Implementing The Behaviour-Based Approach: A Practical Guide.

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Introduction

Within the field of occupational safety and health many efforts have been made to improve safety in the workplace. These efforts have focused upon legislation, engineering failure, safety awareness campaigns, safety training, and unsafe acts. Taken as a whole, these efforts have not always been successful in impacting upon accident rates. Traditionally, the legislative approach has not made much of an impact simply because the resources necessary to police the situation have not always been forthcoming. An example of this is provided by the current level of approximately 90 factory inspectors to police somewhere in the region of 100,000 construction sites, not all of which have been notified to the appropriate authorities. The legislative approach has also included attempts at 'blitz' inspections by the HSE. During 1987-88 inspections of over 2,000 construction sites were conducted. These inspections revealed a worrying picture with one third of site agents and supervisors having poor knowledge of basic health and safety requirements. Most importantly during the period of the campaign there was no measurable decrease in the number of deaths or serious injuries (HSE, 1988). The recent change of emphasis to an 'auditing of systems' approach, rather than an 'inspection of sites' approach by the HSE (1992) is very welcome, as it implicitly addresses these and other issues.

Engineering approaches have typically focused on the designing out of the possibility of accident occurrences, by for example providing guards on machinery etc (DoE, 1974). Although a useful route to pursue, this approach has often been based on a reactive process founded on somewhat misleading perceptions of accident causation, and typically does not take account of the effects of rapidly changing technologies (HSC, 1993).

Other kinds of interventions designed to improve the poor accident record by raising operatives' safety consciousness through the use of safety poster campaigns, and other informational safety campaigns, have not been consistently successful. Such campaigns are generally ineffective, as illustrated by Saarela et al. (1989) who found that in a Finnish shipbuilding yard, a two year campaign did not impact on the accident/injury rate, although it did lay foundations for more profound safety interventions. Further evidence of the ineffectiveness of safety awareness campaigns is indicated by the UK construction industry 1983 accident statistics. During this year the national 'site safe, 83' safety awareness programme was put into operation. Ironically, compared with the previous 5 years an increase in the accident rate was found, despite all the time, money and effort (Langford & Webster, 1986).

Similarly, safety training has been one of the fundamental methods for improving safety, based in part on the implicit assumption that safety training in itself is a good thing, in that those who know what to do, will automatically conduct themselves in a safe manner for extended periods of time. Clearly this has not been the case. Despite the notion that safety training will cure most ills in regard to accidents, evidence exists showing that it is not always effective (Hale, 1984), which may be related to the variability of the quality of training given.

It is pertinent at this stage to ask 'why have all the above approaches not been as successful as they might have been? Part of the answer resides in the fact that both safety training and safety campaigns concentrate upon changing people's attitudes, in the hope of influencing their subsequent behaviour. The underlying assumption is that attitudes cause behaviour. However, to a large extent this assumption is inaccurate. Similarly, both the engineering and legislative approaches are based on the assumption that influencing the situation will influence peoples behaviour. To some extent this is correct, but it is not the whole picture. In my view, these approaches have only gone part of the way down the road. This view is based on a school of thought, based on empirical evidence, which postulates a theory of 'reciprocal determinism' (Bandura, 1977), which put simply states 'that the situation people find themselves will influence both their behaviour and their attitudes. Peoples behaviour will influence both their attitudes and the situation, and that people's attitudes will influence their perceptions of a situation and, in turn influence their behaviour'. In other words, the above approaches to improving safety have broadly addressed either people's attitudes or the situations they find themselves in, in an indirect fashion, without specifically focusing on people's behaviour. McAfee & Winn (1989) conducted a review of empirical studies that attempted to change people's safety behaviour using psychologically based management techniques. Every study was successful in improving safety behaviour. However, it also revealed that not one single study had been conducted in the UK. More recently, two UK based studies have been completed. One in the construction industry by Duff et al. (1993) and one in the manufacturing sector by Cooper et al. (1993), both of which achieved their aims of improving safety behaviour. In addition, using an empirically derived measure, positive changes in safety culture were also demonstrated, as a direct result of the behaviour based approach (Cooper & Phillips, 1994).

