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Beyond Bulletins And Presentations: Use Of Scenarios To Learn From Incidents

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Abstract

Many organisations in the process industries seek to improve how they learn and embed lessons from incidents. Yet we hear less from such organisations on trialling novel learning methods in search of better ways to learn from incidents. This paper describes a project that used an engaging and interactive method to help personnel learn generic lessons from previous isolation incidents. A realistic written scenario was developed based on the common characteristics of previous isolation incidents. The scenario was completed by teams in facilitated workshops. Information about the scenario was progressively revealed, and at each stage participants were asked to identify what they would think and do as the events unfolded. Correct answers were discussed as a group, illustrating potential “holes” in organisational barriers if understanding or application of these barriers was lacking. Evaluation of the approach indicated that the scenario was a more interesting and engaging method of learning from incidents than passive methods such as emails, bulletins, and presentations. This project is being extended to scenarios for lessons from other themes of incidents. Using scenarios to strengthen individual learning impact from incidents is unusual, and can be applied by other organisations seeking a deeper level of learning from incidents.

Introduction

There are many examples in the safety science literature of organisations that have failed to learn the lessons of previous events in their own organisation, for instance Texas City and Longford (see Hopkins, 2000; 2008). With this knowledge, an important focus for many health and safety functions is communicating lessons from incidents to the organisation and helping people learn more effectively from incidents.

Woodside identified it had a larger than usual amount of commissioning activity scheduled in 2011. Such work involves many isolation and de-isolation tasks. It was also known from review of incidents that errors made during isolations are a reoccurring theme of incidents at Woodside and many other companies. Moreover, the organisation has recently updated its Health and Safety Operating Standards and Procedures to include Process and Mechanical Isolation. This situation prompted the health and safety function to consider how to help people learn lessons from previous isolation events in advance of the increased commissioning activity. Discussions on how to best approach this task resulted in a decision to move beyond the typical learning methods used such as bulletins and

presentations. Woodside sought a more engaging and interactive way for personnel to learn the lessons from previous isolation incidents.

The decision to invest in trialling a new learning method for the subject of isolations was further supported by a study on the relationship between level of training engagement and hazard severity. This study demonstrated that when the hazardous event severity is low, highly and less engaging training had comparable levels of effectiveness (Burke et al., 2011). However, highly engaging training was shown to be considerably more effective in promoting safety knowledge acquisition and performance than less engaging training when the severity level of the hazardous event is high. Errors during isolations are considered high hazard events and the consequences can be severe.

Effective learning

Differences in the type of experience upon which learning is based, and the type of learning method, can influence effectiveness of learning. These distinctions from Argote and Todrova (2007) are shown in Table 1. The type of experience upon which learning is based can be direct (e.g. personal involvement in an incident), or indirect (e.g. reading about an incident which happened to a colleague). Direct learning is typically more powerful. However, indirect learning can be influenced to improve its impact. Passive, indirect learning methods, such as reading a bulletin about an incident that happened to someone else, will have limited impact. Yet indirect learning can be more effective if influenced to be more active, where individuals must interpret others' experience, and evaluate cause and effect relationships. Such mental processing is likely to lead to greater indirect learning.

Table 1: Effect of types of experience and learning method on learning

		Type of learning method	
		Passive Less mindful	Active More mindful
Type of experience	Direct Own experience	More effective	Most effective
	Indirect Others experience	Least effective	More effective

Studies examining the effectiveness of health and safety training methods in relation to degree of participation in the learning process support this theory. For example, a meta-analysis conducted by Burke and colleagues (2006) found that as the method of safety and health training becomes more engaging—from passive methods, such as lecture, to engaging methods, such as hands-on training incorporating discussion—the training becomes more effective, resulting in greater knowledge acquisition, a higher level of safety performance, and a greater reduction in injuries.

