Communication and training for informal risk assessment

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With the current upturn in minerals industry production, there is considerable movement within the industry workforce, with new recruits being drawn from within the industry and from other industries. Any change to the normal mode of operation, such as new equipment or new recruits, has the potential to introduce new hazards.

The practice of informal risk assessment (IRA) is commonly used during the course of the shift to identify hazards and to assess the effectiveness of the control measures in place. The IRA process is often supported by the use of prompt cards designed to reflect the site approach to risk assessment. Ensuring that new recruits use this informal approach competently relies on effective training and leadership; a good understanding of what can go wrong and how to manage the risks; and the availability of current and timely safety information. In addition, the overall quality of site training, leadership approach and safety culture provides the basis for continual improvement. When supported by lessons drawn from past unwanted events, these factors combine to impact on the way individuals deal with risk. The glue that binds these is the site knowledge management system, so it is essential to align this system with the implementation of communication strategies and mechanisms that support these factors.

A recent ACARP project investigating communication strategies and mechanisms for informal risk assessments has identified the following as important to the success of communication at coal mining operations.
- A clear understanding of the communication profile of the site workforce
- Identification of differences in communication preferences and skills of supervisors and non-supervisors
- Identification of potential barriers to communication created by the nature of the coal mining environment eg communication with contractors, physical barriers
- Identification of the roles and responsibilities of leaders that support the effective operation of the communication system
- Development of a clearly identified feedback process

A good understanding of these features is needed in order to establish communication strategies and mechanisms that will have a positive effect on the factors that contribute both directly and indirectly to informal risk assessment.

Communication profile
Questionnaire data collected from six different coal operations that represent a cross section of sizes and mining techniques have been used as the basis for this paper. The data analysis outcomes were used to construct communication profiles for supervisors and non-supervisors to allow identification of areas where communication strategies might need to be implemented.

The table on the next page shows the communication profiles for the following sub-groups of questionnaire respondents.

SOC   = Supervisors at Open cut/surface operations
SUG   = Supervisors at Underground operations
NSOC = Non-Supervisors at Open cut/surface operations
NSUG = Non-Supervisors at Underground operations

	SUG	NSUG	SOC	NSOC
Predominant Age Group	35-44	25-34	35-44/45-54	45-54
Experience	>5yrs	>2<5yrs	>5yrs	>5yrs
Language barriers	7%	1%	0%	1%
Hearing/sight problems	15%	7%	4%	16%
Literacy problems	11%	8%	2%	13%
Predominant Work area	Production (74%)	Production (44%)	Production (30%) Maintenance (30%)	Production (62%)
Changes in work location each shift?	√	√		√
Same group of people each shift?	√	√	√	√
Same tasks each shift?	√	√	√	
Same equipment each shift?	√	√	√	
Email skills	√	√	√	
Basic MS Word skills	√	√	√	
Access to email at work	√		√	

Table 1 Communication profiles for supervisors and non-supervisors at coal mines

Analysis of the demographic data showed that most supervisors surveyed at both underground and open cut operations fell into the 35-44 year category. However, this differed for non-supervisors, with the majority of underground non-supervisors aged 25-34 years and open cut non-supervisors aged 45-54 years. This result was not unexpected, given the more physically demanding work environment of underground coal operations compared with surface operations, and was reflected by the fact that underground non-supervisors generally had less experience (between 2 and 5 years) compared with the other cohorts (more than 5 years). It was interesting to note that physical incapacity (hearing and sight) and literacy were more likely to impact on communication than language barriers. In each case, open cut supervisors were the group least likely to be affected.

People working at surface sites were more likely to experience changes in work tasks and equipment than those underground, while open cut supervisors were least likely to change work location. All groups tended to work with the same people each shift.

The most obvious area of difference in the profiles among the groups was the confidence levels associated with electronic communication tools. Overall, supervisors had far greater confidence in their computer skills than non-supervisors, particularly in the open cut sector. While it might be assumed that the younger workers would have greater confidence in their computer skills than the older workers, this distinction was only evident for non-supervisors. Perhaps this could be explained by the fact that supervisors, particularly at open cut operations, generally had more opportunity to use computers to develop these skills.

