Behaviour-based Safety: Part of the Problem or Part of the Solution?

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Abstract

The appropriate control of hazards and assessment of risks at the level of the individual employee is critical to the elimination of accidents and injuries. Yet accidents and injuries are still worryingly commonplace in the petroleum industry. In response, industry has increasingly focused on two approaches to assist in the elimination of harm. Firstly, we have seen a growing acceptance and implementation of behaviour-based safety (BBS). Secondly, we have seen a formalization of risk management methodologies.

We argue that both the BBS approach and the more general focus on risk management at the level of individual employees and work teams are not wholly un-problematical and we offer a solution to some of the problems.

Introduction

Behaviour-based safety (BBS) (1) is now sufficiently well known amongst the health, safety and environmental management community that a description of the process is unwarranted in this paper. Regarding BBS, however, this paper suggests that the approach is of limited value in eliminating all accidents because it focuses attention on behaviour itself, rather than the uniquely special human quality that is our ability to think.

It is quite clear that horses, dogs, monkeys, pigeons, rats and mice behave, and that people also behave. But what makes the behaviour of all people special and qualitatively
different to that exhibited by animals is that we have the common ability to think, scrutinize, consider, plan, foresee and manage our behaviour in ways that are both consciously directed and subjectively meaningful to each and every individual. We suggest that coupling the special quality of people to “think before they act” with the risk management process is critical if accidents are to be totally prevented. Behaviour-based safety does not meet this requirement. Worse still, although Australian Standard 4360 for Risk Management (2) is appropriate to controlling hazards and assessing risks in a theoretical sense, the application of the risk management methodology is undermined “at the coalface” by limited personal competence in a practical sense and the actual deployment of BBS with its sole focus on “at risk behaviour”.

We argue that the focus on “at risk behaviour” does not necessarily address the actual risk management requirement for people to be able to cognitively identify the hazards they face, then cognitively evaluate the risks associated with the hazards that are present and only then, consider the positive behaviours and practices that should be adopted to control the hazards. Instead, BBS focuses attention just on the behavioural component. We suggest that a focus on behaviour alone is not nearly good enough for the complete process of risk management that can control hazards and eliminate harm at work.

We suggest that the limiting factor at the level of personal competence has resulted from the historical inability of hazard and risk management training and associated tools to develop the necessary cognitive ability, awareness and knowledge within the workforce to control workplace hazards. The lack of attention to the requirement for high standards of cognitive ability for risk management amongst employees has more recently been amplified by the damaging concentration of effort and resources on “at risk behaviour” within the BBS paradigm.

Additional problems that limit the potential benefit of risk management are particularly evident when commonly used training methods and tools and the BBS process are deployed in non-Western environments where education levels, language patterns and cultural differences make such tools and training wholly inadequate. The deployment of ill-considered hazard and risk management training and associated tools occurs because the majority of training relies on a “passive” approach to awareness and knowledge, often involving verbal lectures, PowerPoint presentations, videos and the like followed by an application of associated tools which are over-reliant on “checklists” of one type or another (3, 4).

In addressing the shortcomings of pre-existing risk management tools, training processes and BBS, Woodside Energy has addressed the cognitive requirements that are necessary for personal competency as outlined in Royal Dutch Shell’s EP 95-0150 HSE Skills Portfolio (5), Woodside’s Functional HSE Competence Catalogue (6), the Australian Competitive Energy’s (7) Workplace Competency Initiative, and the Australian National Training Authority (8) competencies as detailed in the Chemicals, Hydrocarbons and Oil Refining training package. In response, we have developed a combined training activity and risk management tool that ensures that cognitive skills, and awareness and knowledge competencies are fully developed in order that appropriately safe behaviour can be performed to control hazards and minimize risks. In our program we enable participants to demonstrate their cognitive and behavioural competency in:

1. Identifying the highest risk health, safety and environment (HSE) hazards that are present in the workplace or in every-day life;
2. Understanding the application of the risk management process involving identifying the hazards, assessing associated risks, working out the behavioural controls and recovery should controls fail;
3. Applying appropriate risk management terminology; and
4. Seeking out locally applicable risk management resources to turn to for assistance in managing hazards.
Why we need a new approach

ExxonMobil technical data reported by Toellner (9) indicated that a lack of cognitive ability to recognise hazards and appropriately assess and evaluate associated risks was linked to multiple unsafe behaviours that in turn, were linked to more than 90 per cent of workplace accidents. In the Australian context, Australian Standard (AS) 4360 for Risk Management (2) describes a process that seeks to facilitate the recognition and control of hazards in order to manage risks and reduce the frequency and/or severity of accidents. Australian Standard 4360 describes an eight step process for managing risk (10).

