or fails in different circumstances. Beginning in the 1970s, communication about risk was strongly influenced by people with scientific and engineering backgrounds. Initially, it was believed that for people to appreciate risk and consequences all that was required was provision of clear and understandable information. This approach has been recognised as inadequate by many risk communicators (Covello & Sandman, 2001; Ropeik, 2006; Slovic, 1999). Risk communication needs to consider the inherent complexity and the understanding of the concept of ‘risk’ as well as the inadequacies of viewing risk assessment as a purely scientific process (Slovic, 1999). As outlined in the Standards Australia Handbook *HB 327:2010 Communicating and Consulting about Risk* (SA/SNZ, 2010), it is important that risk communication clearly offers the facts of the situation, but also takes into account:

- The willingness to consider new information
- Confidence or trust in such information (or its source)
- The relative importance given to information
- The selected methods of transferring the information and the form of information provided.

Covello and Sandman (2001) identified obstacles to risk communication, including:

- Uncertainty, complexity and incompleteness of data
- Factors influencing how individuals process information about risk
- Distrust
- Selective reporting by the news media.

The first two obstacles listed above are arguably most relevant to OHS risk decision-making. Firstly, uncertainty, complexity and incompleteness of data can adversely affect risk communication in the workplace. To make effective decisions, managers need to know the potential harm posed by threats (e.g. to health or safety). Although risk assessments are designed to provide this information, they seldom provide exact answers. The outcomes of risk assessments are estimates, with varying degrees of uncertainty that can justify conflicting interpretation of the data depending on the perceptions and values of the decision-makers. This has been identified as an issue by Dekker (2011), who argued that the selection and presentation of information – the framing of the risk – will influence the decision. (See section 5 for a discussion on the role of risk assessments in decision-making.)

Secondly, also relevant to OHS risk decision-making is how information about risk is processed by individuals, including decision-makers.

As a minimum, effective communication requires information on the nature of the risk and the benefits or costs associated with it. Details of the benefits, uncertainties and risk-management issues will vary depending on the type and severity of risk and the organisational level where the decision is made. The OHS professional needs to take the audience into account to manage the perceptions and perspectives of the decision-makers for that particular risk. Sinisi's (2003) framework for effective risk communication (Figure 2) offers a practical guide for OHS professionals.

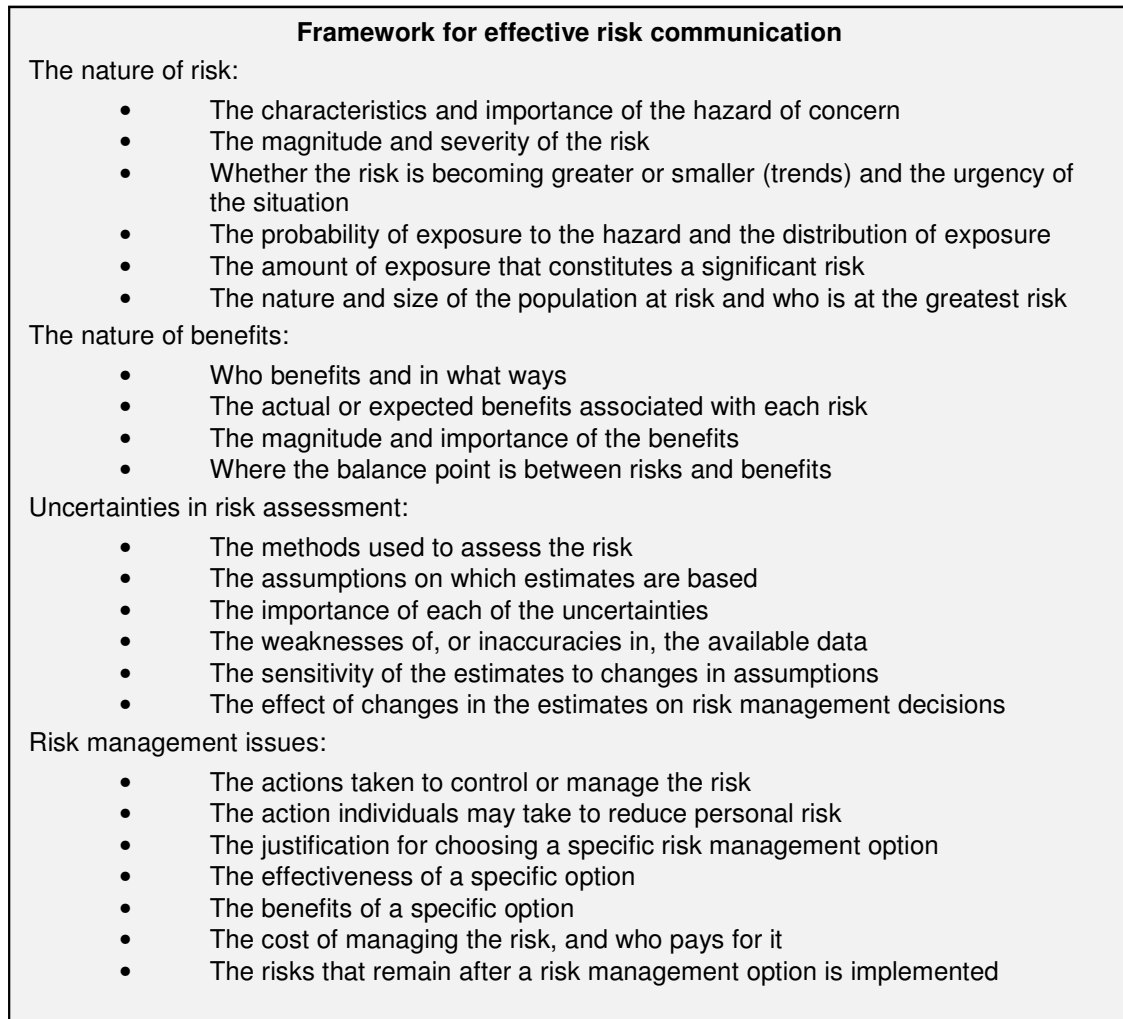


Figure 2: Framework for effective risk communication (Sinisi, 2003, p.183)

For further information, Standards Australia Handbook *HB 327:2010 Communication and Consulting about Risk* (SA/SNZ, 2010) provides useful advice on risk-communication processes.

4.3 Contextual factors

A person who is considering the riskiness of a particular event does not do so in a vacuum, but in the on-going social, situational and organisational context. A number of frameworks exist that can help us to understand these different factors that influence a person making a decision about risk. A recent example is that being developed by Bearman and colleagues, which they have called the ‘Y’ of Decision Context. The ‘Y’ of Decision Context incorporates elements of Reason’s work on organizational accidents (Reason, 1990); the Human Factors Analysis and Classification System (HFACS, Wiegmann & Shappell, 2003); and work on pressures that can lead people to make poor decisions in operational settings (Bearman & Bremner, 2013; Bremner, Bearman & Lawson, in press; Bearman, Paletz & Orasanu, 2009; Bearman, Paletz, Orasanu & Brooks, 2009; Paletz, Bearman, Orasanu & Holbrook, 2009).