Communication preferences

A comparison of communication mechanisms used on site and workforce preferences confirmed that verbal communication was the most common mechanism used by sites and was the preferred option of all respondent cohorts. While written communication was also commonly used, only underground non-supervisors showed any particular preference for this mechanism. Similarly, while supervisors used electronic communication, they clearly preferred verbal. Other forms of communication identified included 2-way radio, hand signals, Chinese whispers, noticeboards and logbooks.
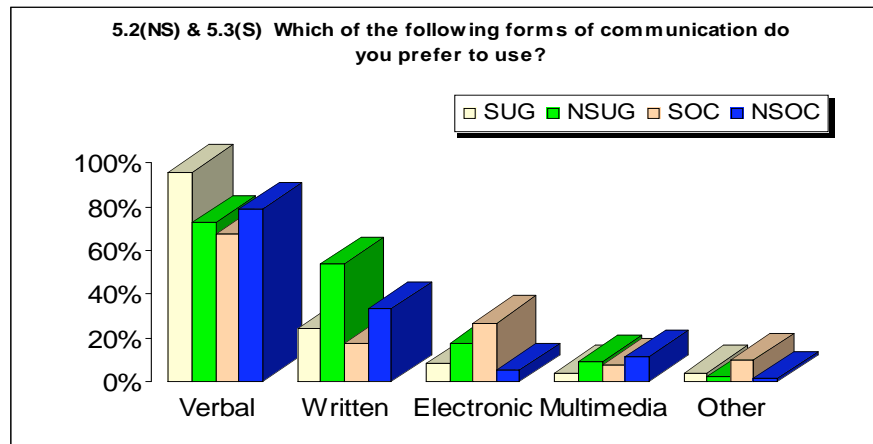
Most respondents appeared to have a very positive attitude towards discussion about safety, tasks to be undertaken and questioning information that is unclear. This was particularly the case for the underground sector.

Effectiveness of communication mechanisms

Questionnaire respondents were asked to rate a range of communication mechanisms for effectiveness. Overall, non-supervisors considered conversations to be the most effective means of communication for information required to work safely during the shift. Supervisors agreed, but considered meetings and toolbox talks just as effective. Written reports appeared to be better accepted by underground rather than by open cut workers. Hand signals and 2-way radio were generally rated poorly, while muster room notices and email were consistently rated as less than effective.

Barriers to success

The effectiveness of the communication system may be limited by the nature of the work environment and tasks undertaken at the site. Factors such as complex task loads associated with operating large mobile equipment, hot seat shift changeovers, where one operator replaces another without shutting down the equipment, and physical barriers, such as noise and reduced visibility, should be taken into account when planning communication strategies.

Varying shift rosters and the physical size of an operation can also pose barriers. Work teams within the one organisation sometimes exhibit different styles of communication that are driven by what they do, and how, and when they do it. The presence of employees not directly employed by the site, such as contractors who perform tasks not undertaken by anyone else, can also create an invisible barrier to communication if these people are not perceived to be an integral part of the workforce.

Access to maintenance and equipment information is sometimes impeded by the need for specific training to operate the software package. If access is limited to site employees for security purposes, then a recognisable process needs to be put in place to ensure information is available when needed during the shutdown operation.

Other factors that have the potential to limit the effectiveness of the communication system include:

- Use of mechanisms not favoured by the workforce
- Poor people selection &/or inadequate training for leadership roles
- Organisational barriers posed by different work areas and levels of management
- Physical barriers posed by the work environment
- Transition between electronic and verbal/written forms of communication & vice versa
- Conversion of informal language to formal/standardised language
- Additional cognitive load when trying to communicate (esp. 2-way) while undertaking a complex task (eg operating large mobile equipment) – reluctance to interrupt task
- Task location - impacts on ability to engage face to face (esp. open cut)
- Lack of performance measures to identify how well information is interpreted
- Potential breakdown at the user interface between technical services and operational areas
- Use or absence of selective terminology or jargon

Feedback

Feedback is essential for continual improvement of any system. The factors that contribute to the quality of informal risk assessment should be measured for their effectiveness by a recognised feedback process. Improvements made in response to feedback should also be clearly identified and communicated to the workforce.

