i-SAFE / WE-SAFE

A Safety Culture Improvement Program at the New Hope Group

Queensland Mining Industry Safety & Health Conference Townsville

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TABLE OF CONTENTS

1.   SUMMARY

This paper has two parts; the first section will provide a review of our industry's safety performance and some commentary as to why fatality rates may have increased whilst other lagging indicators of performance continue to improve. This perplexing problem requires urgent attention in order for our industry's social licence to operate to be protected. Secondly, a summary of the successful implementation of the safety culture improvement program across the New Hope Group will be provided. The paper concludes with cautions that although lessons can be taken from the New Hope experience each operation will need to carefully assess their own particular cultural operating environment and state of risk management maturity in order to determine their most appropriate course of action.

2.   THE CHALLENGE

Figure 1: Australian Mining Industry Fatalities
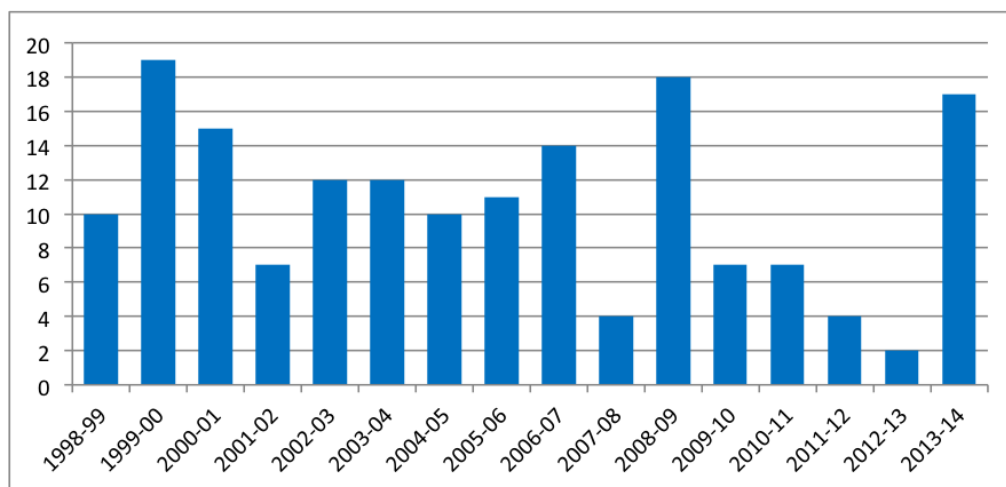
The current year is not progressing well either. The mining industry and in particular the coal industry is under immense scrutiny and adverse action from minority activist groups pressuring the industry's social licence to operate. It is critical that the industry keep the majority of the population on side and one way to threaten this is through a poor industry safety performance

The major mining sectors of iron ore and coal have come under intense margin pressure in recent years. Is this decline in profitability impacting the effectiveness of our safety culture? Is there a relationship between job insecurity and safety performance? [1] Production generally continued to grow during most of this period however employment has not and it would appear rational that if employees are abnormally stressed their mind may not be where it should be at critical moments. Of course correlation is not causation however this may be worthy of further investigation.

I have heard it said at a recent safety forum that the industry needed to concentrate on the hierarchy of controls and get engineering based controls in place. The view was that there was an over emphasis on human behaviour in our safety management systems. Although this may be very sound advice and no manager experienced in safety system management would disagree that the hierarchy of controls is a sound concept, does this oversimplify the problem of reducing the number of fatalities in our mines?

"For every complex problem there is an answer that is clear, simple, and wrong."

H. L. Mencken

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[1] Probst TM and Brubaker TL., The effects of job insecurity on employee safety outcomes: cross sectional and longitudinal explorations. Journal of Occupational Health Psychology 2001; 6:139-159

In hazardous environments the risk of accident is controlled through the implementation of highly reliable and wherever possible hard controls, in combination with, a strong safety culture. Below in Figure 2 is a diagram which explains what an organisational safety culture is and how it relates to an individual within that organisation. A strong safety culture is one which exhibits the characteristics of that in Figure 3 below.

