NSW MAKING IT HAPPEN

NSW GOVERNMENT Planning & Environment Resources Regulator

HOF: a regulator’s perspective

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MSAC fatalities review

In 2014 the Mine Safety Advisory Council engaged Peter Wilkinson of The Noetic Group to undertake a fatalities review.

Recommendation 2: Drawing on the discipline of Human Factors, including human and organisational factors expertise, identify the reasons which make it more likely risk controls will be successfully and reliably implemented.

Incident prevention strategy

The Mine Safety Regulatory Reform Incident Prevention Strategy outlines a process of holistic reform to develop an outcomes-focused, risk-based approach to regulating mine safety.

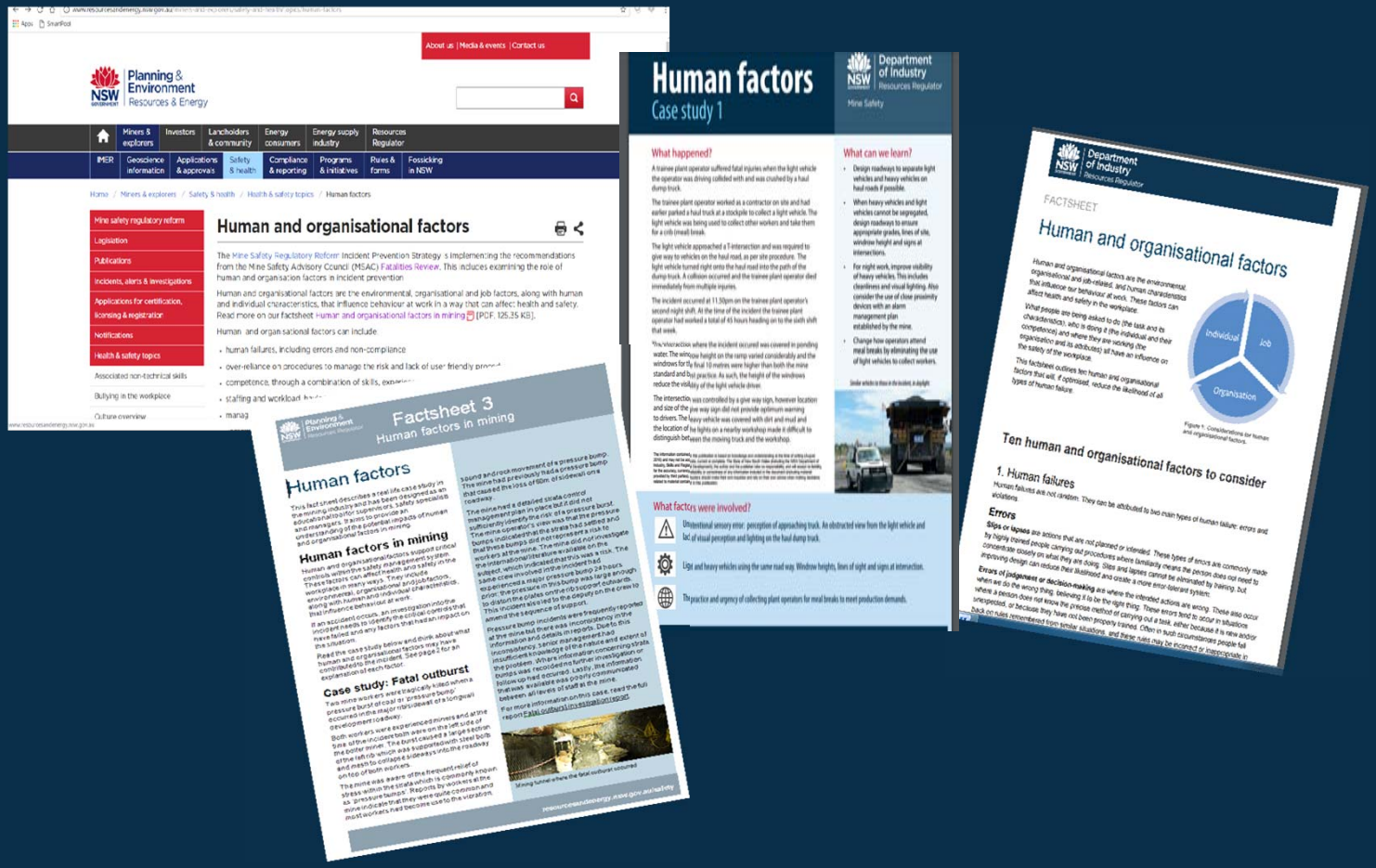
The strategy identified three main project areas:

1. Risk-based intervention.

2. Human and organisational factors.

3. Quality data.

HOF info for industry



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Human and organisational factor analysis

The Resources Regulator engaged the Keil Centre to help develop a bespoke human factor analysis tool for investigators and inspectors.