The feedback process should:
- Address the need to translate verbal feedback into electronic format for storage on the site knowledge management system
- Identify ways to ensure accurate translation at communication interfaces i.e. from verbal to written, written to electronic, etc.
- Identify ways to disseminate outcomes of the feedback process
- Encourage use of the process

From the questionnaire data, it is clear that informal face-to-face interaction is the most likely forum to gather and disseminate useful feedback. However, this poses the challenge of how best to record and store this information. Trained facilitators may prove effective for overcoming this issue, particularly given the reported positive attitudes to discussion about safety, tasks to be undertaken and questioning information that is unclear.

While it may be desirable, it is not always practicable to provide feedback relating to hazard reports directly to the individuals who have submitted them. However, it may be important to these individuals to know the outcomes or they may lose faith in the system and perceive reporting to be unimportant. A communication flowchart that clearly outlines the process for accessing feedback could be a useful tool to have on display.

Electronic feedback via the site knowledge management system or email messages may be appropriate for people who have ready access to a computer and have been trained to use the system. However, it is unlikely that underground crews would have the opportunity to take advantage of this approach. They may be better served with a paper system placed in a recognised area, such as the muster or lamp room, provided the information is stored in a systematic and recognisable manner. As this approach does not encourage 2-way feedback, it may be useful to nominate a champion to monitor its effectiveness.

Safety related information that is collected and stored in electronic data management systems forms the core of the organisational memory that can be drawn to support day to day decision making through informal risk assessment. However, this information is not always centrally located, particularly where maintenance data is stored in a separate system from the site safety and health management system. The design of the knowledge management system is also important for document control systems that determine how version control is established. People must be trained to effectively understand and use the system to ensure that the latest version of a document, such as a JHA[1], is available electronically.

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[1] JHA – Job Hazard Analysis

Leadership that drives communication is an important part of the informal risk assessment process. Frontline supervisors, trainers, mentors and champions play important leadership roles in disseminating information, gathering feedback, encouraging people to carry out informal risk assessments and monitoring continual improvement of the IRA process.

The frontline supervisor plays a key role in ensuring that safety information is communicated to the work team in a timely fashion and in a format that is easily understood and acted upon. However, many frontline supervisors find themselves overwhelmed by the volume of information that they are expected to deal with. Much of this information arrives via a mechanism suitable for the supervisor, such as email, but which must be disseminated to non-supervisors via a different mechanism, such as verbal instructions or a printout of the email. This need to interpret and further disseminate information requires time and effort, which may have a negative effect on the timeliness and currency of information.

Historically, the role of mentor has been utilised on an informal basis to help inexperienced workers to work safely. Through their experience, mentors command respect, which further ensures that the messages they deliver are taken on board and used effectively. However, the information that they pass on to individuals is mostly verbal, and as such has not always been captured in the knowledge management system for the benefit of others within the organisation. Mentors have an important role to play in the transformation of tacit information derived from verbal communication into explicit information that can be stored and reproduced via the knowledge management system. They may also be in a position to direct feedback to decision makers. The value of their advice could be enhanced if the mentor's role was clearly identified and communication channels for feedback established. (Crichton 2005).

It is becoming common practice within the minerals industry to appoint "Champions" to drive particular issues or themes related to safety and health. Champions tend to support a process or issue, such as a business improvement program or a focus for implementation of company standards, rather than specific tasks. While much of the current mining safety and health legislation demands that communication and consultation be a recognised part of the risk assessment process, it is significant to note that champions for this purpose appear to be thin on the ground. A person fulfilling this role could be expected to gather feedback informally in order to direct these messages further up the management chain to those in a position to act on them.

Experience through past lessons
Lesson Learned information is commonly made available to the workforce in the form of single page notices that may contain one or more images relating to the incident. However, it the project data showed that most respondents rated toolbox talks and meetings to be at least as effective, if not more so, than written reports. This may suggest that the hard copy documents should be incorporated into the verbal forums to help reinforce the message.