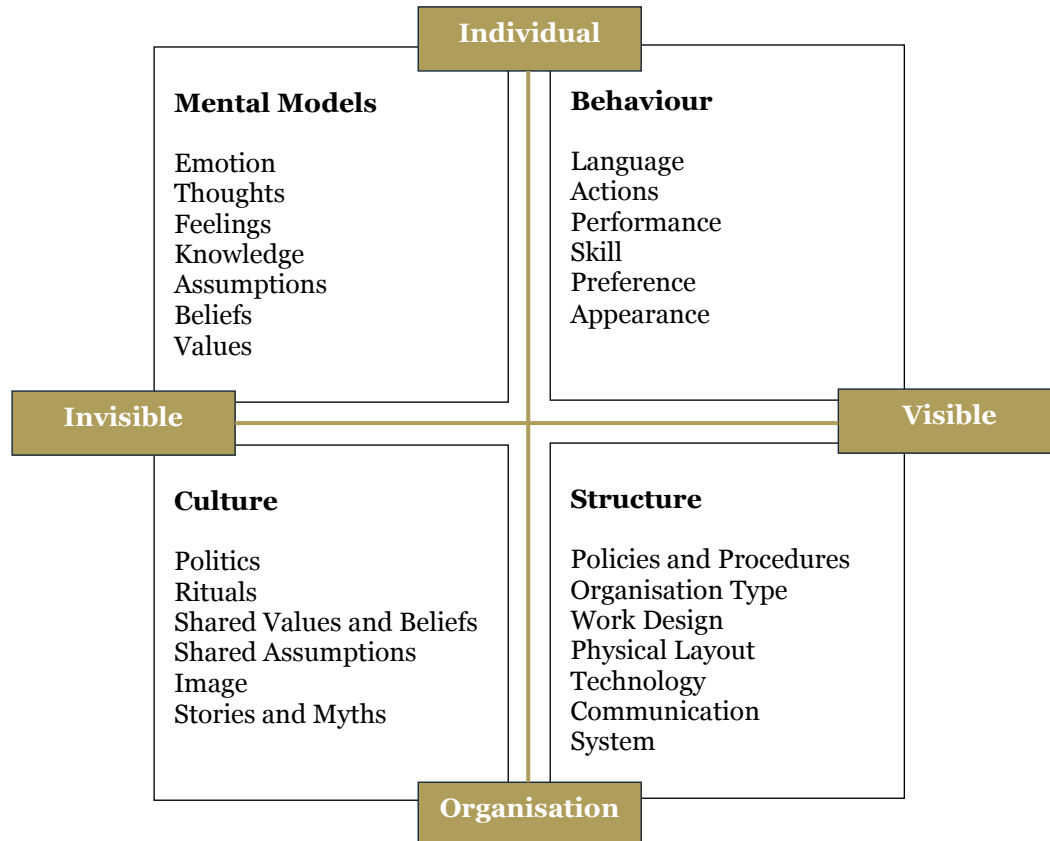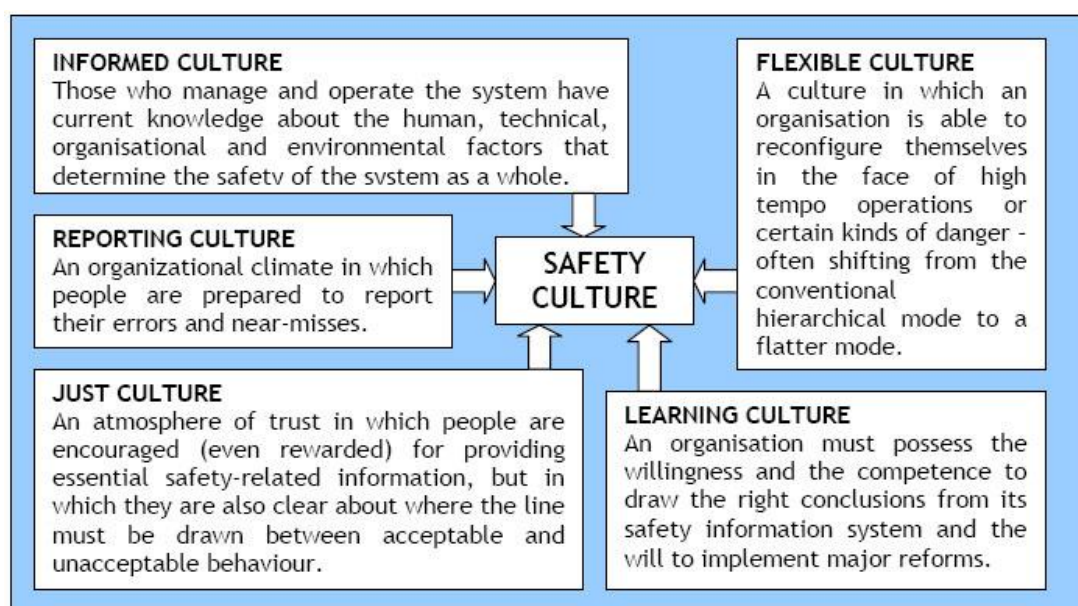**Figure 2: How an Organisational Safety Culture relates to the Individual**