Attitudes and behaviour

Many approaches to improving safety concentrate upon changing people's attitudes, in the hope of influencing their subsequent behaviour. The underlying assumption of this approach is that attitudes cause behaviour. This assumption is, however, inaccurate. A considerable body of scientific evidence shows that the relationship between attitudes and behaviour is a tenuous one. Indeed, an attitude is often an expression of how we would like to see ourselves behaving, rather than the behaviours that we actually engage in. For example, evidence has shown that workers with the most favourable attitudes towards personal protective equipment are those least likely to actually use it in practice. Similarly, senior management in many companies express the view that the safety of its employee's is of the utmost importance. However, very often these same managers design the overall workflow system, and/or the reward system in such a fashion that unsafe practices are inevitably encouraged.

Safety programmes that only focus upon and attempt to change people's attitudes, will meet with little success. This leads to the question 'what will change people's attitudes'? A partial answer lies in changing the behaviour associated with the attitude. For example, a study was conducted with the aim of increasing employee usage of ear protectors in a metal fabrication plant. Prior to the study the usage of ear protection was extremely low, as the majority of employee's held unfavourable attitudes towards the

wearing of ear protectors, owing to their reputed discomfort, etc. Two approaches were undertaken. One approach by behavioural scientists, focused attention on the extent of temporary hearing loss experienced by employee's who did not wear ear protection during the course of a working day. Feedback about the extent of hearing loss was provided on a daily basis to each individual worker, in an attempt to change their behaviour. The second approach was undertaken by management in two phases, in a different department. The first phase took the form of group lectures, poster campaigns and talks with individual employees in an attempt to change their attitudes and subsequent behaviour. The second phase consisted of sanctions such as temporarily suspending employees from their jobs with associated losses of pay and other penalties. The results were very illuminating. The first approach that focused upon the employee's behaviour through the provision of feedback on temporary hearing loss, resulted in an increase in ear protector usage from an average of 30%-50% during the baseline period, to an average of 80%-90% after 5 months, although turnover of employees was approximately 65% during this period. The second approach which attempted a change in attitudes resulted in a maximum of 10% ear protection usage during the same time period.

A number of possible reasons exist as to why behaviour influences attitudes. One of these may be consistency. People like to be consistent in both their behaviour and attitudes. If there is a mismatch between the way we behave and our attitudes, internal tensions will result. This means that if we consciously change our behaviour to achieve some end, we typically tend to justify our reasons for change by rearranging our attitudes and belief systems to fit with the new behaviour/s. Thus, to some extent our behaviour reflects and represents our attitudes. An example of this is provided by the introduction of legislation, making it mandatory to wear hard hats on site. Prior to this legislation many construction operatives would not wear hard hats on site unless forced to. Nowadays it is not uncommon to see these same operatives wearing their hard hats, while walking through high streets etc.

Another way in which behaviour may influence attitudes is through its affect on social norms. Members of a particular work or social group generally conform to the norms of that group through peer pressure, because group membership demands conformity to the norms and values which form the memberships basis for reality. In the context of safety, a group member will adopt the collective definition of what behaviours, practices or tasks are considered to be risky. An individual who deviates from these group norms will, in all probability, encounter sanctions from the group membership that can ultimately result in the rejection of that individual by other group members. In fact the strength of social norms in impacting upon the way people behave is succinctly demonstrated in the ear protection example already discussed. At the end of the study period, only one third of the workers who had taken part in the behavioural approach remained in the department, because of the high turnover of employee's. The other two-thirds were new employees who had not taken part in the treatment phase. Nonetheless, the percentage of ear protection usage had continued to dramatically improve. Thus new norms for accepted work behaviours were firmly established which the new employee's adhered too. In the UK construction research of Duff et al. (1993), this phenomenon of social forces in play was also observed. On one site, the scaffolding safety indicator showed a consistent decrease in safety performance, resulting in much teasing of scaffolders by other trades people. The cause of the poor performance was the site management refusing to pay for the necessary scaffolding to ensure compliance with legislation. Despite this, the scaffolding company 'blitzed' the site to improve the safety standards without remuneration, to ensure that the scaffolding company's reputation was not damaged. In summary, the above evidence demonstrates a weak link in traditional approaches to improving safety. Focusing upon attitudes to improve safety not only has to cope with the problem of the tenuous links between attitudes and

behaviour, but also that attitudes are difficult to change. A focus on actual safety behaviour, however, avoids the weak link by not trying to change attitudes.

