Overview of best practice in Organizational & Safety Culture

Offshore Helicopter Safety Inquiry

Newfoundland and Labrador, Canada

May 2010

Presented by

Aerosafe Risk Management

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ATSB	Australian Transport Safety Bureau
BASI	Australian Bureau of Air Safety Investigation
CAAP	Civil Aviation Advisory Publication
CASA	Civil Aviation Safety Authority (Australia)
CRM	Crew Resource Management
DNV	Det Norske Veritas (global provider of services for managing risk)
ICAO	International Civil Aviation Organization
NPD	Norwegian Petroleum Directorate’s
PPE	Personal Protective Equipment
OH&S	Occupational Health and Safety
ORP	Operational Risk Profiling
RCS	Relative Cultural Strength
SMS	Safety Management System
VRMP	Venture Risk Management Planning

1 Executive Summary

Culture surrounds us and influences the values, beliefs, and behaviours that we share with other members of a group. In the case of an organizational culture, the culture determined by the set of beliefs that underpin the accepted ‘norms’, decision making and behaviours of an organization and its people. When it comes to safety, the safety culture of an organization will heavily influence the level of risk willing to be accepted, the openness of communication and trust. Culture serves to bind together members of groups and provides clues and cues as to how to behave in normal and abnormal situations.

This paper has been developed as a resource to the Offshore Helicopter Safety Inquiry and provides a theoretical basis for understanding culture. This paper does not provide an expert assessment of the safety culture of the Offshore Oil and Petroleum Industry in the Newfoundland Labrador area, but rather provides modern and accepted models and concepts for appreciating culture and how to recognise the traits of a positive safety culture.

One of the key aspects of defining a safety culture is in understanding the role national, professional and organizational cultures play in safety decisions. The key to shaping the safety and risk culture of an organization is in how an organization creates the environment for risk to be managed and how safety decisions are to be made and safety actions to be taken. When an organization adopts a formal approach to safety oversight through the implementation of a safety management system, an environment is created that influences behaviour which then eventually shapes the beliefs and attitudes of those in the organization.

When trying to identify the traits of a positive safety culture, the key demonstrator is the set of safety behaviours that are present. These safety behaviours are portrayed through open reporting systems, adoption of “just culture” principles in investigation and incident review, an atmosphere of trust between staff and management, effective communications and closed loop processes for passing information back to those that have raised concerns.

There is a key role for formal safety management systems and risk management practices in the development and improvement of safety culture. By adopting a systematic approach to the management of safety risks an environment for consistent practice is established. The global aviation industry has been proactive toward the development of positive safety culture for the past twenty to thirty years. The key for high risk industries that rely on the use of aviation is to successfully “integrate” the frameworks, processes and philosophies for safety to achieve a common, visible, positive and acceptable safety culture.

2 Introduction

The terms safety culture, safety management and error management are now commonplace in many high risk industries including oil and gas, petrochemical, medical, transport and in particular aviation. Much of this stems from the work of Professor James Reason in the 1990s and others such as Professor Patrick Hudson and Doctor Bob Helmerich. This paper is not, and does not attempt to be, an academic paper on safety culture. If provides an overview of safety culture through a review of relevant literature and an examination of organizations which have implemented the concept. It aims to assist a reader in understanding the basic concepts of safety culture and to make informed assessments of organizational performance.

Aerosafe Risk Management has been engaged by the Offshore Helicopter Safety Inquiry as a leading global specialist in aviation risk management and safety management systems. One of the underpinning elements of any successful risk or safety management approach is the organizational and safety culture. The disciplines are closely related and can not be considered independently.

It is commonly recognised that the offshore oil industry is higher risk than many other industries and therefore a high risk workplace. In line with the International Standard on Risk Management (ISO31000), “risk is the chance of uncertainty impacting upon an organization’s objectives”. In relation to safety, safety of workers in the workplace is a very practical and real issue. When managing the safety risk exposure of any high risk workplace, the key questions to examine in relation to the underpinning organizational and safety culture should include:

- What is safety culture?
- How is a safety culture developed or achieved?
- Why safety culture is considered such a key factor in overall organizational safety?
- How is a safety culture implemented successfully?
- How can the presence of a best practice safety culture be identified?

2.1 Limitations and Caveats

While references are provided as annexes, they are not ordered as in a traditional bibliography. Rather, they are provided as a reading list in a sequence which will allow a busy reader to access the most useful reading first. A list of additional texts which may be of interest is also attached.

Safety culture is a complex area which is still subject to academic debate. It is not possible in the time available to provide an exhaustive paper on the subject and readers should seek further advice on any issue on which they are unsure.

This paper is provided to the Offshore Helicopter Safety Inquiry as a reference document that can be used in inquiry deliberations. This paper does not provide an assessment of the culture of the Offshore Oil and Petroleum industry in the Newfoundland Labrador area.

2.2 Background

Hudson (1999: p 1-11) describes safety as "something that has to be actively managed to allow profit or advantage to be gained...(management) of risk is the name of the game. Those organizations which manage their risks best are in place to make the most profit. Those that do not manage so well are either perceived as dangerous or are forced to scale down their operations to achieve acceptable levels of safety."

The evolution of thinking on safety has accelerated since the early 1990s. In aviation for example advances in safety have traditionally been achieved through the investigation of accidents, sometimes known as the "smoking hole" approach. Although learning through the investigation of accidents is necessary and is still used by investigative agencies it is seen as insufficient due to its high cost both in lives and damage. Many investigations also place blame, usually through such conclusions as "pilot error".

Following James Reason's work, the Australian Bureau of Air Safety Investigation (BASI, now the Australian Transport Safety Bureau) was the first agency to use the

model for all major reports, directing attention to organizational factors underlying aviation accidents (Hudson, 2003: P10). A key element of this and subsequent investigations was formalised in International Civil Aviation Organization (ICAO) Accident Investigation, as the "no blame approach". This encouraged free and open reporting. Indeed it allowed the introduction of legislations around the world in Member States, the investigation authority to require parties to answer questions even though such answers may be self incriminating. Such information is regarded as being so important to a successful investigation that safeguards of confidentiality and immunity to its use in future litigation are also included.