The “Y of Decision Context” identifies some of the pressures that form the context in which decisions are made in the real world. These pressures can be characterised as external and internal pressures. Outside the person are pressures from social, organizational and situational factors. Inside the person are pressures from personal factors, such as: mental states, physiological states and limitations. To a greater or lesser extent these pressures influence all people making decisions about risk; they may be strong or weak, subtle or coercive, direct or indirect (Paletz et al., 2009). Moreover, the pressures are likely to be found in combination so that a person may experience pressure from multiple sources. For example, a person making a risk-based decision may have pressure from their physiological state (e.g. they may be fatigued), may feel pressure from goal seduction (to get the job done) and may be subject to pressure from people outside the organization (e.g. stakeholders). This kind of situation represents reality for many people and is the context in which decisions are frequently made. While the influence of these pressures may seem rather obvious in the dispassionate setting of a classroom or an office, in the ‘heat’ of the moment they are rarely obvious to the people who are involved. It is important then to seek to identify and manage the influence of these contextual pressures on risk-based decision making.

The pressures identified in the framework are not necessarily bad, but merely exist in a person’s operational world, unlike the conceptualisation of pressures or latent vulnerabilities in some other models (see for example Reason, 1990; Wiegmann & Shappell, 2003). Pressures are part of the normal working environment of most people and it is unlikely that any person making a decision in an organisational context would be entirely pressure-free. While some of the pressures for each broad type of influence are identified in Figure 3, this is intended to be illustrative, not exhaustive.

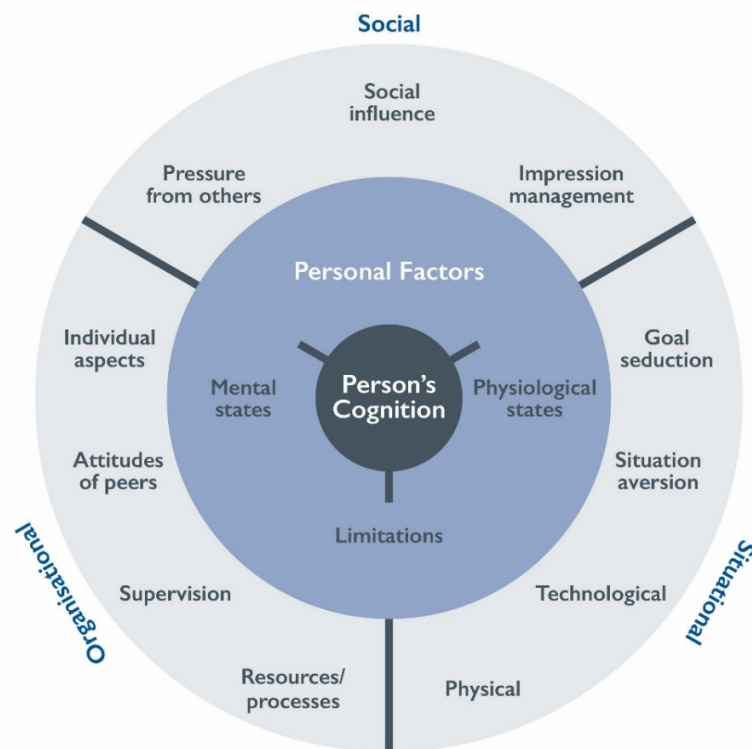


Figure 3: The ‘Y’ of Decision Context (Bearman and colleagues)

Each of the pressures on risk-based decision-making identified in the framework are discussed in more detail below with examples drawn from research conducted by Bearman and colleagues.

4.3.1 Internal personal factors

The inner ring of the ‘Y of decision context’ identifies personal factors which will influence the way that someone makes risk-based decisions. Pressure from personal factors can result from the:

- Mental state of the person;
- Current physiological state of the person;
- Mental/physical/social limitations. (Wiegmann and Shappell 2003)

Mental states include all of the mental conditions that can affect risk-based decision making. This includes typical ways of thinking and pernicious attitudes, such as: overconfidence, complacency and misplaced motivation (Wiegmann and Shappell, 2003). Mental states can also include things like: task fixation, distraction and loss of situation awareness (Wiegmann and Shappell, 2003).

Physiological states include influences on risk-based decision making from the physiological or medical condition of the person. Fatigue in particular, has well recognised effects on decision making as identified in Paterson and Dawson (2012). From a risk-based decision making perspective, sleep deprivation appears to impair flexibility of thought processes, reduces the ability to deal with the unexpected, increases over-reliance on previous strategies, makes it harder to ignore distractions and has a detrimental effect on language skills/communication. (Harrison and Horne, 2000).

Mental, physical or social limitations occur when a person is simply not mentally or physically able to conduct an adequate risk assessment or is not socially adequate to appropriately communicate it to others.

4.3.2 External Factors

External factors (the outer ring of the “Y of decision context”) are derived from the situational, social and organisation environment.

Situational Factors

Certain factors in the situation facing a person can exert pressure on their risk-based decision making. These situational factors are:

- The physical environment;
- The technological environment;
- Goal seduction;
- Situation aversion.

The physical environment refers to the operational context (such as weather and terrain) and the ambient situation (such as heat, light and smoke). The physical environment can represent significant challenges that may influence a person’s risk-based decision making. For volunteer incident commanders for example, the nightshift is considered to be much harder than the dayshift.

“Nightshift is one of the toughest of the lot as far as I’m concerned...your reflexes and everything else have got to be...50 per cent better than in dayshift.” (Bremner, Bearman & Lawson, 2014, p14)

The technological environment is the range of technology or equipment that is required to carry out the tasks involved in the work. Technological factors can create pressures that can lead people to make poor decisions. Having well designed equipment and technology that supports a person's decision making is clearly important and is a major pre-occupation of the field of human factors and ergonomics (Wickens, Lee, Liu and Gordon-Becker, 2003).

Goal seduction and situation aversion are strong situations that are considered to constrain possible alternative courses of action (Bearman, Paletz and Orasanu, 2009).

Goal seduction can be characterised as a situation where the goal is simply having too much of an influence over the decision making process. Humans are goal-oriented beings and the achievement of goals is an important part of human functioning. However at times the desire to achieve a particular goal can distort decision making. The category of goal seduction was named in honour of one of the participants in a study reported by Bearman, Paletz and Orasanu (2009). This participant stated that they got themselves into a difficult situation because they were keen to return home to see their fiancé after an extended period of time away from home. As the participant admits, the desire to see his fiancé hampered his decision making.

“Yeah, and this was a decision that was hampered or the decision was almost a decision made by my then fiancé who was talking to me and I was in [place name], she was in [place name], and was you know, promise of a good night, and that kind of an attitude.” (Bearman, Orasanu & Paletz, 2009, p558)

In this case the pilot ended up getting himself into a bad situation because the goal that he was trying to achieve distorted his risk-based decision-making.

Situation aversion in contrast can be characterised as situations where the person is pushed away from a particular situation that they perceive as aversive. These situations are not the dangerous situation that will present a genuine risk to the person, but situations that will be uncomfortable or inconvenient. The desire to avoid such situations can on occasions lead to flawed risk-based decisions. In the following quote the participant highlights the influence of such factors in making bad decisions.

“You know, where you drop into a village and once you get there you find the phones don't even work, you know, no services. They don't even have running water...I think it's important for people to understand how things come down the line sometimes... that it's easy to make bad decisions.” (Bearman, Orasanu & Paletz, 2009, p558)

Social Factors

Humans are social beings and the social context provides one of the important factors that shapes our decision making. Three main categories of social factors have been identified:

- pressure from others;
- social influence
- impression management.

Pressure from others describes the overt influence that people attempt to have over our decision making. For example, pressure can be exerted by customers and members of the general public.