Individual

Mental Models

Emotion
Thoughts
Feelings
Knowledge
Assumptions
Beliefs
Values

Behaviour

Language
Actions
Performance
Skill
Preference
Appearance

Invisible   **Visible**

Culture

Politics
Rituals
Shared Values and Beliefs
Shared Assumptions
Image
Stories and Myths

Structure

Policies and Procedures
Organisation Type
Work Design
Physical Layout
Technology
Communication
System

Organisation

Figure 3: Characteristics of a Strong Safety Culture (Reason)

INFORMED CULTURE
Those who manage and operate the system have current knowledge about the human, technical, organisational and environmental factors that determine the safety of the system as a whole.

FLEXIBLE CULTURE
A culture in which an organisation is able to reconfigure themselves in the face of high tempo operations or certain kinds of danger - often shifting from the conventional hierarchical mode to a flatter mode.

REPORTING CULTURE
An organizational climate in which people are prepared to report their errors and near-misses.

SAFETY CULTURE

JUST CULTURE
An atmosphere of trust in which people are encouraged (even rewarded) for providing essential safety-related information, but in which they are also clear about where the line must be drawn between acceptable and unacceptable behaviour.

LEARNING CULTURE
An organisation must possess the willingness and the competence to draw the right conclusions from its safety information system and the will to implement major reforms.

The development of the Reason Swiss Cheese Model (SCM) of accident causation over time is a good example of the recognition of the importance that organisational cultural factors can play in the safety management system.

Figure 4: Early Example of the Illustration of the Swiss Cheese Model
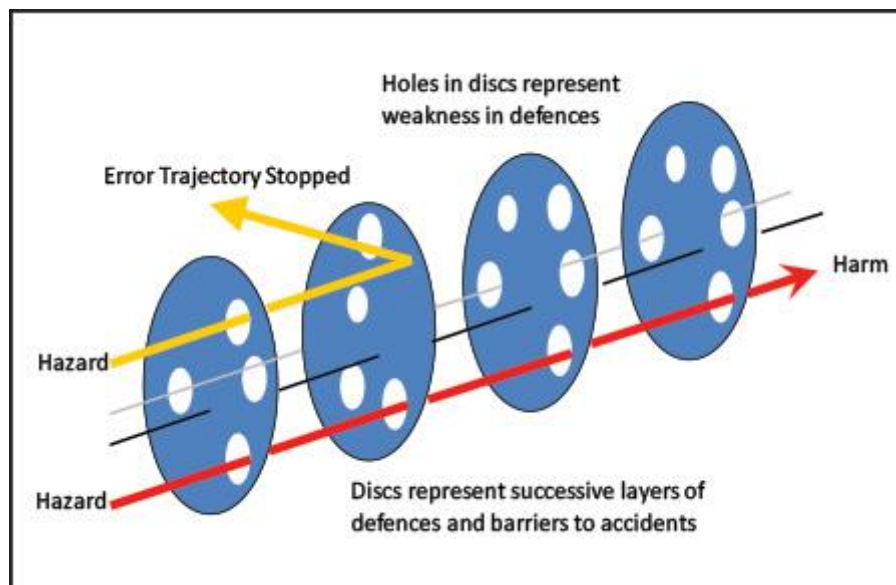
This model illustrates the fact that in complex changing hazardous environments no control is 100% effective, however a safety system will have defences in depth through the implementation of multiple controls. This model is consistent with the hierarchy of controls in that engineering controls are likely to have a higher reliability (small or fewer holes) than human behavioural controls (larger or more frequent holes). However subsequent illustrations of the SCM have introduced the importance of local and organisational factors into the model.