The aim was:

- to build a web-based tool
- develop a human failure taxonomy for unintentional and intentional behaviour
- develop a taxonomy for performance shaping factors specific to the mining industry
- map the path of decision making for HOF
- design and deliver training on HOF to inspectors and investigators.

Case study

What happened?

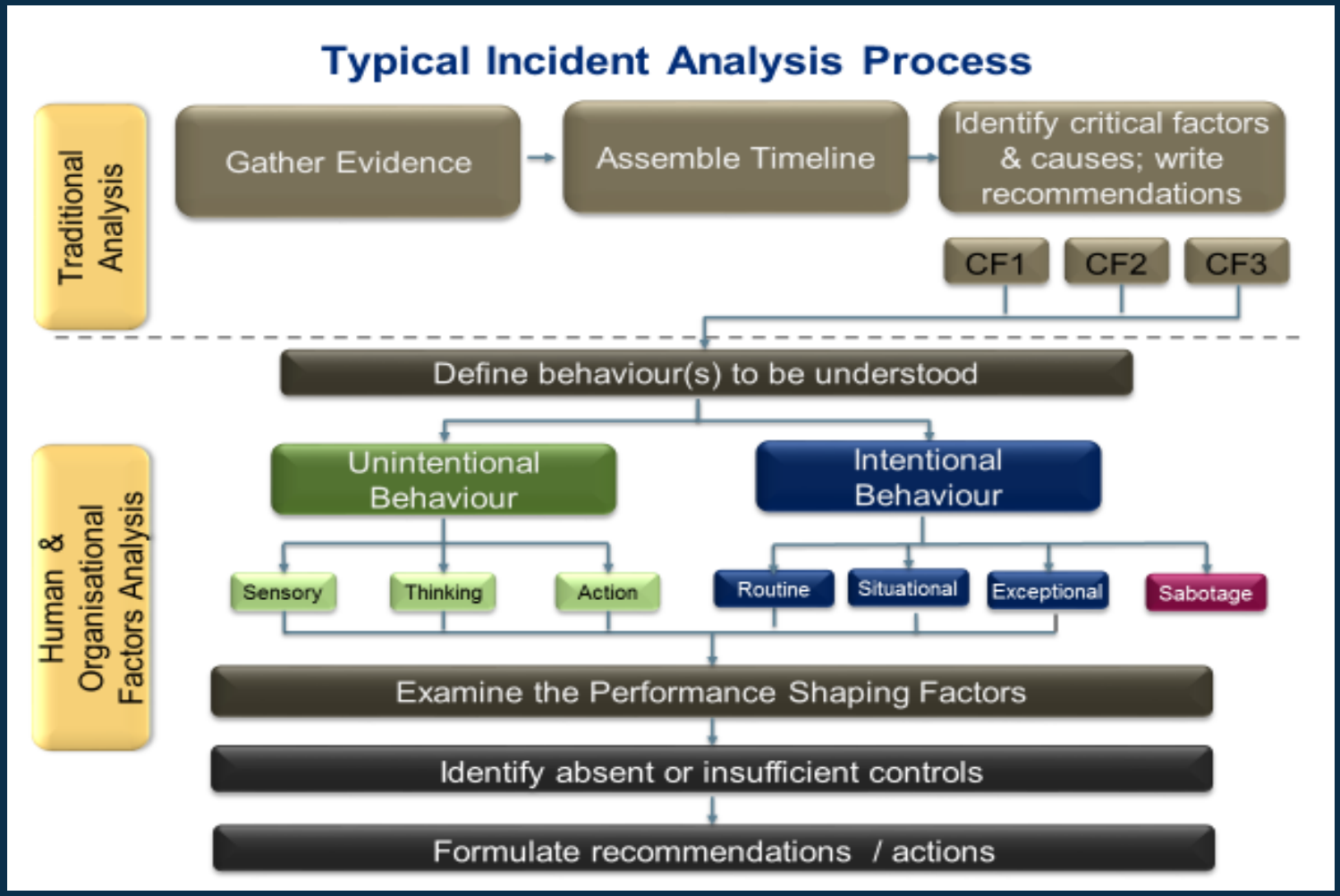
An incident occurred in an underground coal whereby a multi-skilled mine worker was moving a bull hose when he uncoupled two hoses without isolating the main air supply.