In more recent years it became apparent that if the "no blame" concept was taken to the extreme it could be used to absolve individuals from accepting accountability for their actions. Everything could become an "organizational issue" even if people at the "sharp end" had not acted reasonably and professionally. A "just culture" approach developed to address this problem.

3 Defining Safety Culture - What is a Safety Culture?

It is difficult to find a specific starting date for the field of "safety culture" in the aviation or other high risk industries. It can be argued that as organizations have always had a culture, safety culture per se has always been present. However as previously discussed, there is a close link between safety management and safety culture; safety culture is an intrinsic part of safety management and there can't be effective modern safety management without a culture which addresses safety. It is generally accepted that the science of safety culture evolved from the aftermath of a series of disasters, mainly in Europe. Safety cases grew from the Flixborough accident in 1974. This was followed by the Seveso incident in 1976, and the Piper Alpha disaster of 1987. The Piper Alpha inquiry, conducted by Lord Cullen, identified the requirement for systematic safety management with safety cases used to prove the effectiveness of the system.

In the mid-eighties the oil and gas industries such as Shell started to implement systems and address cultural issues by realising safety was of prime importance and that it was not just a matter of individual personal responsibility. They developed a

set of eleven principles of enhanced safety management based largely on the experience of the industry leader DuPont. This occurred in a generally top down, prescriptive regulatory environment which could at times be contrary to common sense or even sound engineering practice.

Piper Alpha can be identified as a turning point. Lord Cullen proposed extending a goal setting regime which meant that society sets overall goals and organizations find their own way of achieving these goals. He also referred to the ISO 9000 and BS5750 standards and the use of safety cases as living documents to prove that the systems were working. This approach is used in the Norwegian Petroleum Directorate's (NPD) legislative basis (Hudson, 2001:p 2).

This evolution has been characterised as having four phases. The first is generally considered the "technical period" during which there were rapid technological developments and accidents were viewed as having mechanical causes. The second phase was the "human error" period where the limitations of humans were identified as being the major cause of breakdowns. The third phase is referred to as the "sociotechnical" period where the negative impact of ergonomics and poor design were seen as a cause of human error. The final stage is often called the "safety culture" period which recognises that operators are not performing their duties or interacting with technology in isolation, but are rather working as coordinated teams within an organizational culture (Wiegmann et al, 2007: p1-12).

4 Key Traits & Features of Culture

The safety culture of an organization has a large role to play in effectiveness of safety and risk management practices of an organization. The safety culture sets up the environment in which the workers of an industry operate. When it comes to aviation, the culture influences how the crew and passengers of an aviation operation interact. It is important to understand the influences that are affecting the environment and the safety culture within which people work. This section of the paper seeks to provide a clear definition of safety culture and what it means to an organization.

4.1 Defining the Different Aspects of Culture

Culture surrounds us and influences the values, beliefs, and behaviours that we share with other members of groups. Culture serves to bind us together as members of groups and to provide clues and cues as to how to behave in normal and novel situations. When thinking of culture, what comes to mind first is national culture, the attributes that differentiate between natives of one culture and those of another. For pilots, however, there are three cultures operating to shape actions and attitudes. The first, of course, is national culture. But there is also a strong professional culture that is associated with being a member of the pilot profession. Finally, organizations have their own cultures that are closest to the daily activities of their members. While national cultures are highly resistant to change because they surround an individual from birth, professional and organizational cultures may be modified if there are strong incentives (Helmriech, 1999).

4.2 National Culture

On National Culture, Helmriech (1998) states:

National culture represents the shared components of national heritage. These include behavioural norms, attitudes, and values. Some aspects of national culture that have been identified as critical in aviation include Individualism-Collectivism, Power Distance, and Uncertainty Avoidance or regard for Rules and Order.

4.3 Professional Culture

On Professional Culture, Helmriech (1998) states:

A very positive aspect of the culture of pilots is pride in their profession. They love their work and are strongly motivated to do it well. This can help organizations work toward safety and efficiency in operations. The professional culture of pilots also has a strong negative component in a near-universal sense of personal invulnerability. It has been found that the majority of pilots in all cultures feel that their decision making is as good in emergencies as normal situations, that their performance is not affected by personal problems, and that they do not make more errors in situations of high stress. This misplaced sense of personal invulnerability can result in a failure to

utilize the Crew Resource Management (CRM) practices that have been outlined in this course as countermeasures against error.

4.4 Organizational Culture

On Organizational Culture, Helmriech (1998) states:

The organization provides the shell within which national and professional cultures operate and is a major determinant of behaviour. It is at the organizational level that the greatest leverage can be exerted to create and nourish a safety culture. To achieve this requires the strong and demonstrated commitment of senior management as well as policies that encourage open communication and action instead of denial as a reaction to problems and risks uncovered.

4.5 Safety Culture

National Culture, Professional Culture, and Organizational Culture all have major influences on an organization's Safety Culture. Wiegmann et al (2002) conducted a comprehensive study of safety culture and from the various definitions, both inside and outside the aviation industry, found several commonalities that exist regardless of the industry being considered.

These commonalities are:

1. Safety culture is a concept defined at the group level or higher, which refers to the shared values among all the group or organization members;
2. Safety culture is concerned with formal safety issues in an organization, and closely related to, but not restricted to, the management and supervisory systems;
3. Safety culture emphasizes the contribution from everyone at every level of an organization;
4. The safety culture of an organization has an impact on its members' behaviour at work;
5. Safety culture is usually reflected in the contingency between reward systems and safety performance;
6. Safety culture is reflected in an organization's willingness to develop and learn from errors, incidents, and accidents; and

7. Safety culture is relatively enduring, stable and resistant to change.

From these commonalities Weigmann et al (2002) determined the following definition of Safety Culture:

"Safety culture is the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns, strive to actively learn, adapt and modify (both individual and organizational) behaviour based on lessons learned from mistakes, and be rewarded in a manner consistent with these values".