Figure 5: Recent Illustrations of the Swiss Cheese Model
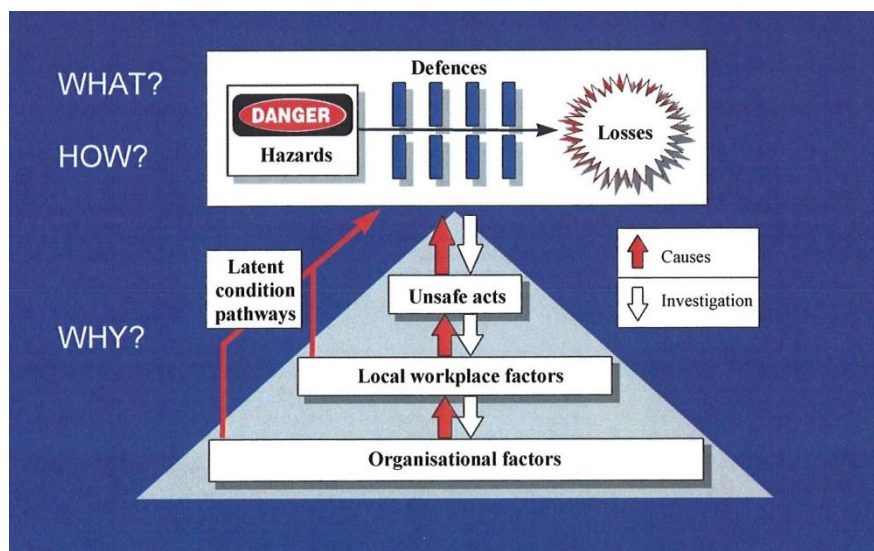
The result of these multiple layers of defence is to make single failure accidents very rare. Accidents in modern mines typically require the unlikely combination of several different causal factors, both human and technical, to enable hazards to penetrate the controls and cause accidents.

3.   THE IMPORTANCE OF SAFETY CULTURE

It is important to remember that these are dynamic systems where the "holes in each defence" are changing over time. The holes in defences due to active failures are in flux, moving around and opening and shutting according to specific circumstances. [2] The elements of a safety management system will usually be widely distributed throughout the organisation and therefore are likely to be influenced by something as equally pervasive. The organisational safety culture's influence extends to all parts of an organisation. It can affect all the "cheese slices" and their associated "holes".

A poor safety culture is likely to increase the number of defensive weaknesses due to **active failures** e.g., inadequate training, poor communication, poor or no procedures. Where the unspoken belief is that production goals are seen to take a higher priority than those relating to safe operation it is likely to encourage an atmosphere of non-compliance and the acceptance of violations. The concept of Safe Production breaks down. Secondly, a poor safety culture may lead to an inability to appreciate the extent of hazards introduced into a system through inadequate maintenance and testing or inadequate equipment. An acceptance of long term or **latent failures** may develop. Most importantly a poor safety culture is likely to induce an acceptance of known defence failures; insidiously this tends to occur where we know that there are many layers to our defence. Workarounds are invented. It is all too easy to postpone fixes beyond reasonable timeframes.