“A vehicle accident you may have somebody seriously injured or trapped and other occupants of the car are not seriously injured or trapped but they are traumatised by the fact that one of their relatives or friends are in a precarious situation and they can put a lot of pressure on particularly the crew leader that you're not doing enough quickly enough.” (Bremner, Bearman & Lawson, 2014, p16).

Social influence describes the more subtle influence that observing others performing certain actions can have on our own behaviour. The behaviour of others can influence how risky we perceive a situation to be, even if we don't know any information about the other people or how they are operating. The behaviour of others can be taken as evidence of reality, that is, we observe the actions of others and assume that these people know more about the situation than we do (Deutsch and Gerard, 1955). An example of this can be found in the following quote where the pilot observed another pilot flying through bad weather, assumed that the weather must be ok to fly in and got caught in a deteriorating weather situation.

“But it got hazy, misty, foggy-type weather. So we waited, and waited, waited, and waited, and finally somebody made it through so we thought, let's go look-see, and here we go. We got up in there, almost to the other end and you could see a little—it was getting worse down there in the corner.” (Paletz, Bearman, Orasanu & Holbrook, 2009, p439)

The effect of social influence can be particularly strong when the situation is ambiguous, accuracy is particularly important or when the other person is perceived to be an expert (Baron, Vandello, and Brunsman, 1996; Cialdini & Trost, 1998).

Impression management is concerned with our management of the way that we are perceived by others. In particular we don't like to look bad in front of our peers. If someone is doing something risky, there can be quite strong pressure for another person to follow suit.

“Ego plays a big role in pushing a pilot to do something that, you know, he doesn't want to come back and say I couldn't make it or the wind was too high. . . . He's got his reputation to live up to as far as, well, three other pilots made it; what's wrong with you?” (Paletz, Bearman, Orasanu & Holbrook, 2009, p439)

or more succinctly

“This guy's flying and I really look like a [expletive] 'cause I don't want to fly.” (Paletz, Bearman, Orasanu & Holbrook, 2009, p439)

Organisational Factors

The organisation within which people work will also shape the decisions that they make about risk. Organisational factors are pressures from aspects of organizational life on risk-based decision making. This is in contrast to the social environment, which is concerned with the influence of people in the broader social context who are outside the organisation.

Organisational influences that are identified in the framework are:

- An individuals' organisational beliefs
- The attitudes and beliefs of a person's peer group at work
- Supervision
- Resource allocation/organisational process decisions.

An individual will hold certain beliefs about an organization, which can shape the way they make decisions. For example, in small commercial aviation operations, pilots are very aware that the organization needs to make money and not lose clients. This can lead pilots to take flights they otherwise would not take. As one pilot in the study reported by Bearman, Paletz, Orasanu & Brooks (2009) asserted

“You don't want to lose your clients. If you won't go and pick up those fish – someone else will”
(Bearman, Paletz, Orasanu & Brooks, 2009, p1057)

Another organisational pressure on a person is the actions and attitudes of immediate peers in the organisation. The actions and attitudes of organisational peers towards safety can exert a strong influence on a person's risk-based decision making. Such influences can be particularly strong if organisational peers have been with the organisation for a significant length of time, as the following quote shows.

“There is a core of senior personnel who've been getting away with flying in a certain way for many, many years and in some places, they end up being the ones who indoctrinate...younger pilots”
(Bearman, Paletz, Orasnau, & Brooks, 2009, p1057).

At the next level of the organisation, the supervisor of a group can also influence risk-based decision making. The supervisor tends to set the bar about risk acceptance of people in their immediate team. People then take their cues about how to act from the behaviour of their immediate supervisor. If the supervisor is engaging in behaviour that is risky, then it is more likely that others in the work group will also perceive that behaviour to be an acceptable level of risk.

“The chief pilot was flying in the [airplane name] and he went. And I figured if he can do it—I can do it.” (Paletz, Bearman, Orasanu & Holbrook, 2009, p439)

In the context of the broader organisation, decisions about resources and organisational processes can influence the decisions that are made by people at lower levels in the organisation (Bearman, Paletz, Orsasanu & Brooks, 2009; Wiegmann and Shappell, 2003). Policies, procedures, goals and direction flow from higher level to lower level employees. As an employee's level rises, so does the capacity to make influential and strategic decisions.

4.3.3 Summary

The “Y of Decision Context” identifies some of the pressures that form the context in which decisions are made in the real world. These pressures can be characterised as external and internal pressures. Outside the person are pressures from social, organizational and situational factors. Inside the person are pressures from personal factors, such as: mental states, physiological states and limitations. To a greater or lesser extent these pressures influence all people making decisions about risk and such influences may be subtle or coercive in nature. Moreover, pressures are likely to be found in combination so that a person may experience pressure from multiple sources. This kind of situation represents reality for many people and is the context in which decisions are frequently made. While the influence of these pressures may seem rather obvious in the dispassionate setting of a classroom or an office, in the ‘heat’ of the moment they are rarely obvious to the people who are involved. It is important then to seek to identify and manage the influence of these contextual pressures on risk-based decision making.

4.4 Structural features within an organisation

The ‘Y’ of decision context developed by Bearman and colleagues identifies organisation factors such as attitude of peers, supervision and resources. There are a number of other organisational factors that have been found to impact on decision-making. Some of these have been grouped under the heading of structural features within an organisation.

4.4.1 Organisational structure

A recent research project in Australia⁴ set out to determine whether the influence of technical specialists, including OHS specialists, with senior decision-makers was improved by a formal organisational structure (i.e. reporting lines on published organisation charts) giving them more direct access to senior management. In fact, technical specialists reported that their organisations are regularly restructured, often following senior management changes. In this case, the new organisational structure reflects the priorities and interests of the new senior

⁴ Unpublished Doctor of Philosophy study by Savitha Balu at Australian National University.

management team – in particular the CEO. If the CEO already sees the importance of OHS, then the organisational design will reflect that and the structures will give good access to senior levels by OHS specialists. Conversely, if these areas are not seen as significant, then they will be buried further down the organisation chart. This suggests that the location of technical safety specialists within the organisational structure may give an insight into the importance placed on this issue by senior management, but whether imposing a structure that highlights OHS management would lead to more effective consideration of OHS issues at a senior level is still an open question.

4.4.2 Background of the senior management team

Following on from findings about the control of structure by the CEO, the research also indicates that the attitude and understanding of OHS issues by the senior management team plays a critical role in determining the influence of OHS specialists. If the senior management team are already aware of the importance of safety, then they will listen to their OHS specialists. One key factor (also supported by some disaster analysis research, see for example: Hopkins, 2012; Hayes and Hopkins, 2014) appears to be the disciplinary background of the senior management team. In some organisations, the management team consists entirely of individuals with a background in management and related support functions (accounting, law etc.), rather than a background in the core tasks of the business itself. Without a representative on the senior management team who is an expert in the technical aspects of the business, such issues are not given high status in decision making.

It is worth noting that PG&E (the operator of the San Bruno pipeline) has been criticised for exactly this issue. Since the disaster PG&E has been substantially restructured to give a stronger focus on specialist technical expertise throughout the organisation, including at the most senior levels of management and even on the Board. (Hayes and Hopkins, 2014)

4.4.3 Executive remuneration schemes

In their study on the impact of executive remuneration schemes on decision-making Hopkins & Maslen (2014) note that the apparent irrationality of BP's failure to devote more economic resources to safety in the period between the Texas City explosion in 2005 and the oil well blow out in the Gulf of Mexico in 2010 makes more sense when it is recognised that organisations themselves don't act – individuals within them do.