The behavioural approach towards improving safety, therefore, differs from traditional approaches in two simple ways. The first is its concentration on observable safety behaviour, rather than unobservable attitudes towards safety. The second is its emphasis on the encouragement of safe behaviour, rather than the punishment of unsafe behaviour. Many organizations would argue that they do encourage desirable behavior. However, it is often the case that reward systems and/or company policies tend to encourage undesirable behaviour. The following illustrations focus on the construction industry, although they are also relevant to all other industries. It has been found that site agents, who use the meeting of cost estimates as a motivator, or as a means of applying pressure to reduce costs, are likely to increase the probability of injuries occurring on the job (Hinze & Parker, 1978). Similarly, a general lack of formal safety training for new site managers does not place new site management in an ideal situation for improving safety on sites, simply because they do not know what is safe and what not (Wilson, 1989) is. Further, reward systems that stress payment by output only (i.e. target work) result in violations of safe working practices; implicit understandings between operatives and management to turn a blind eye to unsafe practices; and, beliefs among workers and managers that adhering to safety rules will considerably reduce production leading to obedience only to those rules that do not cost time (Hale & Glendon, 1990). Thus, these types of policies and practices adopted by an organization are often counter-productive to safe behaviour, which further demonstrates the impact that the situation can have on people’s behaviour.

When non-compliance to legislation or safety rules occurs, management often places an emphasis upon the use of discipline and punishment to rectify the situation. This is in contrast to the rewarding of compliance, which will have the effect of increasing the likelihood of compliance. Managers rarely praise employees for working safely, but do tend to punish those who do not. Unfortunately, however, the ways in which rewards and punishment influence behaviour differ considerably. For rewards to be effective in encouraging and maintaining behaviour, they need to be given only every so often. Punishment, on the other hand, must fulfil two criteria to be effective. It must occur every time the behaviour occurs, and as soon as possible after the behaviour. However, this is not always feasible. You cannot, for example, punish someone immediately and every time they commit an unsafe act, simply because you are not always going to be there to observe it. Thus, relying on the punishment of individuals for engaging in unsafe acts is not likely to improve the situation. Encouraging desirable behaviour, however, by positively acknowledging safe behaviour is more likely to be successful, as it does not have to be given immediately and every time. Evidence indicates that one of the most powerful methods of encouraging desirable behaviour is to provide social rewards in the form of praise or recognition. Ideally, these forms of social reward should only be used for specific desired behaviours, not for general 'good works'. Initially, rewards should be given as soon as possible after the desired behaviour, but only when the desired behaviour has occurred. This has the effect of making it clear to employees the linkage between the desired behaviour and the subsequent reward. Whenever possible, although very difficult in practice; the rewards should be related to the desired behaviour, not the outcome of the behaviour. After a period of time, as the behaviour becomes an established part of the individual’s repertoire, rewards can be given on a less frequent basis.

The giving of rewards can also be seen to be feedback as to how well people are doing. In all walks of life we are provided with feedback from many sources, that subsequently affects our behaviour. For

example when driving our cars, we get feedback from the speedometer. If we are breaking the speed limit we tend to adjust our speed and slow down. Thus, information feedback fulfils an error correcting function. It also acts as a motivational spur, in that feedback provides us with knowledge of the results of our behaviour, motivating us to take corrective actions. Indeed available evidence indicates the effectiveness of feedback in enhancing performance in many fields of endeavour. In terms of improving the safety behaviour of employees as a whole, a very powerful behavioural change agent is the public posting of group feedback as to how well employees are doing; in relation to those areas of safety they are specifically trying to improve. The advantages of group feedback are that all personnel, including sub-contractors, can tell whether or not their collective efforts have been successful. This type of feedback is usually in the form of a large graphical chart posted in a public location (eg site canteens, department walls, etc). The feedback chart lets all personnel know how they are performing in relation to specific, difficult targets they have set themselves. If there has been an improvement in safety performance, the behaviours that led to the increase are rewarded by this knowledge, resulting in either continued maintenance of current levels or further improvement, depending upon whether the target has been reached or not. Conversely, provided the workforce as a whole is committed to improving safety, if the feedback indicates a decrease in performance, previous safety performance is punished,resulting in dissatisfaction which in turn stimulates greater effort to improve safety behaviour. Very often, the actual posting of the weekly performance results are watched in anticipation by employees. This has often resulted in a focusing of attention, and reinforcement of particular aspects of safety, by stimulating conversations among employees as to how well they are progressing. Other effects include raising general levels of safety awareness and positively changing attitudes, simply because the feedback provides a direct measure of the groups own safety performance.