However, no matter how relevant the lessons may be, individuals often fail to recognise and accept that these same incidents could occur at their own workplace. Some sites have attempted to address this anomaly by encouraging the participation of individual/s who have been personally involved in a site incident to discuss the lessons learned with workmates. This is an approach that could be further improved by involving mentors to reinforce the lessons, based on their own experience, and to drive discussion towards identification of similar potential situations.

Training
New starters at mine sites will receive training to develop the skills required to perform a range of tasks and to understand the specific mining hazards that they may encounter. Most sites will also provide training for the specific informal risk assessment process that has been customised for company or site conditions. The quality of this training is most important in helping people to make good decisions about managing risks.

Sites commonly rely on pocket cards or booklets used as personal safety tools to drive the informal risk assessment process and to guide thinking about specific hazards associated with the task at hand. Key questions about the status of the equipment to be used, the

procedures to be followed and the competency of the people involved also serve to guide workers through the process. How much information and how to word questions are key issues that drive the many different designs of prompt cards and booklets.

The design of training materials and delivery mechanisms should demonstrate an understanding of the communication preferences of the trainees and the nature of their work environment. The relevance of training content could be improved by customising it to reflect actual site conditions, and by including supporting anecdotal material drawn from site incidents where possible.

It may be advantageous to involve mentors and/or champions in the training process to ensure consistency in transferring theory to practice. These people should be able to provide valuable feedback about the applicability of the training materials to the trainees as well as feedback about the overall success of the process.

Interaction among trainer, mentors and trainees also provides an opportunity to identify issues relating to the use of coal mining "jargon". Jargon is commonly used by industry personnel, but can sometimes create a barrier to clear communication if the intended message recipient is new to the site or work area and has not been educated to understand the terminology being used. For example, the term **"PASS[2]"** is commonly used in the minerals industry, but may be used to denote either of the following:

1. **Positive Attitude Safety System (PASS)** - a positive and proactive approach to engage people in open discussion of observed deficiencies and desired behaviours that occur in their workplace.
2. **Personal Alert Safety Systems (PASS)** emit a loud, highly discernable audio alarm when sensing the absence of motion if a worker becomes immobilized for 25 seconds. The systems are used by fire and emergency services to detect these distress conditions.

Regardless of how training is presented, it is important to incorporate a feedback process that will allow the effectiveness of the training materials and delivery format to be assessed.

Practical training approaches may offer opportunities to identify human factors issues with equipment associated with the task or with the procedures in place. It also creates an opportunity to establish the "language" used to communicate the existence of hazards associated with this area of competency. For example, lockout/tagout procedures may be characterised by colour coding for each particular action, thus creating a visual language that is clearly understood by competent individuals.

Safety culture
The development of the site safety culture takes place over a period of time, through training, behaviour modification programs and communication of safety performance. With many new starters in the industry there is also a need for communication that supports the site safety culture on a shift-by-shift basis. In particular, people should be skilled in the use of verbal techniques that encourage workmates to carry out informal risk assessments and to comment on unsafe actions in a positive manner.

While most respondents rated conversations highly for this purpose, other mechanisms also need to be used, as verbal communication during shift is often limited to conversations between individuals or small groups. The information tends to remain with these groups and is not passed on to the entire crew as lessons learned about the tasks undertaken.

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[2] PASS – A prototype of the Positive Attitude Safety System (PASS) was first created and developed by James S. Burns. Since then it has been significantly refined and is now available through independently owned franchised companies in various companies