It is important to note that this definition is stated in neutral terms. The definition implies that an organization's safety culture exists on a continuum and that the safety culture can either be a good or bad culture.

4.6 Safety Climate

Wiegmann et al (2002) identified that the term *safety climate* was often used synonymously with the term *safety culture*. There is however a distinction between the two terms. Wiegmann et al (2002) found that *safety climate* differs from *safety culture* in the following ways:

1. Safety climate is a psychological phenomenon, which is usually defined as the perceptions of the state of safety at a particular time;
2. Safety climate is closely concerned with intangible issues such as situational and environmental factors; and
3. Safety climate is a temporal phenomenon, a "snapshot" of safety culture, relatively unstable and subject to change.

Using these points and a detailed study of various definitions for safety climate Wiegmann et al (2002) determined the following definition:

"Safety climate is the temporal state measure of safety culture, subject to commonalities among individual perceptions of the organization. It is therefore situationally based, refers to the perceived state of safety at a particular place at a

particular time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions".

4.7 Maturity of the Safety Culture

Westrum (cited in Westrum & Adamski, 1999) suggests that the critical feature of organizational culture is information flow. Hudson (2001) further developed this work by defining five distinct climates that define stages of an organizations safety culture. These five stages are:

1. **Pathological**: The organization cares less about safety than about not being caught;
2. **Reactive**: The organization looks for fixes to accidents and incidents after they happen;
3. **Calculative**: The organization has systems in place to manage hazards; however the system is applied mechanically. Staff and management follow the procedures but do not necessarily believe those procedures are critically important to their jobs or the operation;
4. **Proactive**: The organization has systems in place to manage hazards and staff and management have begun to acquire beliefs that safety is genuinely worthwhile; and
5. **Generative**: Safety behaviour is fully integrated into everything the organization does. The value system associated with safety and safe working is fully internalised as beliefs, almost to the point of invisibility Hudson (2001).

These five stages provide a model for measuring the maturity of an organizations safety culture, culminating in the Generative stage. See Figure 1 on the following page.

Figure 1 - Descriptions of the different types of safety culture

	PATHOLOGICAL	REACTIVE	CALCULATIVE	PROACTIVE	GENERATIVE
COMMUNICATION	Nobody is informed, no feedback, everybody is passive, no care/knowledge about safety, don't see(k) or ask the problem, collect what is legally required	Management demand data on HSE failures, denial until forced to admit, top-down flow of information, bottom-up incidents, lots of statistics nobody understands, safety hot issue after accident	Environment of command and control by management, lots of HSE graphs, statistics but no follow up, info goes top-down, failures bottom-up, little top-down feedback, toolbox meetings, procedures exist but are only once read. Action is delayed after knowledge.	Management goes out and seek, discuss for themselves they know what to change and how to manage, the feedback loop (bottom-up and top-down) is closing at supervisory level, safety topics become part of other meetings, asked for by workforce, they need detail to understand WHY accidents happen	No threshold between management-workforce, management participates/shares activities (dialogue), HSE is number 1, all feedback loops are closed, safety is integrated in other meetings; no special safety meetings required, workforce keeps itself up-to-date, they demand information so they can prevent problems
ORGANIZ-ATIONAL ATTITUDES	No belief or trust, environment of punishing, blaming and controlling the workforce	Failures cause by individuals. No blame but responsibility, workforce needs to be educated and follow the procedures, management overacts in eyes of workforce	Workforce is more involved, little effect on procedures, designs, practices. Workforce does not understand the problem, management is seen as obsessive with HSE, but they don't 'mean' it (Walk-talk)	Workforce involvement is promoted but rules/organized by supervisory staff which is obsessed by HSE statistics	Management is recognized as a partner by workforce, management respects workforce, management has to fix systematic failures, workforce has to identify them.
HEALTH, SAFETY AND ENVIRONMENT (HSE)	No HSE status, HSE issues are ignored, minimal requirements, no rewards on good performance, safety is inherited but not known, reliance on experience	Meets legal requirements, collects statistics but no follow-up, design is changes after accidents, procedures are rewritten to prevent previous accidents, no update or improvement.	HSE well accepted, advisor collects data and creates own statistics, HSE rewards for positive and negative performance, design: quantitative methods, procedures to solve unsolved problems, standard procedures preferred from the shelf, large numbers of procedures but few checks on use/knowledge.	Separate line HSE advisors promoting improvement, but try to reduce the inconvenience to line, for good HSE initiatives there is career enhancement for senior staff, HSE is in the early stages of design, procedures are rewritten by workforce, integration with competency, complaints about externally set targets.	HSE department is small, advising the management on strategy, group, no special rewards, individual pride, procedures are written by workforce, continuous improvement, small numbers of procedures are integrated in training.
ORGANIZATI-ONAL BEHAVIOUR	Denial anything is wrong, avoids HSE discussion, management is hierarchical and stagnant to changes, focus on profits not on workforce, workforce has lots of freedom as management don't care	Management holds workforce responsible for failures, overacting, management states that it tales safety seriously, but it is not always believed by workforce.	Detail focused/playing with numbers, believe company is doing well in spite of contrary, targets are not challenged, inability to admit solutions may not work the first time	Management knows the risks, interested in HSE, takes culture into account, safety priority over production which leads to incompatible goals, lots of management walk-abouts, communication and assessment about accidents and near-misses and their consequences	Safety is equal to production, enthusiastic communication between workforce and management and vice versa, workforce has a lot of freedom due to trust.
WORKING BEHAVIOUR	Workplace is dangerous, messy, no (legal) health requirements, management does not CARE and does not KNOW.	Basic legal requirements implemented, housekeeping is temporary, improved when inspection comes, management KNOWS but does not always CARE.	Clean and tidy working environment, housekeeping is very important (prizes). Management CARES but does not always KNOW.	Management CARES and KNOWS, discussion about prioritization, time and resources are available for improvements even before accidents happen.	Management CARES and KNOWS, workforce furnishes its own environment, management passes the experience around to other sites.