Using simulation and scenarios for learning

Drawing on the information above, Woodside sought to use a more active and direct method for people to learn from its previous isolation incidents. It is common to simulate incidents for people directly controlling technical systems (e.g. putting pilots or control room operators in high-fidelity simulators), and to develop incident commanders' emergency response competence (e.g. Flin, 1996). Moreover, managerial judgment can be successfully measured via scenarios, and used to select and develop

managers (SHL, 2004). A written scenario was also recently used to simulate a non-emergency management task to aid post-incident learning for managers (Lardner & Robertson, 2011). Woodside determined that use of a scenario would be appropriate to simulate previous isolation incidents in a novel and engaging way.

Identifying generic lessons for scenarios

General lessons can be extracted from previous events. For example, van Wijk, Taylor and May (2009) reviewed ten major incidents from various industries and identified eight common organisational and cultural failings. Organisations, including Woodside, also review their incidents periodically to identify potential trends and common underlying causes. Similarly, the intent here was to examine several isolation incidents and extract the common lessons that were independent of the specific equipment or facility. These generic lessons could then be included in a scenario to simulate something like the previous isolation incidents.

Method

Scenario development

Eight of the organisation's previous isolation incidents were reviewed. The key lessons were identified, including the errors made during design of the isolation, implementing the isolation and removing the isolation as well as factors that shaped people's performance and contributed to the errors. Some of the common performance shaping factors included ambiguity in communications, time pressure, and lack of independent checks. A realistic written scenario was developed based on the common characteristics of those previous incidents. The scenario involves the repair a high pressure pump, which includes executing the required isolations to complete the repair.

The scenario included six pages of written text. The first page introduced the scenario and key players. Subsequent pages provided further information, where the situation progressively developed. Each page was written such that participants would adopt the role of one of the key players in the scenario. At the bottom of each page, questions were posed for participants and probed what they would think and do at each stage of the situation. The final page of the scenario also asked what behaviours would have prevented the potential loss of containment event described. This task directed participants to make links to the safety culture behaviour framework already in use within Woodside.

The scenario was validated and tested with subject-matter experts. This validation was conducted in two stages. First, subject matter experts were consulted to review the draft materials. Changes were made based on their feedback, namely amendments to match terminology used in the permit to work system. Second, the scenario was conducted with another group of subject matter experts. Based on feedback from this session minor changes were incorporated into the final scenario.

Workshop development

Given the intent to design an interactive and engaging learning experience, a workshop was also developed. The workshop was one and a half hours long and included the following elements.

- Explanation of reasons for the workshop and for focus on isolations.
- Completion of the scenario in pairs.
- Group discussion of answers to the scenario, illustrating potential "holes" in organisational barriers if understanding or application of these barriers was lacking.

- Quiz on human error to reinforce key lessons emerging from the scenario about how and why isolation errors occur.
- Discussion on implications of the workshop.
- Evaluation of the workshop and scenario as a method of learning from incidents.

The full facilitated workshop was then trialed with a range of personnel from different business areas and minor updates made based on feedback. Finally, detailed notes were developed for facilitators on how to conduct the workshop. A facilitator version of the scenario was developed which included answers to each page of the scenario.

Project implementation

The workshop, known as the “Isolations Campaign” was first facilitated for the health and safety management team by the authors of this paper. This enabled the managers to experience the workshop first hand, understand the materials, and determine the target audience in their respective areas. The expected target audience for the campaign was production technicians, managers and supervisors, and anyone else involved in the design, implementation, and removal of isolations.

The health and safety managers subsequently conducted workshops for teams in their areas. In larger areas, facilitators were selected to conduct the workshops and training provided to them by the organisation’s human factors advisers. The workshops were run with 6-12 participants and included a mix of managers, supervisors and people who were not in leadership roles. This mix helped people at all levels see how errors can be made and how leaders can contribute to conditions that influence the likelihood of errors.

Once the Isolations Campaign was completed for people involved in upcoming commissioning projects, information about the scenario and workshop was uploaded onto the health and safety intranet for use by other groups as appropriate.