The eight-step process is often simplified in workplaces to the three-part mantra “spot the hazard, assess the risk, make the change” (11). Regardless of the number of stages or steps involved in the risk management process, it is important to remember that risk management is useful in developing a clear understanding of the hazards involved in the environment and their associated risks and then making informed decisions about the implementation of barriers and controls (12). Informed decision-making is a cognitive process involving active thinking and deliberation in combination with the use of pre-existing knowledge and new information. Unfortunately, however, the application of BBS with its limited focus on “at risk behaviour” has tended to limit the utility of the wider risk management process. So instead of the requirement for the process of “spot the hazard and assess the risk”, BBS directs our attention straight to the “make the change” step involving a focus just on behaviour.

To be successful, risk management requires a greater degree of focus on the cognitive abilities that lead the decision-making process for selecting appropriately safe behaviour or practices that will control hazards. Without the cognitive ability to process relevant information within the risk management process, “at risk behaviour” exists without contextual information on the actual hazards being controlled, and the relative degree of risk involved in the activity which could release the hazard.

Furthermore, according to AS 4360 (2), “To be most effective, risk management should become part of an organisation’s culture. It should be integrated into the organisation’s philosophy, practices and business plans rather than be viewed or practised as a separate program.” We agree and as such, we believe that hazard identification, risk assessment and the implementation of hazard barriers, including appropriately safe behaviours, is a key cognitive competency that should be performed by all employees whilst carrying out their daily activities.

In attempting to meet the risk management requirement identified in AS 4360, Ahern (13) identified that three distinct methodologies of risk assessment have evolved over time. These were classed as quantitative, qualitative and semi-quantitative. Ahern (13) noted that quantitative risk assessment (QRA) is a complex procedure that is usually outsourced to a qualified risk engineer who is competent in the process. However, the risk engineer may have little familiarity with the workplace or job activities that will occur and may not be personally at risk from the hazards. In addition, the managers, supervisors and employees who are responsible, and who are at risk, may not feel any ownership over the QRA process and, worst yet, may not understand the results. With regard to those points, Cooper (4) noted that: “In both the planning and execution of the risk management process, it is important to ensure that all those who need to be involved are given adequate opportunity to do so and are kept informed of developments in understanding of risks and the measures taken to deal with them”. Because of the complexity of the QRA process and the required expertise involved, QRA may not satisfy the required “communication and consultation” step of the risk management process (2, 10) and it is not really suitable for use as a hazard identification and risk assessment tool by operational level personnel “at the coalface”. It may be of limited use at a “system” or organisational management level.

In response to the shortcomings of the “expert-driven” and high-level process of QRA, qualitative risk assessment has evolved over time. The qualitative risk assessment process relies much more on the experience and knowledge of an assembled team to make subjective analysis of the hazards and associated risks faced directly by employees in the workplace. This approach has the benefit that it can be completed at the workplace by managers and supervisors who are responsible for safety, together with personnel who will be exposed to the hazards (4, 13).
The qualitative risk assessment methodology, however, has a couple of drawbacks which have become apparent. Firstly, the majority of established tools and techniques for facilitating the qualitative risk assessment process involve the use of simplified checklists of one kind or another (4). Typical examples of the types of checklists used include the Danger Identification List (14), various checklists developed by WorkSafe (11), the Enhanced Safety Management Checklist (15), and the Safety Training Observation Program (STOP) Audit Checklist (16). While the use of a checklist-based risk management process is attractive to HSE Managers because it simplifies risk assessment and is quick to use and relatively inexpensive, it also tends to precondition the expectations of those involved and block the identification of hazards and risks which go beyond the limits of the checklist itself (4). Moreover, the use of checklists is common within the application of BBS and this may further reduce the usefulness of the wider qualitative risk management process by restricting the attention of those involved to the “at risk behaviours” rather than the precursor hazard identification process, the necessary risk evaluation and the decision-making process about how best to control the hazards. Put simply, checklists may be a barrier to the type of cognition required for good risk management.