Implementing the behaviour based approach

The guide that follows, is based on both the authors' theoretical and practical experience, and as such is concerned with outlining the principles and practices involved. Obviously, each organization is different but the approach is very flexible, and can be adapted to suit all types of organizations and situations.

Planning

As with most types of interventions, some planning is required. This usually entails deciding on the scope of the intervention, in terms of which departments etc will be involved, and the necessary resources, as well as identifying the person, usually a senior manager or safety advisor, who will coordinate the overall effort.

Measuring current perceptions of the safety culture.

Ideally, at the very beginning of this type of approach it is useful to measure employee's current thinking, in terms of safety, along various dimensions. This not only provides information as to currently held beliefs, but it aids in the development of the safety performance measures, so that they can be devised with maximum effect. It also provides senior management with information concerning the effects their current policies and practices are having on safety *per se*. Moreover, the results of the safety culture measure can be used as a baseline, by which the effects of the behaviour based approach on the plants safety culture can subsequently be assessed.

Management Briefings

During the planning stages, briefings must be held with line management as early as possible, to outline and explain the philosophy of utilizing goal-setting and feedback to improve safety performance. If line

management does not 'buy in' to the process, problems may ensue. At the end of these briefings management will be asked to demonstrate their commitment to the successful implementation of the approach by fulfilling certain requests. These are [a] that they inform their subordinates that this type of intervention will be put into effect in the very near future and that their cooperation will be necessary. This aids in subsequent efforts, because the workforce are not in the dark as to what will be happening; [b] that they suggest appropriate personnel to be recruited as observers, or ask for volunteers; [c] that they allow all their subordinates to attend the subsequent goal-setting meetings; [d] that they allow observers to conduct one observation session during each working day. This does not usually take any more than 30 minutes at most; [e] that the managers themselves attend the goal-setting sessions to provide support to the observers; [f] that managers should praise subordinates who work safely; [g] that managers should regularly remind workers to try and reach the safety goals; [h] senior management should make a point of visiting each department (or workplace) on a weekly basis to discuss and make comments on the progress to date.

Recruiting Observers
Similarly, during the planning stages provision needs to be made to recruit employees to become safety observers. This is done normally on the basis of three criteria. First, the observers should be people who are known to be committed to safety. Second, each observer must be willing to undergo training, and continue to observe their colleagues safety performance for at least six months. Third, one observer should be obtained from each individual shift crew or department in order to ensure that the same observer will be *in situ*. If these criteria are not followed, and people are simply told that they will be observers, some initial problems can be expected, although these will not be insurmountable.

Interviews
Another aspect of planning is to ensure that a stratified sample of approximately 15 percent of the workforce will be made available for 30 minute interviews, to provide a check on the utility and practicality of the safety performance measures that will be developed, and gleaning further information that may be useful.

Training
Similarly, the planning stage will entail setting aside a days training for the observers, once the safety performance measures have been devised. If the plant or facility is large, it may be necessary to set aside sets of training days for groups of observers. As a rule of thumb, a ceiling of 25 observers should be set for each training group, simply because it becomes difficult to train more than this effectively at any one time.

Safety Performance Measures
After the planning stage, developing a reliable safety performance measure, for each department or type of trade, will be one of the first and main objectives. This will consist of identifying possible contributory factors to accident causation and sub-dividing these into observable behaviours or situations that are indicative of safe or unsafe events. Due to the many and varied production processes, many types of accidents can occur for many different reasons. Therefore, it is a good idea to analyze all the companies accident records for the previous two years. It is usually better to go back to the original accident reports, rather than computer summaries, unless the computer records are very comprehensive. Following a fixed sequence, the accident records should be sorted into three main categories. The first step is to sort the accident data by department, etc. The second step consists of identifying the different

types of accident within each department, and then sorting these by the place of injury on the body. This step allows identification of both the main types of accident, and the types of task contributing to the causes of accidents. Third, the records should be classified on the basis of whether or not the individuals behaviour, or the situation contributed to the accident. A last final step, is to peruse the records to ascertain whether or not particular individuals are involved in more accidents than the norm, in relation to their peers, within the previous two year period. If such individuals are identified, it is a good idea to try and recruit them as observers.