What was the result?

This action resulted in whipping of the pressurised hose until the hose was isolated. A deputy and another multi-skilled mine worker were standing near the area when the incident occurred.

Aim of the review

- trial the SHOF tool
- identify the PSFs which may have deteriorated and contributed to the condition.


Typical Incident Analysis Process
Traditional Analysis
Gather Evidence
Assemble Timeline
Identify critical factors & causes; write recommendations
CF1
CF2
CF3
Define behaviour(s) to be understood
Human & Organisational Factors Analysis
Unintentional Behaviour
Intentional Behaviour
Sensory
Thinking
Action
Routine
Situational
Exceptional
Sabotage
Examine the Performance Shaping Factors
Identify absent or insufficient controls
Formulate recommendations / actions

	Failure type	Definition	Characteristics	Examples
Unintentional Action (Error)	Sensory Error	Where information input via sensory channels is degraded.	• Associated with expectancy and attentional focus	• Mishearing an instruction from a colleague • Not seeing an oncoming vehicle • Not detecting smell of chemical/product • Reading the wrong pressure gauge • Misreading a speed indicator
	Action Error: Slips and Lapses	Where a simple, frequently performed physical action goes wrong.	• Associated with familiar tasks requiring little conscious attention: • Slip: where the right action is intended but the wrong action is performed • Lapse: where the required action was omitted due to a momentary memory lapse • The individual often finds it difficult to explain why they acted as they did.	• Opening wrong valve • Moving a switch in the wrong direction • Forgetting a crucial step in a procedure • Driving vehicle away with fuel hose still attached
	Thinking Error: Mistakes	Action is carried out as planned, but wrong course of action is taken. Decision making errors, errors of diagnosis or judgement involving conscious mental processes.	• Misapply a good rule, or apply an inappropriate rule • Misdiagnose an indication and apply inappropriate corrective action	• Ignoring alarms in a real emergency based on a history of false alarms • Misjudging vehicle capability due to experience in a different vehicle • Applying outdated procedure which doesn't fit the current conditions
Intentional Action (Non-compliance)	Routine	Deviation from rules and procedures as the normal way of operating in order to get the job done.	• Non-compliance has become the norm • Consensus within team or organisation that it is not necessary to follow the rule/procedure 'to the letter' • Organisation/team 'turns a blind eye'	• Driving at a speed outside the speed limit, because everybody does it • Omitting pre-start inspections because supervisor never checks them
	Situational	Non-compliance with rules or procedures, due to situation-specific factors, such that non-compliance is perceived as the best way to get the job done.	Taking shortcuts or not following procedures in order to overcome an obstacle, such as time/production pressure, broken down equipment or impending weather conditions	• Changing sequence on a procedure to save time and get the job done • Omitting an independent inspection when a supervisor can't be located
	Exceptional	The non-compliance is intended to solve a novel problem in highly unusual circumstances, such that compliance is perceived as the only way to resolve the problem, and get the job done.	Takes a calculated risk in deviating from the rules due to highly unusual circumstances. The rules are seen as no longer applying.	• Speeding on the way to maternity unit • Skipping communication steps in procedure during emergency in order to return plant to safe operations and avoid catastrophic failure
	Sabotage	An egregious act, where non-compliance is intended to cause harm or damage.	Unlike other non-compliance which seeks to get the job done, sabotage is characterised by malicious intent to cause harm.	• Acts of arson • Deliberately putting plant into unsafe state

Behaviours that contributed to this incident	
Person performing behaviour	Multi-skilled mine worker
The task they were engaged on at the time	Breaking the join in the air hose
What they did (or did not do)?	Did not check for isolation or test for dead at the manifold valve
What was the result?	Hoses whipping around
Was the behaviour intentional?	Yes
Based on the evidence, the intentional behaviour that best describes this behaviour is?	Situational (please refer to appendix A for definition of behaviours)
Reason for selecting this behaviour type:	• wanted to save time • perceived it was not necessary as from a distance he thought the bull hose (spinning valve) was open • did not check for isolation