Behaviour that seems irrational from an organisational point of view may be far more intelligible when seen from the point of view of individual actors. Their failure to spend money on the prevention of major accidents may indeed be quite rational for them. Major accidents are rare, and underinvestment can continue for years without giving rise to disaster. On the other hand, managers are judged on their annual performance, especially with respect to profit and loss. Consequently, spending money on the

prevention of major accident events is not necessarily in their short-term interest. On the contrary, cutting expenditure on maintenance, supervision and training may enhance short-term profits, while inexorably increasing the risk of disaster in the longer term. Moreover, business unit leaders tend to think in the short term because they may only be in a particular management position for a couple of years before moving on. They may thus be long gone before the results of their cost-cutting decisions become apparent. At least one commentator, Bergin, has seen this as a root cause of the Texas City explosion: “Managers did not act to prevent Texas City (he says) because every incentive and potential penalty they faced told them not to.” (Hopkins and Maslen, p.1,2)

In their interviews of managers, Hopkins and Maslen found while financial bonuses were a factor, the performance review with their supervisor gave them the clearest indication of what was really important to their supervisor/manager and how best to please them. Moreover, for the managers interviewed, they most valued positive feedback – an indication from their supervisor that their contribution is valued. In many cases the monetary reward is seen as symbolising this evaluation rather than being an end in itself.

4.4.4 OHS performance measures

Relevant, reliable and valid OHS performance data is critical to informing strategic and tactical decisions in OHS (O’Neill, 2013). While lost time injury (LTI) rate has historically been, and remains, a measure of OHS performance used by many organisations its validity as an indicator of OHS performance is increasingly being questioned. Organisation practices directed to deliberate manipulation of LTI numbers and also research indicating an inverse relationship between LTI Frequency Rate and measures of severity of injury fatality are just two factors impacting on the dissatisfaction with LTI as a valid measure. So called ‘positive performance measures’ or leading measures are increasingly being favoured but there is a lack of definitive research defining the most appropriate positive performance measures.

Taking the adage “what gets measured gets paid attention to”, whether an organisation uses LTIs, or other lag indicators and/or positive or leading indicators will impact on the perceptions and attention of senior managers and so strategic and tactical decision-making.

4.4.5 Organisational culture

The OHS Body of Knowledge chapter on *Organisational Culture* (Borys, 2014) identified a number of characteristics of organisations that focus on safety, several of which relate to decision-making.

Table 1: Characteristics of an organisation that focuses on safety

Area of focus	Practice
1. Reporting	<ul style="list-style-type: none"> Rewards bad news Challenges good news Institutionalises a reporting system Accepts that people are allowed to complain
2. Risk	<ul style="list-style-type: none"> Promotes understanding of risk and how it is controlled Institutionalises a clear and shared picture of risk Promotes ‘creative mistrust’ rather than complacency Implements structures and standards to support the control of risk Promotes understanding that work is sometimes dynamic and complex; establishes processes for dealing with complexity as well as linear aspects of work Promotes understanding of the difficulties people face in the workplace
3. Physical environment	<ul style="list-style-type: none"> Maintains excellent standards of housekeeping
4. Organisational design	<ul style="list-style-type: none"> Safety professional/s report to the CEO through a line of report separate from operations
5. Incentives	<ul style="list-style-type: none"> Implements incentive schemes for managers that focus on the control of risk rather than injury rates
6. Decision making	<ul style="list-style-type: none"> CEO makes decisions in favour of safety
7. Engagement	<ul style="list-style-type: none"> Leaders and managers engage workers in conversations about how to improve safety
8. Rules	<ul style="list-style-type: none"> Implements processes for improving procedures Trials new ideas, has less-proscriptive requirements, provides more freedom to innovate but with greater review
9. Resources	<ul style="list-style-type: none"> Provides and maintains suitable tools and equipment Provides the right materials for workers to succeed
10. Learning	<ul style="list-style-type: none"> Enables and supports ongoing learning Implements processes for understanding and learning from variability Focuses on success and setting people up for success Implements processes for making the invisible visible
11. Accountability	<ul style="list-style-type: none"> Sets clear expectations and accountability
12. Ethics	<ul style="list-style-type: none"> Looks after people Encourages whistleblowing
13. Business integration	<ul style="list-style-type: none"> Integrates safety into all aspects of the business Places safety alongside business objectives
14. Leadership	<ul style="list-style-type: none"> Leaders actively and visibly promote safety

(Borys, 2014. pp. 24, 25))

4.5 Organisational behaviour

Two processes that may be considered under this heading are a process of determining ‘a line in the sand’ which has been described in relation to operational decision-making and ‘groupthink’ which may apply to operational or strategic decision-making.

4.5.1 'Line in the sand'

Supervisors and managers making decisions about day to day operations rarely use risk-based concepts as a way of thinking about specific situations or deciding on actions - that is, they do not specifically consider chance, probability or likelihood of things going wrong. For them, safety is an active concept. Actions focus on two aspects: compliance with rules; and ensuring sufficient integrity of the barriers.

In examining operational decision-making Hayes (2013) has highlighted an important class of decisions that are being made outside existing rules and procedures by setting a situation specific 'line in the sand'. In these cases, neither the decision making process nor the criteria used is documented in the form of a procedure.

When some safety barriers that are normally in place are compromised, but no specific operating limit is in danger of being breached, operational managers set a line in the sand – a short term, situation specific limit aimed at ensuring that the system remains sufficiently safe. It seems likely that the line in the sand approach has been adopted because it supports the cognitive processes that the operational managers naturally use as experienced decision makers (Dreyfus and Dreyfus, 1986, Klein, 2003) based on intuition rather than analysis and with a strong commitment to the required outcome. Such an approach does not dictate how best to come to a conclusion about the safety or otherwise of the system. Rather, it specifies a way of helping an operational manager to stick to his/her judgement once the initial conclusion has been drawn (unless the situation changes).

4.5.2 'Groupthink'

The concept of 'groupthink' entered the safety lexicon as an outcome of various analyses of the space shuttle disasters Columbia (1986) and Challenger (2003) which killed a total of 14 astronauts. (See for example: Esser & Lindoerfer, 1989; Moorhead, Ference & Neck, 1991; Ferraris & Carveth, 2003; Dimitroff, Schmidt & Bond, 2005.)

The term groupthink is attributed Irving Janis. In his analysis of the Cuban Bay of Pigs crisis, Vietnam, Korea and Pearl Harbour Janis identified a common thread that the decision-makers had a "desperate drive for consensus at any cost that suppresses dissent among the mighty in the corridors of power"(Janis, 1971, in Dimitroff, Schmidt & Bond, 2005).

Three conditions are usually considered to contribute to groupthink:

- A highly cohesive group or a belief in collective efficacy
- Leader preference for a certain decisions

- Insulation of the group from qualified outside opinions.(Ferraris & Carveth, 2003)

Janis identified eight symptoms of groupthink which may be categorised as below:

Overestimation of the group - power and morality

Invulnerability – where, due to a history of success, even in the face of obvious dangers the group shares an illusion of invulnerability that causes them to become over optimistic and willing to take what may be extraordinary risks.

Morality – group members often believe, without question, in the inherent morality or their position.

Closed mindedness

Collective rationalisation – the group collectively constructs rationalisations that discount warnings and other forms of negative feedback.

Stereotyped views – group members often have a stereotyped view of anyone with a competing view.

