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## What works best at improving mine worker safety and why does it work



Carmel Bofinger – MISHC  
Elizabeth Mahon – Simtars  
Sue Leveritt, David Cliff - MISHC




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## Project details

- Identify the key factors affecting the success of safety programs
- Provide a framework for evaluation
- Funded by ACARP
- Undertaken by Simtars and MISHC
- Co-operation and in-kind support from mines in Queensland and New South Wales






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## Why?

Industry not plagued by new injuries but rather finding effective solutions to existing problems

- Sprains and strains
- Serious traumatic injuries
- Noise induced hearing loss

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## Drivers and Motivators for programs

- Employer's enlightened self-interest
- Information on hazards and controls
- Injury costs and workers compensation
- Worker or Union pressure
- Legislation and Regulation

also Litigation!!







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## Worker Safety Motivation

- Safety climate of an organisation
- Task feedback
- Workgroup norms
- Organisation control systems

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## Determinants of actions

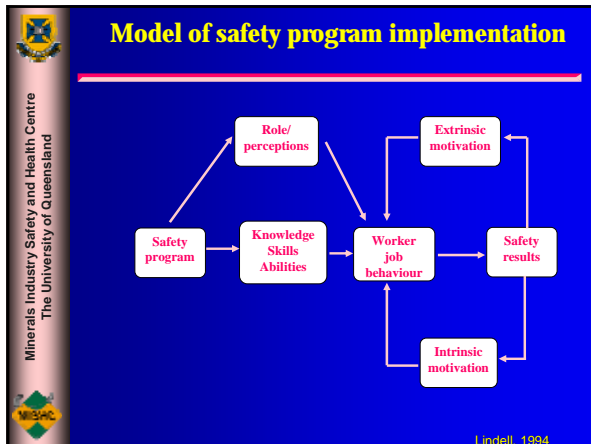
- Knowledge
- Skills
- Abilities

**Define what people are capable of doing**

**Perceptions define what workers think they should be doing**

- Different sources
- Balance safety and production

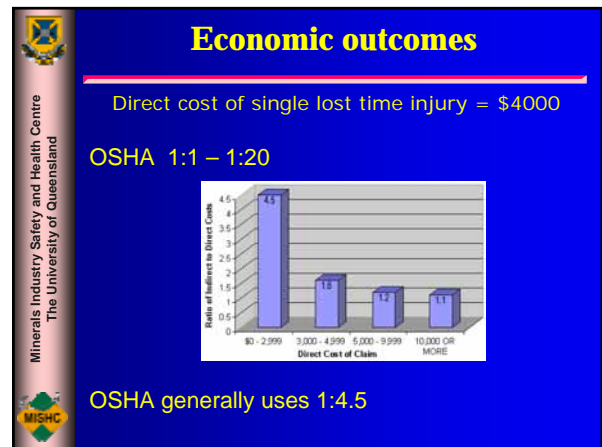





- ### Evaluation techniques
- Demonstrate accomplishment of proposed objectives (how well did I do?)
  - Guide internal program decision-making (how am I doing?)
- Historically, looked at "after the fact" statistics

### Economic outcomes

Cost (problem) > Cost (solution)

$$\text{Cost(solution)} = \text{Cost(safety program)} \times \% \text{ effectiveness}$$


- ### Economic outcomes
- Direct cost of single lost time injury = \$4000
- OSHA 1:4.5
  - Open cut coal 1:9 (Esson)
  - Fatigue related injury \$ 40 300 → 1:10 (Mabbott)
  - Other industries 1:4
- This project used 1:4.5

- ### Methodology
1. Definition of key strategies
    - Questionnaire (21) and conference papers (22)
  2. Site programs and strategies
    - Training program
    - Manual task program
    - Observational audit system
    - Risk management process
    - Safety system program
  3. Components of safety program
    - Evaluation tool

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## Limitations of data

- Questionnaires were answered by people keen to provide information
- Conference papers reported successful programs
- Proactive sites track and evaluate programs
- Proactive sites were involved in on-site evaluations
- Barriers to successful not identified

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## Part 1 - Results

- Programs driven by management ~ 40%
- Programs driven by legislation ~ 20%
- Needs assessment ~ 60%
- Assessed and objectives meet ~ 85%
- Timeframe > 12 months ~ 25%
- Resources – major issue was rostering

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## Part 1 – Results

Issue	Individual (%)	Organisational (%)	Work environment (%)
production and training balance	35	35	15
availability of personnel	25	35	15
rostering issues	45	40	65
other	15	10	35

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## Part 2 – Evaluation

```

graph TD
    Needs[Needs] --> GO[Goals and objectives]
    GO --> Inputs[Inputs]
    Inputs --> Process[Process]
    Process --> Outputs[Outputs]
    Outputs --> Outcome([Outcome])
  
```

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## Part 2 - Evaluation

- Series of questions for program co-ordinator
- Observations by project personnel
- Questions and interviews with workers
- Analysis of data on project collected
- Effectiveness *"doing the right thing"*
- Efficiency *"doing it for the right cost"*
- Appropriateness *"doing it right"*

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## Part 2 - Results

Program	% effectiveness	Cost of program	Cost of solution
Observational audit	70	\$10 500	\$15 000
Risk management	80	\$22 500	\$28 125
Safety system	70	\$ 18 500	\$26 428
Training - legislative	95	\$40 000	\$ 42 105
- informed workforce	<50	\$40 000	\$>80 000

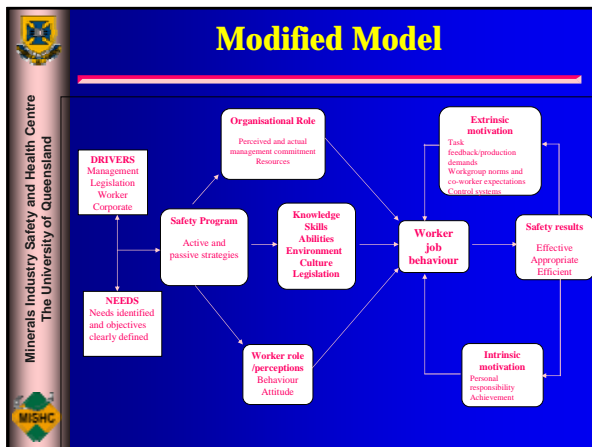
**Part 2 - Results**

Average total direct and indirect costs for an injury in coal mining - \$ 22 000

Economic return for programs if they prevent more than one injury!!

**Part 3 - Results**

- Factors affecting success are complex and inter-related
- 3 major factors
  - Clear identification of needs and objectives
  - Actual and perceived commitment by management
  - Allocation of adequate resources, including time
- Management commitment influences perceptions and impacts
- Motivators must be consistent



**Steps to a successful program**

- Determine the need
  - May be more than one
- Identify the main driver
  - May change throughout the program
- Set goals and objectives
  - Knowledge, attitude or behavioural change
  - Environmental change
  - Technical/equipment change

Stakeholders and target audience

**Steps to a successful program**

- Implement the program
  - Timeframe
  - Identification and allocation of resources – physical, financial, human
  - Costs estimates
- Evaluate the program
  - Effectiveness
  - Efficiency
  - Appropriateness

**Acknowledge the support of ACARP**

**and**

**the mines and personnel involved**