Once the classification procedure is complete, the main focus of attention should be placed on the specific behavioural causes. In the west-country study, for example, forklift drivers often damaged their thumbs, due to the way they place their hands on a raised knob on the steering wheel; operatives often cut the back of their hands on circular knives when threading the film through slitting machines, simply because spare knives were left in the way; operatives in one department often cut themselves with razor blades when clearing up wet waste, simply because they would not dispose of razor blades in the appropriate receptacles provided for them; similarly, maintenance engineers often found themselves squirted in the eye with fluids, when undoing valves, because they were not wearing eye protection.

The safe and unsafe behaviours gleaned from analyses of the accident records, are then subjected to verification, in terms of their utility and practicality, through in-depth, semi-structured interviews with a sample of approximately 15 percent of the workforce. This results in additional items being included that have not shown up in the accident records. On the basis of both the accident records and interviews (and the safety culture measure if applicable), departmental checklists of critical behaviours are constructed. This is achieved by stating the items in behaviourially specific terms, and where ambiguity may be a problem, giving a set of clear and explicit instructions. An example item is 'No spare knives may be left on the right hand side of bar, on slitting machines. A maximum of 3 spare male knives only, may remain on left hand side of the bar when not in use'. Thus, the items on the checklists are written as specifically as possible to allow consistency in scoring between observers, thereby increasing the reliability of the measure. In terms of similarity in accident causes, it may be possible to use the same critical behaviour checklists for all the different offices. Each departmental checklist should be further refined by the departmental managers and safety committees by providing feedback as to the appropriateness of each of the items, along with other suggestions. By following this process there is a build up of employee ownership, which is vital for success.

Scoring the safety performance measure.
The scale used to rate the individual items that determine safety performance on the departmental checklists consists of three columns, the headings of which are Safe, Unsafe and Not Seen. Each item on the checklist is scored in the Safe column as either One, which represents all people behaving completely safe, or Zero which reflects the fact that some or all people are behaving unsafely. Conversely, the Unsafe column reflects the frequency of incidents of unsafe behaviours. This allows the proportion of safe to unsafe behaviours to be recorded. For each particular item, the unsafe column is scored by adding together all the instances of unsafe behaviour. The Not Seen column simply reflects the fact that during a particular observation session, people were not undertaking that particular activity. This allows these items to be discarded from the final percentage calculation. In summary, there are only two possible scores that can be recorded in the Safe column. These are either One or Zero. The Unsafe column can range from one to infinity. Thus, if a score of One is recorded in the Safe column, a zero must be scored in the corresponding Unsafe column. Conversely, if a score of Zero is recorded in the

Safe column, then a score ranging from one to infinity will be recorded in the corresponding Unsafe column. The result of scoring safety performance in this way is that the scoring system is weighted heavily towards unsafe behaviour, which detects the slightest improvement in the frequency of safe behaviours. Therefore, any improvements in safety behaviour that are detected will be real improvements that correspond with reality on the shopfloor.

The formula for calculating the percentage of safe behaviour is based upon individual totals of both the Safe and Unsafe columns, and dividing the sum of these totals into the amount of safe behaviours recorded and multiplying by 100, ie.

$$\%\text{safe behaviour} = \frac{\text{total safe}}{\text{total safe + total unsafe}} \text{ X } 100$$

Training

Each safety observer should undertook a days training in the basic theory and practice of the behavioural approach. The training content should include elements of goal-setting, behaviour modification, team decision-making, how to manage resistance from others, the provision of individual feedback, observational techniques and scoring of the departmental checklists. Similarly, part of the training must be devoted to practice observations within their respective departments, as they may lead to further refinements of the checklists. The observers should continue supervised practice observations for a further two weeks, within their respective departments, to ensure the observers are comfortable and conversant with their task. Any misunderstandings in scoring are usually identified during this period.