Secondly, without further comment on the implementation of BBS programmes, there has been a more general problem with training employees in the qualitative risk assessment process and the use of associated tools. For example, Ho (3) identified that much pre-existing hazard and risk management training was said to be inconsequential because it was delivered in one kind or another of a “lecture based” format and failed to enable trainees to think for themselves. Ho (3) suggested that the majority of training adopted a non-interactive approach and that it was “almost useless, repetitive, boring and leading to information overload”. Some training and associated tools were also said to be unsuitable in locations where education or experience levels and language or culture provided a barrier to learning during the traditional “death by PowerPoint”, HSE lecture, or video.

Ahern (13) used the term “semi-quantitative risk assessment” to illustrate a third type of risk assessment methodology that seems to have advantages over both QRA and qualitative risk assessment. We believe that our new methodology fits the semi-quantitative risk assessment definition and that it improves upon the qualitative risk assessment process by retaining a structured format that helps to foster cognitive skills in “active” thinking and group-based discussion and then capture subjectively, while at the same time allowing the risk assessment to be completed at the work site by employees, supervisors and managers. A central characteristic of our approach is that it avoids the use of the checklist approach but it does rely on the use of pictorial prompts and the facilitation process of “brainstorming” to capture information on identified hazards, associated risks and the behaviours and practices that will control the hazards and minimize the risks (4). In keeping with Ahern’s (13) definition of semi-quantitative risk assessment, our process introduces a number of pictorial prompts along with a risk matrix in order to provide a relative risk ranking (e.g., high, medium or low) of a large number of workplace activities.

In developing the new approach, our project team recognised that the cognitive process of active thinking is critical to thorough task-specific hazard identification and risk management. We suggest that any new training aid and risk management tool should improve the development of the actual cognitive skills required for hazard identification, risk assessment and appropriately safe behaviour amongst personnel. We identify that the solution is for people to be sufficiently motivated to act in a safe manner (safety from the heart) because they have the cognitive skills to think before they act (using their minds). Only when those pre-curators are in place, we argue, is a workplace ready to introduce BBS. Towards those ends, we agree with Cooper (4) that it is essential that the people who are exposed to the hazards are actively involved in the hazard identification and risk control processes. As such, our risk management solution is a radical departure from traditional approaches because it is based on an interactive activity which forces people to actually think for themselves rather than a lecture or checklist approach which forces them merely to listen or review the advice of other people.

Methodology

Our new risk management training tool draws on the two psychological approaches to psycho-social data collection
known as “projective technique” and “Q-Methodology”. Projective technique involves the well-known but little understood process that is commonly seen deployed in the famous Rorschach “ink blot tests” (17) or the less well known Thematic Apperception Test (TAT) (18). Figure 1 illustrates three plates from the Rorschach test.

Figure 1. Examples of the famous Rorschach “ink blots”.

“Projective technique” involves presenting a stimulus item – usually a picture, photograph or “ink blot” – to a person who is then asked to talk about their subjective interpretation of the item. In clinical psychology, the process is said to reveal information about personality characteristics and the like but that application remains controversial. There is no doubt, however, that people are able to speak openly about pictorial prompts and it is this ability to facilitate open communication that we have designed into our materials. As mentioned above, we have also integrated the research process known as Q-Methodology (19, 20) into our training process. In simple terms, Q-Methodology involves the presentation of several stimulus items at once – usually in the form of written statements or pictures – to a person who is then asked to rank order or prioritise the items and talk openly about their resulting sort according to a “condition of instruction”. A condition of instruction can be any verbal or written instruction which seeks to have a person organise the pictures or statements in some manner that is meaningful to the participant (20).

As such, we have prepared two sets of pictorial prompt cards, each set comprising 21 cards and deployed within the projective technique tradition and a Q-Methodology framework. The two sets of pictorial prompt cards address a range of workplace activities which empirical evidence (21) indicated to be the types of activity that people were performing when they were injured or killed. The two sets of cards relate to typically “higher risk” petroleum industry offshore and onshore operating environments and typically “lower risk” support and office-based environments.