Pressure toward uniformity

Pressure on others –group members apply direct pressure to anyone who questions or expresses doubts about the view held by the majority.

Self-censorship – people in the group do not want to disagree with the group consensus and tend to keep quiet about any misgivings.

Unanimity – as people with different views do not speak up there is an illusion of unanimity and thus the group feels that everyone is in agreement with the position.

Mindguarding – certain group members attempt to shield the group from adverse information that might destroy the majority view. (Summarised from Moorhead, Ference & Neck, 1991; Ferraris & Carveth, 2003; Dimitroff, Schmidt & Bond, 2005)

Some writers challenge the phenomenon of groupthink preferring to couch the faulty team decision-making in terms of a deficiency in leadership style. Moorhead et al., (1991) present a ‘revised’ groupthink framework where leadership style can dissipate or exacerbate the symptoms of groupthink while Fuller and Aldag (1998) reject the concept of groupthink, preferring to attribute faulty group decision-making to a “serious loss in attention to critical thinking” recommending a “general problem solving framework to better capture the richness” of the decision-making process. Maier’s position (2002) is that quality decision-making is a function of the quality of the information is based on and the availability of quality information requires access to experts, shared leadership and empowered organisations.

Irrespective of your position as to faulty decision-making in groups deriving from a phenomenon of groupthink or a loss of critical thinking the preventive measures seem to be similar. (Moorhead et al., 1991; Maier, 2002.) These include a range of leadership strategies that: encourage access to quality information that is not edited for political purposes; inclusion of external experts; the leader not expressing a preferred solution; all members taking the role of devil's advocate; and an empowered environment where differing opinions are welcomed.

4.6 Summary

Building on the review of the theory of decision-making in section 2, this section has emphasised that while decisions about risk may have a rational and informed basis there are many influences that may mitigate the rationality of the decision-making.

The decision-makers' mental models about the situation will always be core to the decision. While mental models can be flexible and influenced by risk communication, knowledge and experience they are strongly determined by an underpinning belief system. The decisions made based on these mental models will be influenced by contextual factors present at the time of the decision making. These contextual factors occur at two levels: internal to the person and the external environment.

Personal factors may be temporary such as fatigue, ill-health or emotional state such as anxiety or anger. More permanent personal factors may relate to the cognitive or social skills of the decision-maker.

External factors potentially impacting on decision-making may be relate to the situational, social, and/or organisational context. The situational context includes the physical and technological environment as well external factors that may impact on the decision-maker to consciously or sub-consciously modify their objectives. Social factors impacting on decision-making may be quite subtle with the most common being pressure from others and individual ego.

Organisational factors may be the most pervasive contextual factor influencing decision-making. Many of the organisational factors can be summarised under the heading of organisational or safety culture. However this approach may obscure the individual organisational factors such as: the nexus between profit/productivity and safety including available resources and time for decision-making; attitudes within the organisation to risk, especially that of the leaders; and supervision and management incentive processes such as

bonus and formal or informal performance appraisal systems and OHS performance measures.

In addition to these factors impacting on individuals making decisions there are two decision-making processes about which managers and OHS professionals should be aware. ‘Line in the sand’ decision-making based on judgment by experienced operational personnel can be productive if well informed and supported by appropriate structures. Whereas ‘groupthink’ or a loss of critical thinking by groups leads to faulty decisions.

Having identified the rational and less rational factors impacting on decision-making it is important to examine the role of risk assessments in decision-making.

5 The role of risk assessments in decision-making

Risk assessments provide the formal basis for decision-making about OHS risk, particularly tactical and strategic decisions. The OHS Body of Knowledge chapter *Risk* (Cross, 2012) identified factors that influence the assessment of risk and discussed problems associated with making decisions based on the consequence–likelihood pairing used in most workplace-based risk assessments. These issues included:

- Placing a value on potential consequences
- Defining likelihood
- Combining likelihood and consequence
- Risks with multiple possible values and types of consequence
- Risks with gradual or time delayed consequences.⁵

The UK Health and Safety Executive (Gadd, Keeley & Balmforth, 2003) has also documented their view of the limitations of risk assessments. (Figure 4.)

⁵ See OHS BoK *Risk* for detailed discussion.

Limitations and pitfalls in developing and using risk assessments

- Carrying out a risk assessment to attempt to justify a decision that has already been made
- Using a generic assessment when a site-specific assessment is needed
- Carrying out a detailed quantified risk assessment without first considering whether any relevant good practice was applicable, or when relevant good practice exists
- Carrying out a risk assessment using inappropriate good practice
- Making decisions on the basis of individual risk estimates when societal risk is the appropriate measure
- Only considering the risk from one activity
- Dividing the time spent on the hazardous activity between several individuals – the ‘salami slicing’ approach to risk estimation
- Not involving a team of people in the assessment or not including employees with practical knowledge of the process/activity being assessed
- Ineffective use of consultants
- Failure to identify all hazards associated with a particular activity
- Failure to fully consider all possible outcomes
- Inappropriate use of data
- Inappropriate definition of a representative sample of events
- Inappropriate use of risk criteria
- No consideration of ALARP or further measures that could be taken
- Inappropriate use of cost benefit analysis
- Using ‘Reverse ALARP’ arguments (i.e. using cost benefit analysis to attempt to argue that it is acceptable to reduce existing safety standards)
- Not doing anything with the results of the assessment
- Not linking hazards with risk controls.

(Gadd et al., 2003)

Figure 5: Limitations and pitfalls in developing and using risk assessments (Gadd et al., 2003)

There are two basic methodological approaches to risk assessments: risk matrices; and quantitative risk assessment; both of which have limitations which are discussed below.

5.1 Risk matrices

Risk matrices have two main applications: decision-making about risk and prioritising the order in which identified risks need to be addressed. In the OHS Body of Knowledge chapter *Risk Cross* (2012) discussed the role and limitations of probability-consequence matrices. Duijim (2015) reviewed the concerns regarding risk matrices noted in the literature adding further comments from his analysis. These concerns have been summarised below under the headings of: validity; utilisation; design; and application.

Validity

- Lack of consistency between risk matrix and quantitative measures
- Subjective classification of consequence and probability
- Lack of resolution where combinations of consequence and likelihood lead to the same risk category.

Utilisation

- Varying interpretation of the consequence and probability descriptors
- Individual cognitive bias tending to result in people choosing values in the centre or the high end of the scale.

Design

- Risk scaling is often based on ordinal scales whereas logarithmic scales give greater consistency with quantitative approaches
- Matrices only consider consequence and likelihood and so cannot incorporate other factors such as uncertainty, manageability and criticality.

Application

- Risk matrices should be designed to be appropriate for the circumstances with the descriptors for consequence and probability applicable to the circumstances and agreed by the stakeholders at the time of assessment. Contrary to specific advice in the ISO standard on risk assessment techniques (ISO/IEC, 2009) warning against the use of corporate standardised risk matrices, many organisations have adopted such standardised approaches applying the same matrix to such diverse situations as underground mining, logistics and maintenance operations.

Resolution of the problems associated with risk matrices may be in returning to the discussion on legal, moral and ethical issues in section 2 of this chapter. Where a risk situation is considered a *must do* or *should do* then it is inappropriate to use a matrix in deciding whether to take action. Thus risk matrices become useful in deciding on *could do* actions and perhaps in prioritising the timing of implementation for *should do* actions. OHS professionals involved in the use of matrices in such situations should consider strategies for optimising their design and use. (For discussion on design of matrices see Pickering & Cowley, 2010; Cross, 2012; Duijm, 2015.)