A strong safety culture is likely to resist degradation of individual controls (holes getting larger or more frequent) and most importantly improve the reliability of overall safety system implementation (the controls in place tomorrow will be the same as yesterday). Therefore the overall safety management system is more reliable (holes in the defences did not line up yesterday so no accident and the same can be relied upon tomorrow). Importantly this reliability in the safety management system enables management to stop fighting fires and concentrate on the organisational response to changes in the hazard environment.

4.   NATIONAL CULTURE AND SAFETY CULTURE

Implementation of an effective safety culture needs to be cognisant of the national culture and the stage of safety system maturity of that organisation. Multinational mining companies sometimes have challenges in this regard as they operate in many differing national cultures at different stages of technical development. What works in one country may not in another. What is desired is the equality of safety outcomes across an entire company and this should require very different methodologies of defence in different national cultures. The work of Hofstede in understanding national cultural differences is a good base to start when considering the design of safety management systems. For example studies of the Australian national culture indicate the following characteristics:
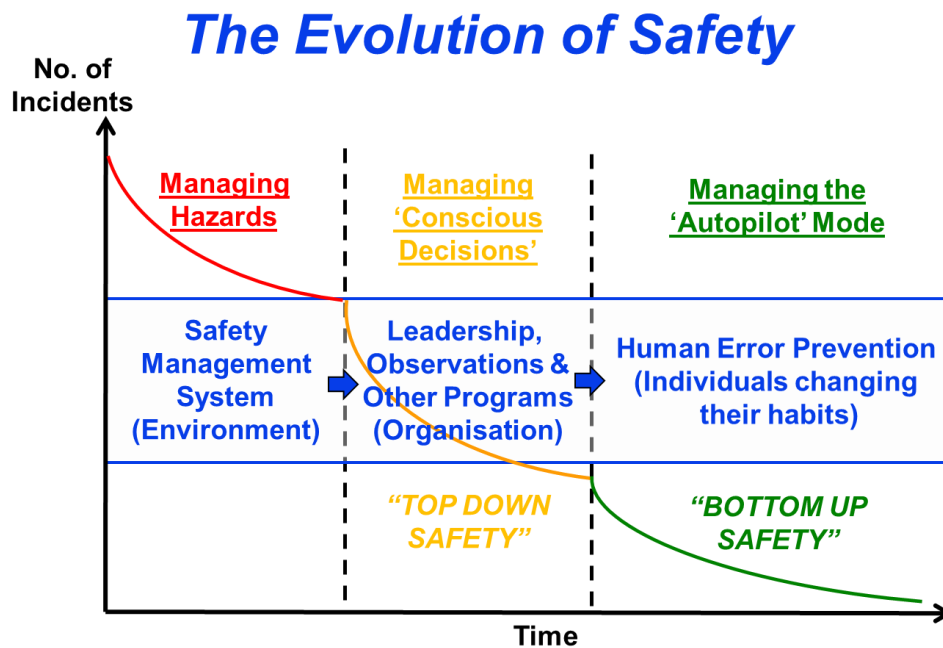
- A desire to be left alone to do a job without direct supervision
- A lack of deference to authority
- An emphasis on team work
- A strong ability to innovate

Therefore the development of a safety management system in Australia should involve all levels of the organisation and be cautious on placing too much reliance on individuals always following procedures whilst working alone. This is particularly the case where the procedures are overly complex placing a high administrative burden on the operator. [3]

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[2] Reason J., Achieving a safe culture: theory and practice. Work and Stress 1998, Vol 12, no. 3, 293-306

[3] For more information see Stephan, S., Improving Your Mine's Safety Culture – The Ultimate Objective of the Safety Management System, Queensland Mining Industry Health and Safety Conference Proceedings 1999