Picture card examples from the operating environments include working with chemicals, electrical equipment, powered and non-powered hand tools and suspended loads, working at height or in confined spaces and working on or near moving machinery and fixed plant. Examples of the operational environment pictorial prompt cards are illustrated in Figure 2. Picture card examples found in the office and support environments include lifting and moving items, loading and unloading vehicles, driving, walking outdoors, exercising, maintaining security, traveling away from home-base and visiting entertainment areas. Examples of the office and support environment pictorial prompt cards are illustrated in Figure 3.
In process, we present one or other of the two sets of 21 picture cards to participants and ask them to consider the 21 images in terms of the level of risk involved in the activity and the types of activity performed in their workplace. That is, the condition of instruction mentioned earlier is designed to enable people to categorise each of the picture card images into “highest risk”, “medium risk” and “lowest risk” activities according to their perception and based on their actual workplace activities and individual duties. The process is delivered to small groups involving a maximum of ten participants and one or two trainers per session. To speed the process and make it easy to record responses, participants are provided with a 7-columns by 3-rows sorting board (21-cells) to which they place one of the 21-image cards in each cell.

Once the participants have sorted the 21-image cards into the high-, medium- and low-risk cells on their sorting board, the trainer then facilitates a group discussion which enables participants to identify their group’s top 5-10 “highest risk” activities for further discussion. At this point, the trainer provides each person with a workbook that allows people to consider and record their hazard identification, risk assessment and behavioural controls for each selected “high risk” workplace activity.

The participant workbook facilitates the risk management process by providing a set of structured questions that participants are required to answer to demonstrate awareness and knowledge competency. The participant workbook also allows trainers to capture and evaluate participants’ learning at the end of the session. Questions in the workbook include:

1. What are the hazards associated with the activity?
2. What are the risks associated with the activity?
3. What behaviours or practices can you adopt to control the health and safety hazards and minimize the risks?
4. What behaviours or practices can you adopt to control the environmental hazards and minimize the risks?
5. Which specific behaviours and practices will you commit to adopting/enhancing?
In addition to 21 image cards, participant workbooks and sorting boards, the training kit comprises a trainer’s guide book, HSE hazards posters and certificates that are provided to participants on successful completion of training.

Results

The training programme has been well received by petroleum industry companies in Australia and elsewhere. Amongst others, companies using the programme include BHP Billiton (Petroleum Division), Monadelphous, Nautronix, OIR Exploration, MI Australia, Apprentices WA, Sakhalin Energy and Woodside Energy. At Woodside Energy, the programme was trialed amongst employees at the onshore LNG plant in Karratha in the far north of WA. Woodside’s Corporate Health, Safety, Environment and Security (HSES) Department has now replaced existing hazard management training programmes with the new approach in order to meet required risk management competency for all employees. Training is currently being rolled-out to all full-time employees and initial feedback from participants has been positive.

A simplified version of the programme has also been developed for use in a schools HSE awareness programme promoted by the Australian Petroleum Production and Exploration Association (APPEA) and sponsored by ChevronTexaco (22). The schools programme is currently being delivered to approximately 22 schools in WA and evaluation is ongoing by researchers from the Department of Psychology at Murdoch University (23).

Conclusion

In conclusion, we have developed a new approach to raising employee competency in risk management that is based on several well-established competency guidelines (1, 5, 6, 7, 8, 24). Our new approach promotes the necessary cognitive process of hazard identification and risk awareness prior to establishing self-motivating behavioural controls that are used to control hazards and minimize accidents. Furthermore, the approach has been designed to specifically address many of the current barriers that face risk management training and tools within the global energy industry (3). For example, the activity avoids “lecturing” in any form, does not deploy a simplistic checklist and promotes active thinking. Moreover, the image-based
nature of the programme minimizes language and education difficulties and specifically addresses the difficulty in engaging participants in multi-cultural, non-Western societies in a positive learning experience. The process also promotes new knowledge and significant interest amongst people with widely differing levels of experience, from students at school, to “green” recruits, and to seasoned “old-timers” (22). For those reasons, the programme is an activity-based learning opportunity that promotes the necessary cognitive skills required for implementing the whole risk management process and not merely the part of the process relating to “at risk behaviour”.

We feel that promoting the necessary cognitive skills within the workforce leading to a real and lasting impact on the hearts and minds of employees is now much simpler and more effective because of this new addition to the HSE toolkit.

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REFERENCES