Results

On conclusion of the workshop, facilitators asked groups three questions to help evaluate the method. Answers to these questions and additional comments were sent back to the company’s senior human factors adviser for collation.

1. Does this method of learning from incidents offer any additional benefits to more traditional methods (e.g. events bulletin, slide presentation)?
2. Did you learn or realise anything new, which you can use to play your part in improving the reliability of isolations?
3. Do you support using this approach in your part of the Woodside business?

The response to the first evaluation question was unanimous. Participants indicated this approach to learning was a far more interesting and engaging method of learning from incidents than more passive methods of emails, bulletins, and presentations. Comments mentioned the interactive nature of the scenario exercise, sharing examples and experience helps learning, the value of group discussion, better than the noise of emailed notices, you have to engage and think about the issues involved.

In terms of the second evaluation question, for some participants the materials reinforced existing knowledge while for others new information was learned. The most common learning was re-emphasising the increased likelihood of error under certain circumstances such as time pressure, and the importance of independent checks and peer review

All participants supported using this approach in their part of the business. The Isolations Campaign was used more widely than the target group. For example, teams in the Development division used the workshops to educate people on human error and performance shaping factors.

Further work and implications for current practice

Use of scenarios is being extended to another theme of events—working at height. A series of the company's working at height events was reviewed and the key learning points extracted. The lessons have been embedded into a set of video scenarios that can be run during tool box talks. Participants are required to identify the lessons associated with each scenario and the behaviours in the company's safety culture model that could prevent a similar future event. The project is being implemented by working at height focal points in the business.

Moreover, a tool has been developed to help personnel select appropriate learning methods. Personnel tend to rely on traditional methods such as presentations and bulletins because they are quicker and easier to develop. This tool helps people understand the intended audience, learning objectives, types of learning required, and the types of learning methods that are most appropriate to achieve that type of learning. This tool further assists personnel to determine ways to evaluate the effectiveness of the learning intervention.

Learning campaigns are also being integrated into the company's annual health and safety planning. Upcoming work activities across the company are reviewed and the company's previous experiences with those activities are also reviewed, including any incidents that occurred. The generic lessons from those previous incidents can then be developed into an engaging learning campaign in advance of the activities to be undertaken. The positive, immediate and certain consequence of personnel applying the lessons soon after involvement in the campaign is likely to influence behaviour more strongly.

Approaching learning from incidents in this way could also help avoid the emotion experienced if lessons are communicated very soon after an event. Such emotion may hinder people's willingness and ability to understand and integrate the lessons. If events are communicated after a period of time and are presented as generic lessons, a more conducive learning environment could be created.

A key consideration in use of scenarios or other more engaging learning methods is the time investment required. Using scenarios to learn from incidents may achieve more effective learning, yet also take more time and effort to develop and implement. It would be infeasible to adopt such approaches for education on all incident lessons. When communicating about high hazard severity events, highly engaging training has been shown to be considerably more effective in promoting safety knowledge acquisition than less engaging training (Burke et al., 2011). Therefore, methods such as scenarios could be prioritised for communication of lessons for high hazard events.

Scenarios have wider application and could be used in the following ways.

- communicate lessons from a specific event in a more active and direct way.
- strengthen learning from incidents when hardware or software fixes are not possible, and changes in thinking style, knowledge and routine behaviour must be relied upon.
- test whether lessons have been successfully generalised to other situations.
- assess and develop knowledge required to manage or supervise safety.

Conclusion

This project drew on learning theory and applied psychology methods to develop a novel way to help people learn from past events. This project has demonstrated the feasibility of constructing a simulated

incident scenario, with the same generic features as real previous isolation incidents. Using this material in an interactive workshop has shown that learning experiences can be made more direct and active and promote more effective learning. Using scenarios as a method to aide post incident learning has merit to be further developed, including more formal evaluation of learning outcomes.

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