5.2 Quantitative risk assessment

Quantitative risk assessment (QRA) is often seen as providing objective information on which to base decisions about OHS risk. In his critique of quantitative risk assessments Hopkins (2004) identifies a number of issues impacting on the validity of QRA. The issues identified by Hopkins include that:

- QRA is based on the assumption that risk can be objectively measured
- QRA does not take account of the circumstance-dependent nature and so the variability of risk tends to equate rates with risk (may be rates of death, injury or equipment failure)
- QRA relies on historical data and/or systematic analysis. Obtaining such information is extremely demanding in time and resources and many assumptions are made in the process
- Data collection may be manipulated to achieve a desired outcome
- QRA does not allow for human factors, human behaviour or organisational management practices. (e.g. industry rates for a valve failure do not allow for human error in not activating a valve or non-compliance with a required maintenance regime.)

While being critical of QRA, Hopkins concludes: that it is not his intention to dismiss QRA entirely, that it can be an aid to decision-making provided its limitations are kept in mind. Hopkins agrees with Tweedale (2002) (as cited in Hopkins) that the value of assessment lies not in the computed risk outcome with its dubious precision, “but in the insights gained in undertaking the analysis and the relative magnitudes of the components of the assessed risk” (p.22).

Hopkins conclusion regarding QRA could be equally applied to qualitative risk assessment:

QRA is largely inappropriate, therefore, as a means of deciding whether risk has been driven to a sufficiently low level. In particular, it should never be allowed to over-ride sound professional judgments about necessary risk reduction measures. It can, however, have more modest uses, such as helping to determine priorities. (Hopkins, 2004. p.23)

6 Implications for OHS practice

In the introduction to this chapter it was identified that poor quality risk assessment and management and poor decision-making about risk have contributed to disasters, fatalities, injuries and disease. If there is to be continuous improvement in health and safety, the OHS professional has an important role in improving the quality of risk management and ensuring that operational and strategic decisions are relevant to the risks. There are strong links between decision-making and organisational learning practices to ensure that decisions are made on the best available information.

There is a key role for OHS professionals in ensuring that decision-making processes are effective and that the role of professional judgement and advice is acknowledged and supported. OHS professionals do not need to be content experts on all OHS-related matters to

positively influence decision-making. Applying Drucker's (1998) description of *knowledge workers* as workers who know more about what they do than their managers, OHS professionals can be considered knowledge workers. However, many knowledge workers have years of education, training and experience, but limited or no training in how to effectively influence decision-makers.

The role of the OHS professional in influencing decision-making will depend on the type of decision with the influence in strategic and tactical decisions being quite direct, and less direct in operational decisions. This section begins with some general comments on giving advice and then explores different influencing strategies for strategic and tactical decisions and for operational decisions and then comments on supporting decision-making in small and medium enterprises (SMEs). It concludes by proposing a model to guide OHS professionals in influencing decision-making about risk.

6.1 Giving advice

Advice improves decision-making accuracy and allows the decision-maker to:

- Share the responsibility of the decisions
- Test the initial decision
- Think of the decision in new ways
- Minimise effort.

Given the function of advice, it is surprising that decision-makers do not follow their advisers' recommendations as often as they should – an effect referred to as *egocentric advice discounting* (Bonaccio & Van Swol, 2014). There are a number of characteristics of advisers that can assist in mitigating advice discounting. Advisers who possess greater expert power relative to the decision-makers or other advisers are more influential. Advisers' intentions also have been shown to influence decision-makers; decision-makers are more likely to discount advice when they are suspicious of their adviser's motives or perceive the adviser to be motivated by self-interest.

OHS professionals may think that their expertise is nothing special. They may underestimate how much they know relative to their peers or superiors, thinking that everyone else must know what they know, particularly when considering in-house issues. This can inadvertently inhibit them giving crucial advice and information to decision-makers (Dunning, 2014). Alternatively, the OHS professional may consider their advice as being the only option with this presumption and the associated way the advice is offered resulting in similar 'discounting'.

Also, the type of advice matters. Advice formulated as information about decision alternatives or options is often better received than an explicit recommendation. However, when advice is explicitly solicited, or when it comes from a subject-matter expert or external consultant, decision-makers may prefer an explicit recommendation in addition to information. This is important in terms of the communication of information resulting from risk assessments.

OHS professionals can help to ensure risk information is included in the decision whether the decision is based on a rational decision-making model or otherwise. The challenge for the OHS professional is to recognise the barriers that can limit this influence and the processes and skills that can promote influence. They need to understand that decisions are rarely made in isolation and there are constraints that define the boundaries of possible decisions (e.g. financial, political), and that decisions may represent a compromise due to these constraints. Barriers to including risk information in decisions that the OHS professional can address include:

- Silo approach to information and responsibility (e.g. perceived safety department responsibility)
- Inappropriate risk assessment
- Ineffective risk communication.

The issues associated with inappropriate risk assessments and ineffective communications about risk have been previously discussed. SA/SNZ HB 436:2013 Risk Management Guidelines – Companion to AS/NZS ISO 31000:2009 (SA/NZS, 2013) discusses the problems of silo-based approaches to risk management and identifies the need to integrate risk management activities into other practices, which applies to OHS risk management and decision-making boundaries.

Goldsmith (2009) identified the following guidelines for influencing decision-makers and converting decisions into actions:

- Information needs to be ‘sold’ to the decision-maker. Do not assume the decision-maker will ‘buy’ the information. The effective influencer needs to be a good teacher and/or a good salesman.
- Focus on meeting the needs of the decision-maker and the larger needs of the organisation.
- Prepare for obstacles before they appear. Presenting a realistic cost-benefit analysis will assist.

- Decisions will be pointless without action. There is a role for the OHS professional to identify potential actions while recognising that OHS actions can have both positive and negative consequences for different organisational areas.
- Realise that decision-makers are human. When they make mistakes, focus on helping and avoid destructive comments.

6.2 Influencing operational decision-making

While operational decisions may be considered routine, often made by people considered specialists in their field, this area of decision-making has the potential to have a high impact on safety. It is important for OHS professionals to understand that rather than being solely directed by rules and documented procedures, decision-making by operators may be impacted by a number of factors. These factors may relate to the individual's mental models about the risk including where they draw the line on safety; their personal factors such as their mental state, level of fatigue; external factors relating to the social relationships; the organisation and the situational environment. These internal and external contextual factors will also influence how the efficiency-thoroughness trade-off is applied in the operational environment.

There is an important role for the OHS professional in supporting good decision-making at the operational level. In addition to the aspects discussed previously, ways in which the OHS professional can influence operational decision-making include:

- Mentoring young professionals
- Providing feedback and analysis of trends through monitoring and reporting feedback systems
- Demonstrating the importance of professional skills and judgement in informing decisions about health and safety.

One specific implication for the OHS professional is that the line in the sand approach as described by Hayes (2013) could be formalised into a procedure for decision making which requires the person in charge to write down the agreed short term operational limit (and the logic leading to it) and how the situation will be monitored to determine when appropriate action should be taken. Putting in place a procedure for operational safety decision making based on the line in the sand concept would make these safety practices more visible and hence able to be drawn in to normal management system practices such as training, review and audit. In a political environment where operational decisions are likely to come under increasing levels of scrutiny, this must be a good thing for safety outcomes and for reputation management.