Performance shaping factors taxonomy

Personal factors	Job factors	Work Environment	Team factors	Organisational factors
Individual technical competence	**Task demands**	**Environmental Conditions**	**Team dynamics**	**Planning & Resourcing & Planning**
Familiarity with task	Physical demands of task	Weather	Team relations & trust	Planning & co-ordination of resources
Level of experience	Mental demands of task	Temperature / Humidity /Light	Team member example behaviour	Availability of appropriate resources
Learning/knowledge of task	Time pressures	Air quality/Noise/Vibration	Team member expectations	Mine planning
Training sufficiency	Task design	Time of Day	Supervisor / Leader example behaviour	
Training recency	Workload	Roadway conditions	Supervisor / Leader expectations	**Training & competence systems**
	Non-standard activity		Supervisor communications quality	Availability of training
			Supervisor planned inappropriate operations	Frequency of training
Individual non-technical factors			Team communication quality	Training quality
Situation assessment	**Communications factors**		Supervisor support / assistance	Suitability of training
Perception & understanding	Information content		Team peer support/assistance	Competence management system
Confidence/motivation/attitude	Communication method		Groupthink	
Job satisfaction/morale	Communication quality		Bullying	**Safety Management**
Attention/alertness/vigilance	Comms equipment quality/reliability			Risk management arrangements (Identification, Analysis, and Control selection)
Distraction			**Work practices**	Worker participation & involvement (consultation)
Boredom	**Procedures**		Team risk management practices	Implementation of risk management arrangements
	Procedure availability / access / location		Permit to work practices	Arrangements covering high risk work
Individual Wellbeing	Procedure accuracy or completeness		Fitness for work management practices	Change management
Stress	Procedure clarity or complexity		Mentoring and supervision practices	Checking inspection & monitoring
Fitness/physical health issues	Procedure format (physical)		Allocation & communication of responsibility	Investigation & audit findings
Sleep problems	Procedure validity / feasibility / suitability		Accountability	Safety trend analysis & review practices
Fatigue	Compatibility with other procedures		Task / shift handover/takeover practices	Fatigue risk management
Mental health issues				Fitness for work management
Substance use	**Ergonomics**		**Planning & Co-ordination Practices**	Contractor management
	Control panel layout/design		Shift organisation & rostering	
	Alarms and warning devices quality		Team staffing levels	**Organisational arrangements**
	Visual display quality		Team composition (skill set/experience)	Maintenance, inspection & testing plant/equipment)
	Workplace layout		Role clarity	Procurement & commissioning
	Fit for purpose equipment & tools		Co-ordination between teams	priority of production bonus and safety incentives
			Co-ordination between workgroups	Interdepartmental comms & co-ordination
	Tool use/equipment use			Industrial relations
	Tools / equipment availability			
	Tools / equipment reliability			**Organisational culture**
	Trust in tools or equipment			Organisational learning
				Trust within the organisation
				Reporting and/or investigation culture
				Consistency of safety message
				Production culture
				Social norms & pressures (Org level)
				Normalisation of risk
				Discipline, rewards & benefits

Performance shaping factors identified

Performance shaping factors				
Personal factors	Job factors	Environmental conditions	Team factors	Organisational factors
Situational assessment	**Task design**	**Light**	**Team communication quality**	**Safety trend analysis and review practices**
Perception and understanding	**Communication method**		**Team risk management practices**	
Confidence, motivation and attitude	**Communication quality**		**Mentoring and supervision practices**	
distraction	**Procedure availability, access, location**			
Sleep problems				

PSF findings

- communication, including communication within the team and to the team
- team supervision
- risk management effectiveness, including quality and feedback

Recommendations

- SLAMS need to be completed at the time and location of the task in consultation with all people involved. This will ensure that the team communicates and coordinate roles and responsibilities
- SLAMS need to be reviewed to consider the effectiveness of controls, with feedback to workers to enable continuous improvements
- if isolation is required, the supervisor should communicate this to the workers undertaking the task.

Where to from here?

- ongoing program of training for investigators and inspectors
- mentoring and coaching program to follow training
- tool will be integrated into work processes
- investigation reports will include HOF
- integrate HOF into proactive targeted assessment program
- greater focus on informing industry about HOF and importance of reviewing controls in respect to SMS and their sociotechnical systems

Questions?

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More information

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