Establishing departmental baselines

Following the two week practice period, a copy of each department checklist should be enlarged to A3 size and publicly displayed on health and safety notice boards in the appropriate department. This is done to make it explicit to the workforce which behaviours are being monitored by the observers. The observations in each department take on average, approximately 10-20 minutes to complete, and are undertaken every day, or on every shift, by the observer touring the department. In order to ensure that the pattern of observations is not predictable, they should be undertaken at different times, on different days. Completed departmental checklists are then posted in a departmental collection box for the computation of results. If VDU's are networked and available for use across all departments, it is possible for the raw results to be entered and computed, on a daily basis. A minimum of four weeks of data are subsequently collected from each department to provide a 'baseline' figure from which any improvements can be compared. Each week's figures are calculated and averaged to provide an overall index of each department's safety performance level. These averages are then posted on to specially prepared 3' X 4' departmental feedback charts, whereby the vertical axis would indicate the percentage of safety performance, and the horizontal axis would indicate time (eg the week numbers).

Establishing departmental goals

All personnel, including senior management, should attend their respective departments 'goal-setting' meetings. The meetings are usually conducted by the observers, but this may fall to the coordinator, or line management. In practice, it may be necessary to conduct these sessions with a series of smaller groups. Alternatively, it may be possible for the observers to go around their respective departments and talk to people individually, accompanied by the coordinator, or line manager, in order to minimise interruptions to the production process.

The meetings should begin with an explanation of the purpose and the philosophy of the behavioural approach. Particular emphasis must be placed on the fact that no individual employee can be identified as a result of the observations, and therefore no disciplinary action will be taken against individuals who do not follow the procedures advocated on the checklists. A copy of the checklist must be given to all those present, to clarify the particular behaviours being monitored. The results of the baseline observations are then presented to the groups, in graphical form on the 3' X 4' feedback charts.

Each individual group are asked to agree upon a goal that is 'difficult, but achievable' for improvements in safety, in relation to the appropriate baseline average (see Cooper, 1993). When consensus cannot be reached within a group, as is often the case, each individual suggested goal-level would be recorded. Subsequently, all the suggested figures are summed and averaged to provide a goal that the group can agree on. Once all the groups within each department have agreed a goal, the group goals are summed and averaged to provide the departmental goal. Although this may seem a long-winded way of going about establishing goal-levels, participation induces commitment to, and 'ownership' of, an improvement process. Previous research in the UK has demonstrated that assigned (delegated) goals de-motivate the workforce, with subsequent detrimental effects upon performance (Cooper et al., 1992). The respective departmental goal-levels are then entered as a solid line on each of the feedback charts. The employee's must also be informed that the results of subsequent observations will continue to be posted on the charts on a weekly basis. Following the goal-setting meetings the feedback charts are posted in the appropriate departments. Observations should continue at the same rate as that during the baseline period. The results of weekly observations are posted on the departmental feedback charts every week. Additionally, it is a good idea to provide information referring to the worst three-scoring items of the previous week, and post it next to that department’s feedback chart, in order to make explicit to the workforce where to focus their attention the following week. During the remainder of the intervention period progress is monitored and assistance given to observers when necessary.

Continuous improvement

Because this approach adopts the philosophy of continuous improvement, it is usually a good idea, to begin planning the following interventions, about 8 weeks after the goal-setting sessions. The benefit of this is that within a relatively short period of time, the amount of employees who have been observers will reach a critical mass. This will help to drive down accident rates even more rapidly. Some would argue that previous observers should continue to observe ad infinitum. In practice, however, experience has shown that this is not really feasible at a formal level, because of the large amount of additional data that is generated which cannot be accommodated in a meaningful way on the feedback charts. Typically, however, experienced observers do continue to observe informally, and point out non-compliance to their peers. Moreover, they tend to provide a support resource for subsequent observers.

It is impossible in an article of this size to fully explain all of the subtleties of this approach. However, the intention is to provide safety professionals with a base level of knowledge from which to work, should they wish to implement this type of approach. This and the previous article on goal-setting can and should be used in conjunction with each other. Feedback and correspondence from readers concerning these articles is welcomed, particularly if the points raised lead to further refinements that aid in the improvement of this approach when applied to safety.

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