6.3. Influencing strategic and tactical decisions

A feature of tactical and strategic OHS decision making is that they always have an ethical and moral aspect, as decisions are made about situations in which injury and ill health is possible and the decision maker is not necessarily the same person as the at-risk person. As discussed in section 2, for legal and ethical reasons, these decisions are not about a 'tolerability' or about notionally achieving a point on a risk assessment matrix but rather about achieving a level of risk which is 'as low as reasonably practical'. Thus the key question is 'what is the required standard of control suited to the situation?'. The OHS professional should not only understand the theoretical aspects of strategic decision-making but have strategies to influence these decisions that will impact on the safety and health of people impacted by organisation's activities.

As noted in section 1.2, the OHS professional is likely to have most direct influence in strategic and tactical decisions. This section provides guidance for influencing such decisions by: picking the battles; clarifying the context; doing the home work; and developing the relationship.

6.3.1 'Pick your battles'

Organisations, companies and individuals make many decisions every day. (There may also be a conscious or unconscious absence of decision-making when a decision is required.) No team or individual can work on every decision at once (Blenko et al., 2013). To ensure effective consideration of risk and OHS implications in decisions, it is important to identify and focus on the key or critical decisions. In other words, 'pick your battles.'

Blenko et al. (2013, p. 3) described two screens that can be used to identify key decisions:

- **Value-at-stake.** Estimate the value involved in each decision, and focus on those with the highest value. To be sure you don't miss the everyday decisions that add up over time, consider the value of a single decision multiplied by its frequency. [The type of value considered will depend on the perspective; for an OHS perspective, this may be in terms of potential harm.]
- **Degree of management attention required.** Some decisions inevitably need more attention than others. They might be more complex. Or they might have greater scope for improvement.

6.3.2 Clarify the context

For the OHS professional to actively participate in or influence strategic decision-making and ensure the inclusion of risk information in the process, there needs to be clear understanding of the context for the decision-making: the what; who; how; and when. (Blenko, Mankins & Rogers, 2013) The OHS professional can assist the decision-making by:

1. Clarifying the WHAT. It is important to know exactly what the decision to be made is about. Is a yes/no required or is it a choice between options?

2. Determining the WHO. The roles in the decision-making process need to be clear. Who will make the recommendation? Who will make the decision? This understanding is essential for the successful integration of risk into the decision process.
3. Understanding the HOW. Is the decision to be made by consensus or by one person? This will influence the information to be provided and the way the information is presented.
4. Knowing WHEN. Every major decision needs a timetable or deadline, and a schedule that ensures follow-up action. (Blenko et al., 2013)

6.3.3 Do your 'homework'

Viner (2015) describes a decision-making process along the lines of classical decision-making for tactical and strategic decisions which is divided into three parts:

- 1 Identifying situations in which the standard of care is not being met.
- 2 Developing proposals for achieving the required standard of care, which can be regarded as *must do*, *should do* or *could do* proposals. (See section 2.)
- 3 Deciding how many of the inherently justifiable proposals (of the must, should or could do types) are affordable, the budgetary requirements for them over a reasonable period of time, and management of their implementation. (Viner, 2015. p.126.)

Decisions can only be made if improvement needs and options are presented. Need is based on deficiencies in the required standard of control and the extent of the moral obligation, which is significantly greater the more severe the likely worst injury could be.

Viner makes a key point that tactical and strategic decisions should be made by the level of management that will be held responsible if the likely worst injury in fact did occur. For example, a decision should not be made at the level of the department or facility manager (most especially if it is a decision not to proceed with the proposed change) if in fact it is the managing director who would be called to account, for instance if a person died as a result. (pp.119 to126). Viner goes on to say (Chapter 8) that the larger the organisation the more likely they are to view risks as losses and find it easier to incorporate risk-related expenditure into normal capital investment operating cost decisions. Whereas if such decisions are made at the level of smaller units within larger organisations they are more likely to be seen as risks with attendant uncertainty. This reinforces the need for strategic decisions about risk-related expenditure to be made at the appropriate level of an organisation.

Management view of a request for funds to manage risk will always be influenced by the probabilistic, hard to prove and delayed nature of the benefits of the improvement compared with the more immediate budgetary impact. The OHS professional needs to understand how to develop and argue the case for effective risk control improvements, especially ones which reduce the perceived influence of discounting in time and space and the negative influence of immediate capital expenditure or recurrent costs. For this reason, such proposals should include a number of options, each of which contain clear and immediate benefits (perhaps in the form of productivity gains) and include both short term and long term improvements.

In unpublished work Viner outlines a structure for developing a proposal for justification for OHS risk-related expenditure which is alluded to in Viner (2015, p.122). This process involves three key questions:

- Has the proposal been adequately researched with consideration given to:
 - Scope of information informing the risk analysis?
 - Extent to which options focus on design/elimination and address both short and long term implementation?
 - Evidence that recommended controls will be effective and address legal obligations?
 - Both one-off and ongoing costs?
- Is the proposal justifiable considering legal requirements, level of risk, other factors impacting on the urgency or cost-benefit considerations?
- What are the options for funding and considering the legal, moral and ethical factors is it reasonable to spread the implementation over a period of time?

6.3.4 Develop the relationship

In a study on the strategic influence of OHS professionals with senior managers Pryor (2014) found that OHS professionals who were influential with senior managers had the trust of managers and that this trust derived from the credibility of the OHS professional and the relationship with the manager.

Factors such as knowledge and track record in the industry and the organisation were important in developing credibility, the ability to ‘call the shots’, ‘speak plainly’ and ‘able to handle the pressure’ were important. However, this had to be tempered with the OHS professional working to achieve change by providing leadership, a vision and creating a collective by engaging and empowering through learning, support and ownership, or what Pryor termed ‘supported empowerment’.

Pryor also identified that the influence of the OHS professional was impacted by the ability of the OHS professional to understand the manager from a personal as well as business perspective. This requires an understanding of the organisational environment and extended interaction with the manager over time where the OHS professional ‘brought the manager along’ by iterative discussion of the various views to arrive at a shared understanding.

6.4 Working with SMEs

Anderson-Marks (2014), who investigated decision-making processes in small and medium-sized enterprises (SMEs), found that:

...owner-managers base business decisions on many factors and use a range of decision-making styles depending on the type, and importance, of the decision to be made...[C]ore business decisions are more often rationally made, whilst discretionary decisions will often be made intuitively based on the information at hand (as cited in the abstract)

Because the decision-making process in small business is similar to that used by big business (Anderson-Marks, 2014), the role of OHS professionals working with SMEs to ensure the consideration of OHS risk in decision-making is very similar to their role in larger organisations.

It is important to engage small business by increasing knowledge and understanding of the benefits of considering OHS risk. This information is more readily accepted when relevant to their business and presented in a clear manner by someone with whom the owner-manager has a pre-existing relationship. Information should be effectively summarised so as not to overwhelm – too much ‘noise’ has been identified as one of the barriers to good decision-making.

6.5 A proposed model for encouragement of risk-based decision-making by OHS professionals

This chapter has outlined many factors that impact risk-based decision-making. Figure 6 summarises the relationship between these factors and the role of the OHS professional. At the centre of the model is the decision. The factors impacting on the decision may be considered from three perspectives: those related to the risk, those related to the decision; and external factors over which the OHS professional had little control.

Irrespective of the type of decision, the outcome will be directly affected by what is known about the risk and the range of control options⁶ considered (the second inner circle). The

⁶ See *OHS BoK chapter Control – Prevention and intervention* for development of controls.

knowledge and influencing skills of the OHS professional will impact on these direct factors with the scope of the knowledge and skills relating to the risk⁷ and to the decision-making process in the outer circle of the model.