Figure 6: A Safety System Maturity Model

The Evolution of Safety

No. of Incidents

Managing Hazards	Managing 'Conscious Decisions'	Managing the 'Autopilot' Mode
Safety Management System (Environment)	Leadership, Observations & Other Programs (Organisation)	Human Error Prevention (Individuals changing their habits)
	"TOP DOWN SAFETY"	"BOTTOM UP SAFETY"

Time

5.   OTHER IMPLEMENTATION ISSUES

Leaders need to be careful regarding the safety culture signals they send through their procedural controls. For example what signals does it send regarding the organisation's safety culture when a visitor to a mining company located in a CBD office tower has to undergo a computer generated induction questionnaire taking 15 minutes when they are always going to be in the company of a company employee? The intended signal of 'your safety is important to us or we take safety seriously' is likely to be perceived by the visitor as 'they are driven by bureaucracy or worse, safety is not risk based here but compliance focused'.

I recently visited a mine site where a 20 seat bus which had been brake-tested still required (by the site procedure) to have its rear wheels chocked even though it was on level ground. It was obvious to any reasonable person that the hazard introduced through potential communication failure between the chock operator and the bus driver during the application or removal of the chocks far outweighed the risk of the bus moving through ineffective brakes.

The introduction of unnecessary complexity is a pervasive problem in the safety management systems of many mining operations. Which procedure is likely to be followed; a 20 page written document full of legal cautions or a 3 page procedure showing in pictures what needs to be done in plain language? It requires the application of real intellect with the input of people who have actually done the job being appropriately valued in order to create a high quality effective procedure.

Regulators and other accident investigators need to be careful not to simply take the easy path of recommending more and more controls in attempts to reduce the probability of accident reoccurrence. Sometimes it may be more effective to reduce the actual number of controls however and apply resources into improving their reliability.

In my opinion an efficient mining regulatory system is one which ensures that it is lower cost to operate a safe mine. Such an approach is congruent with what every manager in a mine should be seeking to achieve which is the principle of Safe Production. It should also encourage an informed and just safety culture. Regulators play a critical role in setting the industry's safety culture through the way in which they administer the law and potentially act as agents of change through influencing industry practice by information sharing.

Where to start? This is a critical and difficult question to answer, Figures 5 and 6 provide some assistance in answering such questions. Where is your organisation on the safety evolution curve? Where will you obtain the most impact for any particular effort of your resources? Figure 7 is illustrating the situation where organisational resources should focus on engineering controls as this will generate the most impact until 30% of effort is expended and then move progressively to safety cultural improvement.

Figure 7: How to Decide Where to Focus
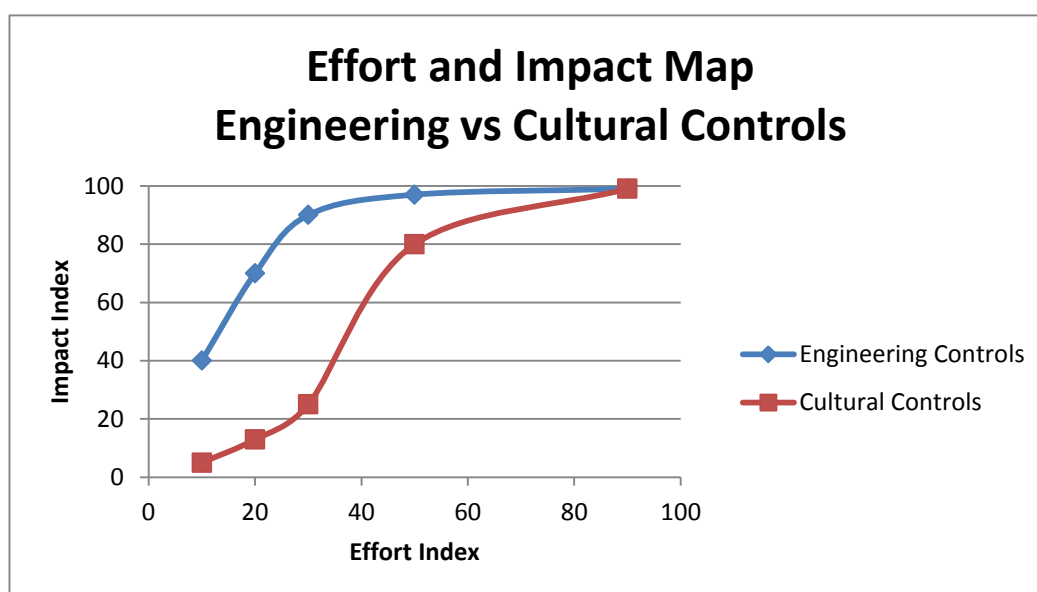
6.   CONCLUDING COMMENTS