5 Developing a Positive Safety Culture

Changing the culture of an organization is not as difficult as it seems. You can't always make everyone in the organization happy, but making sure that people have a positive attitude towards safety is a good start. Reason (1997) developed a series of 'components' that must be present in an organization with a positive safety culture. They include the following;

1. Reporting Culture;
2. Just Culture; and
3. Flexible Culture.

5.1 Engineering a Reporting Culture

It can be difficult to convince the employees of an organization to report hazards and risks. The tendency can be for people to think it is too time-consuming, they are sceptical of the use of the data, they may not trust the fact that they will not be getting their colleague, or themselves into trouble, or they may act on the natural desire to forget that the incident occurred. Therefore, the reporting system must be designed with these elements in mind. Reason (1997) describes the characteristics that are required of a reporting system, as well as the ways to achieve these.

5.2 Engineering a Just Culture

A just culture recognises that it is not appropriate to punish all errors or unsafe acts, and just as inappropriate to provide protection from punishment for all errors and unsafe acts. They key to engineering a Just Culture is establishing a clearly defined line between acceptable and unacceptable behaviour (Reason, 1997). Instilling the belief that an organization handles praise and punishment fairly and consistently is important in developing trust in the company amongst the employees.

5.3 Engineering a flexible culture

Due to the rapidity of change that occurs within organizations today, they must have mechanisms in place to manage complex technology, and to constantly meet the fluctuating demands on their industry. Safety concerns can arise rapidly due to these factors, and they often need to be dealt with quickly and accurately. Reason (1997) describes some of the characteristics of organizations with flexible cultures, and how to ensure that all organizations can establish this.

An understanding of these cultures and how they are developed within an organization leads to a positive safety culture. The aim is to change the way people perceive safety. Staff should want to report hazards with the confidence that action will be taken; management should support them in this and vice versa. While it is an organizational goal to develop a positive safety culture, an employee has a responsibility to always consider the safety implications with what actions he or she may take.

One of the alternate models for key feature of a positive safety culture is defined by Hudson. He notes the following attributes of an organization culture that gives safety priority:

- An **informed culture** where those who manage and operate the system have a current knowledge of the human, technical, organizational and environmental factors that determine the safety of the system as a whole;
- A **reporting culture** where people are willing to report errors and near misses;
- A **just culture** where an atmosphere of trust is present and people are encouraged or even rewarded for providing essential safety related information. There is however a clear line between acceptable and unacceptable behaviour ;
- A **flexible culture** which can take different forms but is characterised as shifting from the conventional hierarchical mode to a flatter professional structure and

- A **learning culture** where there is the willingness and the competence to draw the right conclusions from the safety information system, and the will to implement major reforms when the need is indicated.

The true test of the culture however is in the aftermath of a major incident or accident. Here, the professed values and beliefs are placed under pressure as senior management struggle with competing priorities such as defending the organization's reputation, protecting it from potential litigation, cooperating with investigations by regulators, investigation agencies and perhaps the police. The temptation to withdraw behind barriers and blame directly involved employees may perhaps be too overwhelming.

James Reason in his1998 paper (Reason, 1998, p.294) discussed safety culture. He quotes a definition of safety culture as "Shared values (what is important) and beliefs (how things work) that interacts with an organization's structures and control systems to produce behavioural norms (the way we do things around here)". Hudson then provides an evolutionary progression of cultures from Pathological through Reactive, Calculative and Proactive to Generative (Reason 2005). These ideas come together to provide the table in Figure 1 below.

6 The Relationship between Culture & the Management of Risk

It has long been recognised that risk is inherent in everything we do. By adopting a structured approach to how risk is managed and communicated, a culture of sensible risk taking will emerge. The level and type of risk behaviour is a key component of an organization safety culture. The relationship between risk and safety is very strong and as a result, the safety culture will drive what level of risk an individual will accept within an organization.

Developing and identifying a positive safety or risk culture within an organization is not easy. So how is it developed? The answer lies in the relationship between the organization's environment and the adopted behaviours of the people within the organization. An ideal safety or risk culture is one where understanding, managing

and accepting appropriate risks is part of the organization's every day decision making processes.

6.1 Creating an Environment for the Right Safety Culture

The key to shaping the risk culture of an organization is in how you create an environment where risk is well managed. When an organization adopts a framework for managing risk, it helps create an environment that influences behaviour and eventually shapes the beliefs and attitudes of those in the organization.

Figure 2 -Safety Culture

Culture is often described as "the way things are done around here". A positive safety culture would mean that accepting risk at the right level is just part of how things are done. A negative safety culture may be demonstrated through people being risk averse, ignorant of risk or overconfident with risk taking.

It is not uncommon for an organization to take three to five years to reach the point where a positive safety or risk culture is visible and can be attributed to the proactive implementation of a risk management framework, which includes the application of consistent risk practices and principles. For larger or more complex organizations, it can take even longer.

James Reason in his1998 paper (Reason, 1998, p.294) discussed safety culture. He quotes a definition of safety culture as "Shared values (what is important) and beliefs (how things work) that interacts with an organization's structures and control systems to produce behavioural norms (the way we do things around here)". Hudson then

provides an evolutionary progression of cultures from Pathological through Reactive, Calculative and Proactive to Generative (Reason 2005). All these ideas are focused toward developing an environment where appropriate traits and characteristics are displayed and become part of the moral fabric of the organization.

7 The Role of Safety management Systems in Culture

Safety culture and safety management have been described as ongoing, work in progress, a journey rather than a destination reached. It is therefore not possible to point to organizations which have a completely implemented safety culture but rather point to those who have moved significantly along the path. The following case studies examine companies that have implemented a safety management and safety culture initiatives.