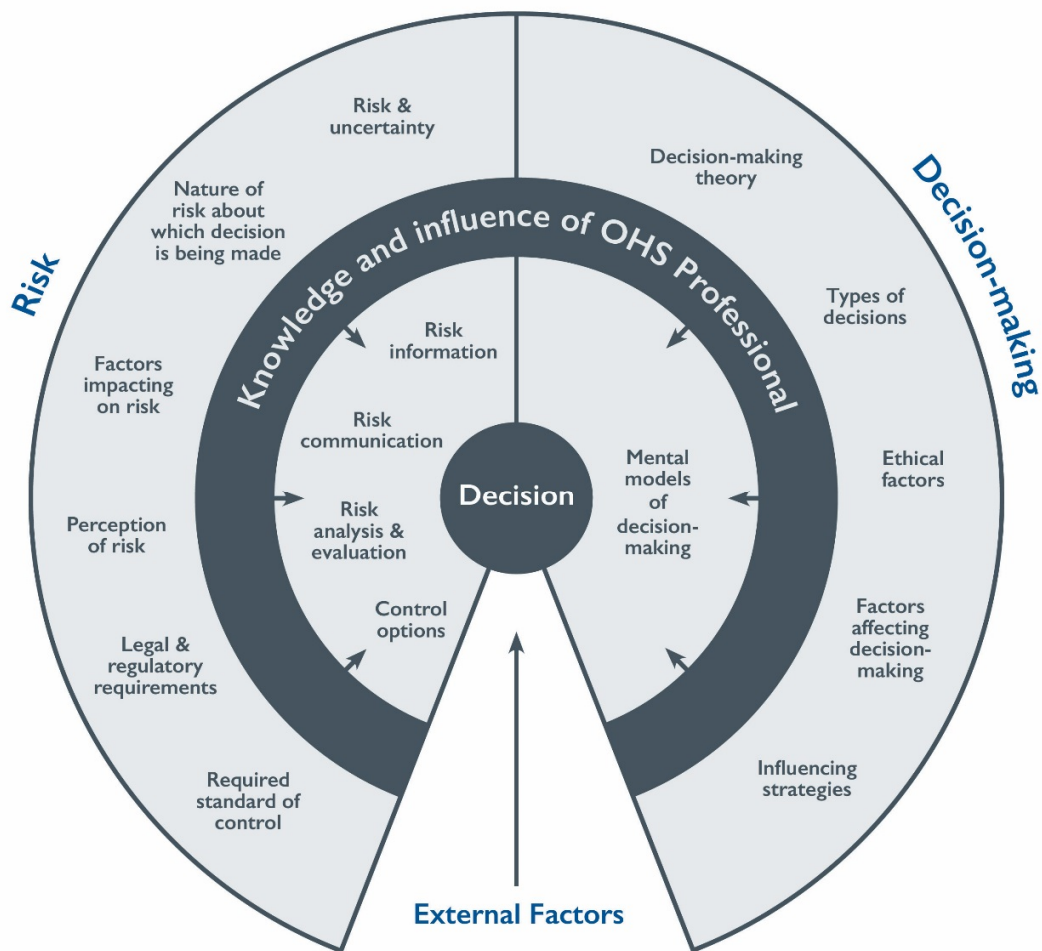


Figure 6: A model for encouraging risk-based decision-making by OHS professionals

7 Summary

The development of this chapter began with a workshop attended by 38 OHS professionals and academics working in risk and decision-making. As a group, the attendees identified that there was no cohesive body of knowledge or understanding of how decisions are made about

⁷ See *OHS BoK* chapter *Risk* for discussion on some of these factors.

risk. This is despite ongoing research on decision-making, including decision-making about risk.

This chapter presents a summary of the theories about decision-making. It identifies factors that influence how humans make decisions and how they may incorporate risk highlighting that humans are not necessarily fully rational in their decision-making processes.

The chapter emphasises that an understanding of decision-making processes, combined with effective influencing strategies will assist the OHS professional to more effectively influence decisions about risk. It has examined decision-making theory, types of decisions and factors influencing decisions along with risk communication, legal and ethical issues, and limitations of risk assessments. Finally, implications for OHS practice were discussed and a model proposed to guide the OHS professional in developing the knowledge and skills to influence decisions impacting on OHS risk.

This chapter has begun the task of collating a body of knowledge on risk and decision-making. As multi-disciplinary research about decision-making *per se* and decision-making about risk is continuing this is the beginning of the discussion.

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Appendix 1: Expert input and consultation

Workshop 1.

Risk and decision-making

12th November, Brisbane

Minerals Industry Safety and Health Centre, The University of Queensland

Workshop to explore current thinking as a basis for developing a chapter for the OHS Body of Knowledge

Program

The objectives of workshop are to:

- Explore the level to which OHS risk is/is not currently considered in organizational and operational decision-making
- Identify the barriers and promoters for the consideration of OHS risk in decision-making
- Identify the role of the OHS professional in facilitating the consideration of OHS risk in decision-making and strategies for achieving this
- Identify the knowledge required to enable the OHS professional to carry out this role with particular consideration of concepts such as risk perception and risk communication that may impact on risk as a

Program

10.00am	Welcome and introduction David Cliff, Director, MISHC Angela Seidel, member Australian OHS Education Accreditation Board, chair of the Risk and Decision-making Technical Panel
10.10	The OHS Body of Knowledge and its role in facilitating evidenced based OHS practice Pam Pryor
10.20	Risk and a concept as addressed in the OHS Body of Knowledge – an overview Professor Jean Cross (UNSW)
10.30	Session 1: OHS Risk and decision-making Presentation: The research - Dr Jan Hayes (ANU)
10.50	Panel presentations: The practice Dennis Else (Brookfieldmultiplex) Jason Economidis (Mining consultant)
11.20	<i>Short break</i>
11.35	Group discussion: <ul style="list-style-type: none">• What is your experience regarding the extent to which OHS risk is considered in decision-making?• What do you see as the barriers and promoters to OHS risk being considered in decision-making?
12.15	<i>Lunch</i>
1.00	Session 2: Factors that influence risk perception and decision-making

1.20	<p>Presentation: The research - Dr Chris Bearman, Appleton Institute, CQ University</p> <p>Group discussion</p> <ul style="list-style-type: none"> • What is your experience of the factors discussed in the presentation/reference papers? • How do you think these factors influence risk assessment and decision-making? • To what extent is risk socially constructed?
2.00	<i>Short break</i>
2.15	<p>Session 3: The role of the OHS professional in facilitating consideration of risk in decision-making, strategies and knowledge</p> <p>Panel presentations:</p> <p>Andrew Lewin (BHP Billiton), David Bond (Thiess)</p>
2.40	<p>Group discussion</p> <ul style="list-style-type: none"> • What do you see as the role of the OHS professional in facilitating consideration of OHS risk in decision-making? • If you were mentoring an up and coming OHS professional what advice would you give regarding strategies for influencing decision-making, particularly around critical risk? • What knowledge would this up and coming OHS professional require to be influential in facilitating consideration of OHS risk in decision-making? (While personal attributes will also be important this discussion should focus on knowledge.)
3.30	<p>Summary and where to from here</p> <p>Carmel Bofinger, Pam Pryor and Panel members</p>
4.00pm	<p>Close</p> <p>Angela Seidel</p>