Recommendations for effective communication strategies

The following recommendations for communication strategies have been drawn from the findings of the ACARP project and are set out here in terms of their indirect and direct contribution to the quality of the informal risk assessment process, as shown in the figure below.
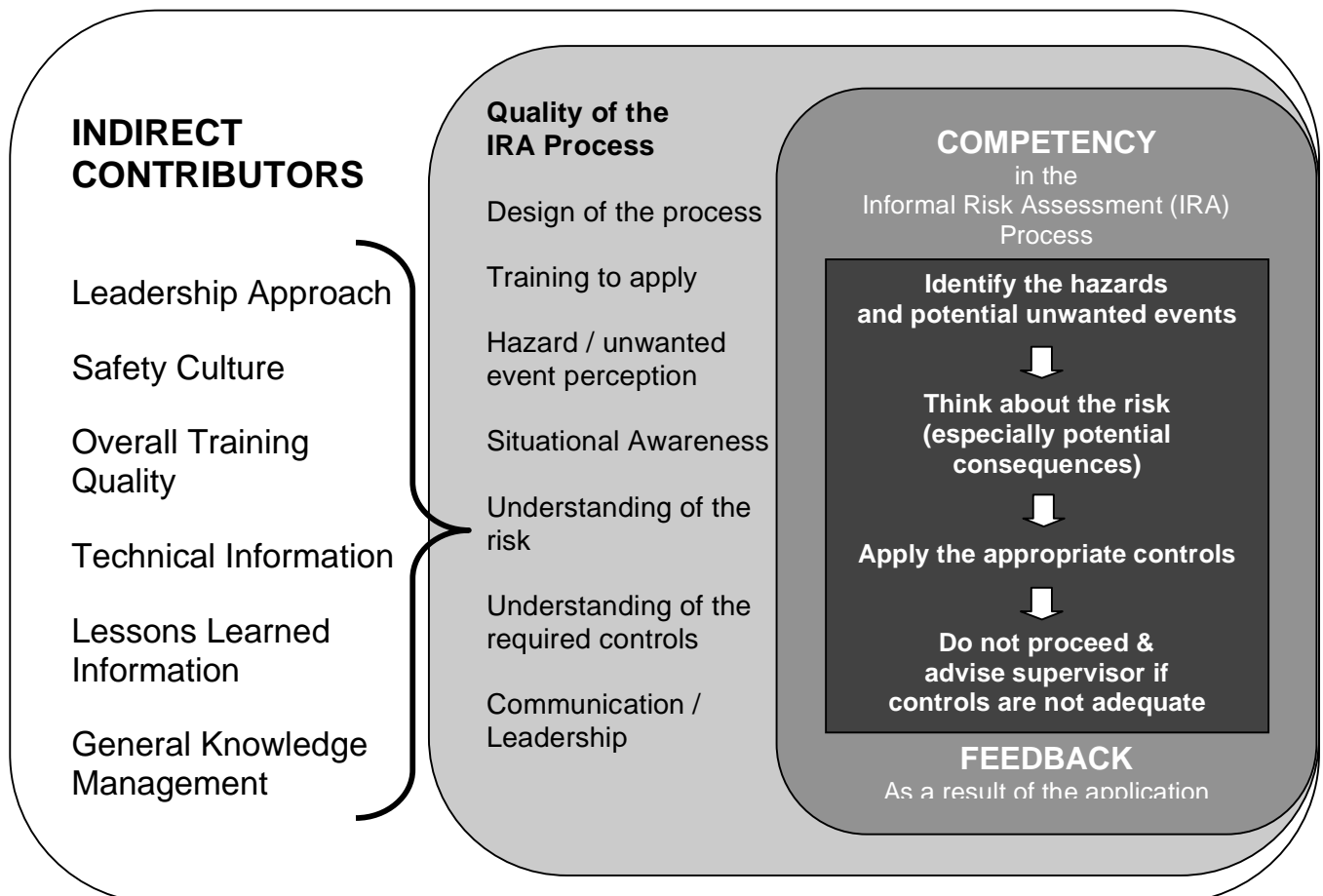
INDIRECT CONTRIBUTORS

Leadership Approach

Safety Culture

Overall Training Quality

Technical Information

Lessons Learned Information

General Knowledge Management

Quality of the IRA Process

Design of the process

Training to apply

Hazard / unwanted event perception

Situational Awareness

Understanding of the risk

Understanding of the required controls

Communication / Leadership

COMPETENCY
in the
Informal Risk Assessment (IRA) Process

Identify the hazards and potential unwanted events

⬇

Think about the risk (especially potential consequences)