7.1 What is a Safety Management System

"Good safety management is more than just a legal and moral requirement. Around the world, there is a growing recognition that safety programs can improve a company's operating performance and profits as well as its safety defences." This statement was taken from the Civil Aviation Safety Authority's (CASA) Aviation Safety Management operators guide and reflects the fact that Safety Management has further benefits than the improvement of safety measures.

There are many different ideas people have about what managing safety involves, however one of the more widely accepted definitions is one that Australia's Civil Aviation Advisory Publication (CAAP) (2009) provides:

"A safety management system is a business-like approach to safety.
It is a systematic, explicit and comprehensive process for managing safety risks"

The inherent structure of a well-established Safety Management System allows for there to be a successful framework for good Governance. This is because of structures such as the escalation of risks, communication channels, and documentation management processes. This is particularly important in the receipt of information by

the Board regarding safety-related matters. Without the appropriate communications channels such as regular Safety Committee meetings, safety alert processes, and information escalation, the Board may receive a reduced level of 'honesty' in the safety information received.

Therefore, along with the appropriate Compliance and Assurance structures, Safety and Risk Management structures and processes are an integral component of achieving good Governance practices.

7.2 Key Elements of an SMS

Figure 3 - Safety Management System (SMS) Diagram

Element 1: Safety Governance & Oversight Safety governance is defined as the system by which management directs and controls the safety practice of its organization. There are three key components of safety governance: safety compliance, safety assurance and safety risk management. These components reflect

and integrate with an organizations' broader Corporate Governance arrangements which include corporate compliance, corporate assurance and an enterprise risk management framework.

Element 2: Safety Planning Effective and detailed planning is a key component of this element of an organizations' Safety Management System. The organization should adopt a business-like approach to managing safety, which includes setting and updating safety objectives and targets annually, task identification and allocation, resource planning and performance measurement.

Element 3: Safety Responsibilities Safety accountabilities and responsibilities should be outlined for the organization. It is recognised that there are different levels of responsibilities for safety. These responsibilities need to be documented and updated as required.

Element 4: Action Management The best way to establish safety, as a core value, is to make safety an integral part of the management plan. This element requires a "process", identification of tasks to reduce risk, allocation of tasks, follow up and close out.

Components of the action management element of an SMS usually include:

- Incident and accident reporting system
- Closed loop reporting system
- Safety program activities
- Safety audits and evaluations
- Hazard management

Element 5: Safety Policy & Standards Safety policy and procedures are formal documents that form the basis for instruction on the philosophies, processes and practices required in a SMS. Internally within an organization a company has a formal policy and document structure in which they have linked process and procedurally-based information on the SMS elements.

Element 6: Safety Assurance The safety assurance element of the SMS is aimed at providing confidence that safety risks are being managed, and the SMS is working the way it was designed to. The reassurance that is provided through the safety assurance module is required for all staff, stakeholders, insurers, the community, and families. Safety assurance is provided in many ways. Some key methods for the provision of assurance are:

- Internal and external Audits
- Annual Evaluation
- Internal and external inspections

Element 7: Operational Risk Management The Operational Risk Management or ORP module of an SMS covers both the hazard and risk management elements of the SMS. Each organization must adopt three different levels of risk management planning, corporate risk profiling, venture risk management planning (VRMP) and operational risk profiling (ORP). All levels of risk management planning are based upon the risk management process outlined in the International Risk Management Standard, ISO 31000.

Element 8: Incident / Occurrence Management & Reporting The aim of an occurrence reporting system, at a very basic level, is communication. The effective communication of occurrences can provide valuable information that can be used as an education tool to help reduce the risk of that event occurring again. Data on occurrences can be collected in a secure manner, allowing analysis of that data to be explored. Utilising a web-based system allows the entry of data from almost any location, ensuring that information can be captured in a timely manner before any clarity of detail is lost. It also allows transparency of information across a variety of business units, and emphasises management's commitment to safety. This is an extremely important point if organizations' members and staff are to feel comfortable using the system.

Element 9: Safety Communications The safety communications element of the SMS is a key component in developing an organization's safety culture by increasing safety awareness and knowledge of safety and risk practice. As well as communicating

safety-related information to relevant staff and members, it is important to also consider the role of safety promotions. These play a role in raising safety consciousness amongst members, and providing regular reminders of their safety-related responsibilities to themselves and others.

Element 10: Safety Training The safety training component of an SMS is broad in scope and includes training on the SMS itself, as well as specific safety-related training courses. It is important to train staff and members in the skills, knowledge and competencies required to make the Safety Management Systems' processes and practices work. .

Element 11: Records and Data Management Part of a formal SMS is the systematic and logical organization of safety and risk information. Safety practices are part of day-to-day operations and management and are usually embedded into operational procedures and practices. In conjunction with this, some specific safety data and information needs to be recorded so it is easily accessible and able to be used by all staff.

Control of documentation and data management ensures that safety and risk management information is communicated effectively, accurately, in a timely manner and remains accessible to management and staff members according to their particular requirements

Element 12 – Cultural Development The primary aim of an SMS is to develop and maintain a positive safety culture. It is also to ensure an organization is committed to monitoring their safety climate and proactively guide what activities are needed to shape the organizational culture.

In order to develop a positive safety culture, there is a link to creating an environment in one's organization that will influence the behaviour of staff and members, which will in time shape the desired culture.

8 Has Safety Culture been implemented successfully? Can this be measured?

Safety culture and safety management have been described as ongoing, work in progress, a journey rather than a destination reached. It is therefore not possible to point to organizations which have a completely implemented safety culture but rather point to those who have moved significantly along the path. The following case studies (see Appendixes A and B) examine companies that have implemented a safety management and safety culture initiatives.