In a well implemented safety system (several hard controls) only cultural influences are sufficiently widespread to increase substantially the probability of lining up the weaknesses (holes in the Swiss Cheese) and thus cause an accident.

Different sites are exposed to different cultures and therefore require different approaches. National cultural differences are important considerations when developing safety culture improvement initiatives. In most Australian coal mines due to relatively high engineering standards and comparatively well-educated workforces a focus on safety culture is required in order to improve fatal injury risk.

Implementation of an effective safety management system including the establishment of an informed and learning safety culture is no easy task as it involves the management of change. Good management capable of operating a mine safely has all the capabilities to operate it productively. In our experience an unsafe but high producing mine is a rare and short lived phenomenon.

7. I-SAFE / WE-SAFE IMPLEMENTATION

Bruce Denney as the Chief Operating Officer recognised that Safety was not where it needed to be; far too many people were being hurt at work. In May 2012 our total recordable incidents were 58 on an annualised basis. At the same time, consideration was given to undertake cultural change across the organisation and it was deemed prudent to start with the cultural change through Safety, a shared value where behaviours could be improved. Safety was also chosen due to proven Safety Behavioural interventions undertaken in other organisations across the mining industry.

In 2012 the role of Corporate Health and Safety Manager was established to bring a coordinated focus to safety across the New Hope Group. The initial scope of the role was to focus on safety through a behavioural intervention program rather than focus primarily on systems and the working environment. Three programs were assessed with Sentis' ZIP (Zero Incident Process) program being favoured for its unique approach to addressing the safety challenge. Underpinning the whole process was to get our employees to think differently about safety and to make it meaningful to them rather that for compliance sake. The ZIP program was also favoured because we were able to rebrand and customise it to suit our own needs. Early in the engagement piece with Sentis we changed the name of the Program from ZIP to i-Safe / We-Safe and created a logo (see Figure 8) to represent the meaning behind the words, in essence **'if I'm safe then we are all Safe'**.

<div align="center">Figure 8: i-Safe / We-Safe Logo</div>

The i-Safe / We-Safe program applies a framework for enhancing our organisation's safety systems using the latest neuroscience developments with the goal of:

- increasing the level and quality of individual employee engagement with safety tools and practices, and reinforcing effective attitudes and personal responsibility for safety;
- supporting our leaders to directly improve safety performance in their team and enhancing the culture of leadership within the organisation;
- creating and maintaining a cultural framework that supports ongoing improvement in safety and performance.

A considered approach was undertaken to implement the i-Safe / We-Safe program. A five stage process was undertaken:

- Defining the destination

  A one day workshop with the executive and senior leadership was held to determine the goals and objectives of the safety cultural change process.

- Assessment and diagnoses

  A safety climate survey was conducted around 7 safety leadership competencies to determine the current state of the safety culture. The data from the survey was supported by a qualitative climate analysis assessing each business area within the organisation via site visits and meetings with key stakeholders.

- Building a customised solution

  From the data obtained during the assessment and diagnosis phase a customised solution was developed. Collateral was developed specific to New Hope including in-house video footage.

- Implementation

  Three pilot programs were developed targeting Senior Leaders, Frontline Leaders and Teams. Based on feedback received during the pilot programs the content was modified.