⬇

Apply the appropriate controls

⬇

Do not proceed & advise supervisor if controls are not adequate

FEEDBACK
As a result of the application

Figure 1 Contributors to informal risk assessment

Leadership approach
- Identify key areas where leadership is required – lessons learned, safety culture, IRA process, training, document control, discussion forums
- Provide a process for ensuring that initiatives implemented by champions are not lost when the champion moves on to another site or work area
- Establish KPIs for leaders relating to information dissemination, feedback, encouragement/coaching and monitoring for continual improvement

Safety culture
- Identify mechanisms other than verbal that can be used to encourage the use of IRA during the shift and to alert people to unsafe behaviours (when verbal communication is impeded)
- Encourage information sharing about the use of IRA and unsafe behaviours
- Ensure that decisions about changes needed are recorded and disseminated

Overall training quality
- Combine interactive multimedia resources with face-to-face delivery to improve quality and relevance of training

Technical information
- Ensure people have the skills to access and interpret information from other work groups and work areas
- Identify communication mechanisms common to different work groups/areas that ensures information is received and acted on as intended
- Provide training for colour coding used to simplify interpretation of technical information
- Ensure that any jargon used is clearly understood boy the site workforce

Lessons Learned
- Use a variety of mechanisms to pass on lessons
- Involve mentors and site personnel directly involved in incidents to ensure relevance is understood
- Create permanent electronic case studies as multimedia resources for use in training, toolbox talks, Comms meetings, feedback sessions etc

General knowledge management
- Design the system to support communication of information, not just as storage device
- Design system to automatically populate reports for newsletters, lessons learned case studies, meeting presentations
- Use to store and disseminate lesson learned case studies
- Provide training for key users of the knowledge management system
- Provide training for the site workforce for related systems eg document control, site intranet

Design of the process
It is recommended that information design for the prompt card or booklet should encourage thinking outside the limitations of a checkbox. The graphic design should be clean and uncluttered, and guide the user from start to finish. This could be achieved by including:
- A process flow chart that identifies decision making and action steps
- Images, drawings & colours that reinforce hazard identification and potential unwanted events
- Open-ended questions
- Lamination of the finished product to protect from coal dust stains

Training to apply
- Involve mentors in the training process to establish their role as coaches while on the job
- Use peer training approach to improve relevance and feedback
- Include the use of the site prompt card or booklet in training related to site hazards

Hazard/Unwanted Event Perception
- Implement discussion forums about incidents and near hits, so that the relevance to the work situation is clearly perceived
- Encourage hazard reporting to provide experience with identifying hazards

Situational Awareness
- Identify ways to support the frontline supervisor and simplify the process of summarising, organising and disseminating information required during the shift and for gathering feedback and reporting on feedback outcomes
- Involve mentors in the process of ensuring accurate interpretation and application of information
- Clearly identify black spots that may interfere with communication
  - Put controls in place to minimise the risk of this happening

- o Identify alternate mechanisms if the first choice fails
- o Provide chart/list of alternates and situations where they should be used
- Identify mechanisms for people to be able to access information at times other than the pre-shift meeting
- Provide training for mechanisms that may require new skills eg site intranet

Understanding of the risk / Understanding of the required controls
- Implement a process involving mentors to reinforce information about what could actually happen and how to prevent it
- Encourage faulty equipment reporting that identifies less than adequate controls
- Encourage use of the feedback process to improve familiarity with the status of controls

Feedback
- Implement a feedback process that addresses both formal and informal mechanisms for gathering and disseminating feedback and the leadership roles required for the process
- Ensure that mechanisms are designed to overcome potential barriers created by the working environment, communication interfaces and communication skills of the workforce
- Develop communication flowcharts that clearly outline the feedback process for each group
- Identify skills and provide skills training for informal feedback
  - o Facilitation skills for focus groups
  - o Skills to transpose verbal feedback into electronic format
  - o Computer skills
- Encourage use of the process by demonstrating positive outcomes

Performance indicators
- Identify KPIs to measure the effectiveness of leaders, the feedback process, reporting and recording process, and decisions resulting from informal risk assessments.

- The feedback process should provide performance measures relating to:
  - o Decisions made as a result of informal risk assessments
  - o Training quality
  - o Relevance of LL
  - o Design of IRA process
  - o Interpretation of information esp. technical information