9 Conclusion

Every organization has an organizational culture and every organization has a safety culture of sorts. The overall culture, be that organizational or safety specific influences thoughts, beliefs and ultimately decision making and behaviours. The true measure of an effective safety culture is depicted by the adequacy of decision making and behaviours by the workforce of the organization. There are many ways in which an environment can be created or ‘engineered’ to shape these behaviours, yet ultimately a positive safety culture is one that is consistent and one that can be duplicated despite any change in leadership or workforce.

There are many theories and models to aide in cultural development. Ultimately an organization needs to determine what type of behaviours they are after and create the environment through the leadership, processes, frameworks and influencing activities to achieve the desired goal.

Safety culture is a much used but sometimes difficult to define concept. When used in conjunction with or as part of a safety management system, it can enhance both the safety and economic performance of the company.

10 Appendices

10.1 Appendix A: Case Study One (1) – Du Pont

Du Pont began operations in 1802 with the establishment of a powder mill. Their first safety rules came into force in 1811 with the following principles (Leinweber, 2009):

- Safety is a line management responsibility
- No employee may enter a new or rebuilt mill until a member of top management has personally operated it.

The above makes a very strong statement which relates to current key principles of safety culture. Firstly, that line management (and workers) are the people who have responsibility for day to day safe operations. Secondly, top management involvement and commitment are vital. Du Pont began to collect safety statistics in 1912. The belief that all injuries are preventable developed in the 1940s. Off-the-job safety programmes began in the 1950s and Du Pont's "goal is zero" programme was established in the 1990s. Given these longstanding initiatives, a strong safety culture would be expected. However, the company understands that more is yet to be done. They identify trends in workplace safety:

- The inadequacies in workplace safety management
- Escalating cost of injuries
- Global news and the internet provide the public with increased insight into serious safety incidents
- Better tools are required to measure and manage safety performance and
- A strong safety culture is a key to achieving their "Zero" programme objectives.

Du Pont base their safety management system on ten key principles including management accountability, employee involvement and the need for all deficiencies to be corrected promptly. They identify the components of achieving cultural excellence as:

- Leadership, what management does to lead employees to safety excellence?
    - Management commitment
    - Policies and principles
    - Goals, objectives and plans
    - Procedures and performance

- Structures, what are the organizational structures that enable the pursuit of safety excellence?
    - Line management accountability and responsibility
    - Safety personnel
    - Integrated organizational structure
    - Motivation and awareness

- Processes and Actions, what actions does the organization take on a regular basis to improve safety performance?
    - Effective communication
    - Training and development
    - Incident investigation
    - Audits and observations.

They then develop the Du Pont/Bradley curve which relates decreasing injury rates to a progression from Reactive to Interdependent cultures. The issue of understanding and measuring the effectiveness of safety culture is made against formal criteria:

- How internally consistent is the safety culture?
- Does the safety culture vary across sites?
- Have recent events changed the culture?
- Do business goals compete with the safety focus?
- Do new employees receive the same training and hold the same values as long term employees?
- Does the pressure to “do more with less” compete with the safety values?

They have implemented “perception surveys” to benchmark globally whether overall targets or pre-established goals have been reached. They find that benchmarking helps in the understanding of performance standards and can assist in analysing the company’s safety perceptions against others in the industry and across industries. Benchmarking provides many benefits including:

- Employees are more likely to accept data
- Employees see themselves as part of the bigger picture
- There are shifts in the corporate mindset
- Employees and leadership both play a role in establishing performance targets and focussing resources and
- The sharing of best practices among benchmarking partners.

The benchmarking data is updated annually and includes more than 9 years of data, over 250,000 responses across 55 industries including energy, food, paper, chemicals, manufacturing and transportation in 41 countries and 1,687 sites. They contend that the perception survey effectively measures a company’s safety culture through :

- 24 core questions
- A cross-section of employees
- The comparison of data across departments, levels and responsibilities
- Tests whether safety is a core value held trough all levels,
- Examines employee involvement in audits, accident investigation, and safety meetings
- Understanding the hidden pitfalls in culture
- Identifies cultural gaps across sites.

They then developed a benchmark of world class criteria, the Relative Culture Strength (RCS). This index compares the site score against the benchmark’s best and worst. Interestingly, the oil industry comes in with a moderate position in the survey. They have found that most industries have moved from the Reactive state and as relative cultural strength improves, safety performance improvement becomes more sustainable. The survey also revealed that major issues are :

- Lack of management commitment
- Breakdowns in communication and
- Inconsistent safety leadership.

Du Pont is acknowledged as a leader in the area of safety management and safety culture. Although they have extensive systems, research facilities and a consulting area specialising in these disciplines, they appreciate that they still have to learn and work towards continuous improvement.

10.2 Appendix B: Case Study Two State Energy Provider, Australia.

This case study has been selected as it demonstrates the challenges faced by an organization which operates in a high risk environment. It has established safety systems and culture. It also contracts the services of a helicopter company to perform tasks which require their employees (workers) to fly in a contracted aircraft. It has several parallels to issues raised in the offshore helicopter accident in St John's Newfoundland Labrador. The company concerned is not identified in the Australian Transport Safety Bureau (ATSB) report and this practice is respected in this case study.

In New South Wales, the State electricity supply is privatised. Several companies compete for consumer business and are responsible for provision of infrastructure. One of the tasks which must be undertaken is line inspection. This is particularly important in bushfire (wildfire) prone areas and must be undertaken in accordance with a State specified schedule.

10.2.1 Factual Data

The ATSB report outlines the accident as follows:

"On 4 April 2006 a Bell Helicopter Company 206B III helicopter was being operated on a survey of powerlines in the St Albans area of New South Wales with a pilot, two power supply company personnel and a photographer on board. At about 1000 Eastern Standard Time, the pilot observed a previously unseen single–strand telecommunication cable support wire rubbing against the copilot's door, and attempted to manoeuvre the helicopter clear of the wire. The helicopter lost directional control and commenced spinning to the right. However, the pilot cleared the wires and attempted a landing in an adjacent paddock. The helicopter came to rest on its right side and was severely damaged. One of the power supply company personnel received serious head injuries and the remaining occupants received minor injuries."