  Senior and Frontline leaders received 4 days of training and the teams 2 days. Leaders received the foundation principles given to teams plus leadership tools to enhance and embed the principles of the program.

  Over 3 months more than 600 employees and contractors participated in the program.
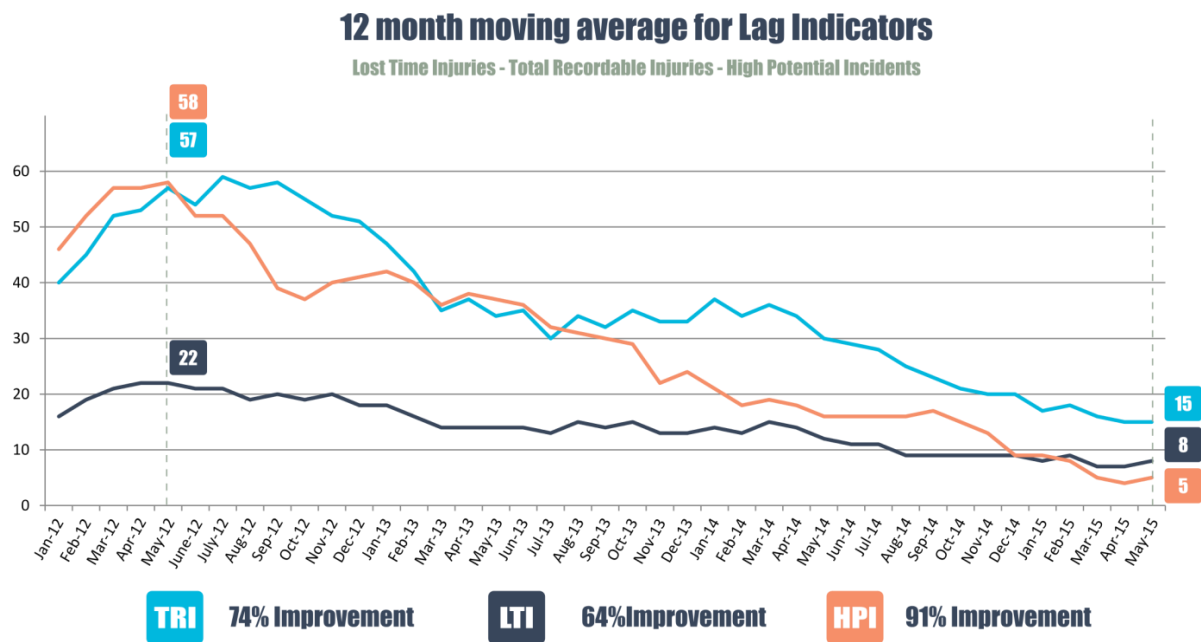
- Maintaining the change

  Since the formal rollout of the program we have embedded the principles of the i-Safe / We-Safe program through monthly toolbox talks; posters designed by Sentis and by employees; i-Safe / We-Safe message on computer desktop wallpapers and embedding the language in meetings. Our coal operations have embarked on refresher sessions for their entire workforce.

  The key principle that has resonated with our workforce is the intrinsic motivator to be safe, which is for their loved ones and the things that are most important to them. This was reinforced by the concept of the PB5 (Personal Big 5) represented by the following diagram.

Figure 9: Personal Big 5 Logo

The results have been very significant for the New Hope Group, with improvement in the occurrences of TRI's (74% improvement), LTI's (64% improvement) and HPI's (91% improvement) over the period May 2012 to May 2015.

Figure 10:   Lagging Safety Indicators for New Hope Group

12 month moving average for Lag Indicators
Lost Time Injuries - Total Recordable Injuries - High Potential Incidents

| TRI | 74% Improvement | LTI | 64%Improvement | HPI | 91% Improvement |

This has also translated to an improved bottom line with Worker's Compensation costs and Premiums decreasing significantly.

Figure 11: Relationship between Safety Performance and Financial Costs

TRI's vs Costs
(Workers Compensation & Premiums)