10.2.2 Discussion

The power company had a well established internal safety management system and culture. It focussed mainly on the occupational health and safety issues relevant to electricity supply operations. It did not extend to aviation operations. Governance structures were in place through a Board and several subcommittees.

The company had formal processes in place for contract development and the examination of responses to requests for tender. There was a strong management commitment to providing a safe workplace and in the case of the helicopter contract they undertook a review of safety issues through a risk assessment. However specialist aviation advice was not sought. The assessment addressed operational risks but tended to assume that these are mitigated by the helicopter company meeting the requirements of the regulator, the Australian Civil Aviation Safety Authority (CASA). Perhaps the assumption was that regulatory compliance equates to safe operation.

As part of the contracting process, staff visited the helicopter company. CASA audits were reviewed as well as the company's safety record. It should be noted that for this type of operator, CASA could be expected to undertake an operational audit every three years and a maintenance audit every year. A follow up call was made to CASA, the following advice was received

"They are a good operation and there are no issues with regards to their safety record."

Their operations manual was also reviewed. This review would have been more thorough and may have raised issues if an expert in helicopter operations had been in attendance. The company has a strong policy statement on safety that states "We will not take shortcuts when it comes to safety". The policy also profiles that:

- *Safety is our first priority*
- *All injuries can be prevented*
- *Working safely is everyone's responsibility and a condition of employment*

- *Safety observations are a must*
- *Our work is never so urgent or important that we don't have time to do it safely.*

This policy, signed by the Chief Executive Officer, provides a strong safety commitment by senior management. It is the basis for a progressive and robust safety culture.

The company had their safety management systems in place since 1994, a system provided by Det Norske Veritas (DNV) (global provider of services for managing risk). This was replaced in 1999 a 20 point system. They were working with DuPont towards ongoing improvements to their system. Appropriate parts of the company are ISO accredited.

Their principal safety concerns were in the area of employment safety in the workplace, OH&S and their systems have been developed to concentrate on this. The Safety Management Plan (2004) describes the system. Each member of the OH&S Branch was given elements of the plan to review and continually improve. Part of this work was addressing the issue of contract management.

The company was therefore an experienced user of safety management systems but their systems tended to be internally and OH&S focused. They also had the elements of a safety culture in place. When contractors were employed they may or may not have been required to have safety management systems. This was very different to requiring that a system be in place that provides an equivalent level of rigor to the risk management and safety assurance provided by the company's internal systems.

10.2.3 Response to the Accident

Immediately following the accident, the power supply company (the company) acted to:

• Suspended all helicopter inspections
• Appoint an internal investigation team to:

– investigate and report on matters relating to the accident
– make recommendations in relation to the resumption of helicopter inspections

• Appoint an aviation risk management consultant to assist the internal investigation team.

During its investigation, the internal investigation team provided the company's employees with regular updates regarding the progress of the investigation and the planning for the resumption of helicopter inspections. This included using staff newsletters and targeted briefing sessions for those employees that were normally engaged in aerial surveillance work.

In its Report, the internal investigation team made a number of recommendations, some of which required action prior to the resumption of helicopter inspections. In response, the company invoked a number of safety actions prior to resuming helicopter powerline inspections on 21 August 2006. Subsequently, a number of additional safety actions have, and continue to be actioned by the company.

10.2.3.1 Risk assessment of the conduct of Helicopter inspections

The company engaged an aviation risk management consultant to develop and assist with the implementation of Task/risk Profiles and Operational Risk Plans. Those profiles and plans were intended for application in the five task categories for which the company conducts helicopter inspections. The content of the Operational Risk Plans included: the conduct of helicopter maintenance and refuelling; communication requirements affecting the conduct of aerial inspections; pre-flight briefing requirements; the identification and recording of hazards; the assessment of relevant risks; the applicability and use of personal protective equipment (PPE); training requirements in support of the aerial inspection task; the requirement for and conduct of audits; the management of helicopter service providers; and airborne procedures for application during the conduct of aerial inspections.

In addition, the Operational Risk Plans required the conduct of 'reconnaissance flights' prior to the conduct of aerial line inspections in order to identify and assess

risks and hazards applicable to the planned inspections. Criteria have been developed for application during the consideration of whether a reconnaissance flight is required prior to an inspection.

10.2.3.2 Risk assessment of the Operator

The aviation risk management consultant was also tasked to audit the contracted helicopter service provider's (the operator) operations. Those audits included a review of the operator's Operations Manual.

Subsequent to the completion of the follow-up audit, the aviation risk management consultant recommended the resumption of helicopter inspections. The operator underwent an additional audit on the day on which helicopter inspections resumed.

10.2.3.3 Risk assessment affecting the use of PPE

The company also engaged the aviation risk management consultant to conduct a risk assessment of the relevant PPE for consideration for use during aerial inspections. That included the consideration of the relevance of the use of helmets and fire-resistant gloves and suits during inspections, and the circumstances in which such PPE, if adopted, should be used. Company employees that were involved in the conduct of aerial inspections were consulted during the risk
assessment, and PPE suppliers provided exemplar equipment for examination by those employees as part of that process.

As a result of the risk assessment, and in consultation with the relevant employees, the company directed that all employees engaged in the conduct of aerial inspections must wear:

- Fire-retardant flying suits and gloves
- An appropriate helmet that included a visor and communications system. Employees were permitted to trial a range of helmets and, based on the results of those trials; orders will be placed for the delivery of individually-fitted helmets.

There were also amendments to company policy - This resulted in the development of a Helicopter Operations Manual, which consolidated the company's policies.

10.2.3.4 General training - Employee Workshop

A training workshop was carried out on 18 July 2006 that involved all company employees engaged in the conduct of aerial surveillance and inspection work. During that workshop, the employees were provided with, among other things, information, instruction and training in the:

- Lessons learned from the accident at St Albans
- Requirements for, and use and care of employees' PPE
- Helicopter Operations Manual, including the explanation of the implications of the amended policies affecting the conduct of helicopter inspections
- Content and effect of the Task/risk Profiles and Operational Risk Plans
- Application of the company's risk assessment policies to the aerial inspection task.
- Specific training - Crew Resource Management

The aviation risk management consultants were also engaged to deliver a number of Crew Resource Management (CRM) workshops to the company's employees that could expect to be involved in aerial surveillance and inspection work. That training addressed the risks, human factors and crew coordination issues affecting crews during the conduct of helicopter operations. In addition, the company has mandated an annual CRM currency requirement for relevant employees.

Further still - prior to the resumption of helicopter inspections, the company negotiated an amended interim contract with the operator. That contract was based on the Task Risk Profiles and Operational Risk Plans.

10.2.3.5 Safety actions implemented shortly after the resumption of flights

Formal performance review and audit of the operator

One week after the resumption of helicopter inspections, the aviation risk management consultant conducted a formal audit and review of the operator's performance. Follow-on audits and performance reviews of the operator's performance were carried out three weeks after the recommencement of aerial inspections and at the end of October 2006.

The aviation risk management consultant assisted in the preparation of the 'Request for Tender', and will also be involved in assessing the tender submissions from prospective helicopter service providers.

Continued involvement of the aviation risk management consultants

The aviation risk management consultant has been retained by the company in support of any decisions affecting the use of helicopters for aerial surveillance/inspection.

10.2.3.6 Sharing lessons with the Industry

The company coordinated the development of an Industry Forum that was held on 18 August 2006. That forum was attended by other power supply companies and industry bodies from throughout Australia. At the forum, the company presented the lessons learnt as a result of the accident, and encouraged the establishment of industry standards and a uniform industry approach to the conduct of aerial surveillance/inspections.

Following the forum, a second power supply company invited the company to make a similar presentation to the second power supply company's staff. As a result of that presentation, the second power supply company has modified some of its existing aerial surveillance/inspection procedures.

10.2.4 Conclusion

The energy company had a well established safety management system and a safety culture, but still the accident happened. The problems of managing safety and safety culture when third parties are contracted are highlighted by this example. There is nothing to suggest that the helicopter company was “unsafe” but the internal culture was not the same as in the energy company.

The actions of the company after the accident highlight its safety culture through the immediate suspension of operations and the instigation of a “no holds barred” investigation. It immediately acquired expert help and involved employees in the investigation. They were kept fully informed and recommendations and training were immediately implemented. They further moved to share their lessons with others in the industry.

That an accident occurred is always a tragedy, however the actions of the company based on the attitudes of a robust safety culture allowed operations to be resumed as soon as possible, sent strong messages to employees and minimised the risk of a recurrence throughout the industry.

11 References

Australian Transport Safety Bureau (2006). *Wire-strike Accidents in General Aviation: Data analysis 1994 to 2004* [online]. [Accessed 2005]. Available from: <http://www.atsb.gov.au/media/32640/wirestrikes_20050055.pdf>.

Cox, S. and Cheyne, A. (2000). Assessing safety culture in off-shore environments. *Safety Science*. **3**, Issue 34, pp.111-129.

Hopkins, A. (2002). *Safety Culture, Mindfulness and Safe Behaviour: Converging Ideas ?*. Working paper 7. ed. The Australian National University: National Research Centre for OHS Regulation and The Australian National University.

Hudson, P. (1999). Safety Culture – Theory and Practice. *In: The Human Factor in System Reliability – Is Human Performance Predictable?*, 1-2 December , Siena, Italy. pp.1-11.

Leinweber, M. (2009 February). *"Safety Culture and Sustainable World Class Safety Performance"*. Presentation presented at ORBSP Safety Forum, US.

Hudson, P. (2001). *Safety Management and Safety CultureThe Long, Hard and Winding Road*. leiden, Netherlands: Leiden University.

Hudson, P. (2003). *Applying the lessons of high risk industries to health care*.. Leiden, Netherlands: Leiden University.

Reason, J. (1998). *Achieving a safe culture: theory and practice*. 12. ed. Manchester: Taylor .

Reason, J. (2005 October). *"Advancing the Culture of Safety"*. Presentation presented at Halifax 5, Calgary, Canada.

Weigman, D.A. Zang, H. von Thaden, T. Sharma, G. and Mitchell, A. (2002). *Safety Culture: A Review*.. Illinois: Aviation Research Lab.

Weigman, D.A. Zang, H. von Thaden, T. (2007). *Wiegmann D.A. et al, A Review of Safety Culture and its Potential Application of Traffic Safety*. Illinois: AAA Foundation for Traffic Safety, pp. 1-12.

Westrum, R. & Adamski, A.J. (1999) *Organizational Factors Associated with Safety and Mission Success in Aviation Environments*. In D.J..Garland, J.A. Wise & V.D.Hopkin (Eds.) Handbook of Aviation HumanFactors. Lawrence Erlbaum, Mahwah, NJ.

12 Additional Reading

1. Deal, T.E. and Kennedy, A.A., (1982) *Corporate Cultures*. Reading, Massachusetts: Addison-Wesley.
2. Glendon, A.I, Clarke, S. and McKenna, E.F. (2006). *Human safety and risk management*. 2nd ed. Boca Raton, Florida: Taylor and Francis Group LLC.
3. Petersen, D. *Safety management: A human approach*. New York, United States of America: Aloray Inc.
4. Schein, E.H. (1992). *Organizational Culture and Leadership*. 2nd ed. San Francisco: Jossey-Bass.
5. Sunstein, C.R. (2004). *Risk and reason: Safety, law and the environment*. Cambridge, United Kingdom: Cambridge University Press.