Safety Performance Improvement Through Culture Change

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Abstract: Achieving exemplary safety performance requires more than attention to systems and procedures. More and more companies are pursuing culture change as the key to delivering and sustaining safety improvement. In order to achieve culture change, it is vital that the right issues are tackled, but culture is complex and it can be difficult to have confidence with regard to what is the right kind of intervention. This paper introduces an approach to safety climate assessment that has been developed to enable cost-effective assessment of an organisation. The tool that is described has also been used to track changes in safety climate, allowing improvement plans to be updated and refocused to maximise the effective use of resources. Some real examples of safety climate assessment and culture change in industry are reviewed.

1 Introduction

1.1 The Need for Change

The UK has one of the world’s best records for health and safety. Nevertheless, in the year 2003/2004 (April to April), there were 235 fatal injuries to workers, almost the same as during the previous year (HSE, 2004). Further, the fatal injury rate to employees was the same in 2003/2004 as in 1999/2000, and that for the self-employed in 2003/2004 was the same as a decade earlier. In other words, the HSE’s statistics suggest that fatal injury rates nationally have plateaued, with no overall improvement trend.

Looking at the manufacturing sector in isolation, the most recent HSE statistics appear positive at first sight, showing that the rate of fatal injuries to workers is the lowest of any year over the period 1992/1993 to 2003/2004. However, on closer inspection we see that this reduction is simply a low point on an undulating flat curve, and past experience suggests that the rate will rise before it reduces.

There can be no doubt that the legislative and societal pressures on businesses have increased substantially over the past ten years. The introduction of major pieces of legislation such as COMAH, coupled with debate concerning the personal responsibility that senior managers should bear for their
organisations’ safety management failures, have served to focus businesses’ attention on safety and increasingly to build within organisations an awareness of the need to build an accident-free workplace. It is therefore appropriate to ask why it is that national safety performance has not improved in recent years.

The influence of organisational culture on safety performance has been a subject of debate and research for a long time. What is clear is that high-performing organisations share some common cultural features (HSE, 2000), and that safety performance improvement can be achieved through cultural change. Some organisations have grasped the opportunity and have achieved very high levels of safety performance, with tens of millions of accident-free working hours. Behavioural-based safety programmes have achieved popularity and are seen as part of the solution to safety culture problems. At the same time, as witnessed by the HSE’s data, underlying problems remain and many organisations fail to manage safety in an acceptable fashion.

Taylor (2002) has characterised three phases of safety performance change:

- Phase 1 “Accidents go with the job”
- Phase 2 Dramatic improvement
- Phase 3 Roller-coaster phase

These phases reflect a transition from fatalism with regard to safety risks and failures, via a period of focused improvement on well-defined issues, to a plateau of lower but non-zero accident levels. At each stage there are cultural challenges. The challenge at one end of the spectrum is to change mindsets and help organisations see that safe working is achievable – thereby enabling them to drive rapid improvement. At the other end, the challenge is to break out of the roller-coaster zone of fluctuating safety performance. The roller-coaster is really an indication that safety performance is not entirely under control, and that a new approach is needed to bring about improvement. Taylor has termed the residual safety performance gap “the culture gap” - which must be closed by achieving greater commitment, involvement and ownership of safety by all employees within an organisation, led from the top.

The HSE’s data are indicative of a safety culture problem, but the particular cultural shortfall cannot be identified from the overview data; what is clear is that organisations need a better grasp of where their organisations’ cultures are healthy and where they are not if they are to achieve improvement.
1.2 Building Improvement

There is a very obvious moral imperative that can drive individuals to seek to eliminate accidents from the workplace. In addition, organisations that decide to improve safety performance may choose to do so for reasons such as the following:

- They may aspire to achieve exemplary performance because it reflects well on them personally or in the eyes of their stakeholders, or because poor performance would be incompatible with their business purpose
- They may simply respond to the threat of prosecution
- They may believe that, as "just another" aspect of business performance, a more safe business should be a more profitable business

The HSE has certainly indicated that the costs of incidents and accidents can be substantial, detracting from profitability and taking up resources that might more usefully be directed elsewhere.

The path that businesses engaged in safety performance improvement follow typically involves the well-established elements of:

- Implementation of technical / physical / engineering controls (which can be seen as driven largely by standards, recognised good practice and legislation)
- Establishment of a safety management system to provide a framework in which safety can be managed
- Safety improvement through people

Many organisations within the UK would consider themselves to have good technical / physical / engineering controls and management systems. They are now seeking to achieve the engagement and involvement of their people in bringing about further improvement, and improve their level of control of safety performance beyond Taylor’s “roller-coaster”.

1.3 The Position of Safety Culture
Technical / physical / engineering controls and safety management systems are important, but it is insufficient to provide safe equipment, systems and procedures if the culture is not conducive to safe working (IOSH, 2004). The precise meaning of safety culture is somewhat elusive, but it has been defined (Uttal, 1983) as consisting of shared values (what is important) and beliefs (how things work) that interact with an organisation’s structure and control systems to produce behavioural norms (the way we do things around here).

Whilst many people can recognise symptoms of a positive safety culture when they experience it, formal characterisation is not straightforward. It is however likely to include features such as (IOSH, 2004, Lee):

- Leadership on safety and a commitment to safe working expressed visibly and in a consistent fashion from senior management downwards
- A workforce that understands the risks it is facing, that is well-trained to manage those risks, that communicates within itself and with its management team
- A workforce that is actively engaged in improving the safety of their workplace and of the business more broadly
- Individuals who take responsibility for their own safety, and for the safety of others, proactively intervening in unsafe situations
- Individuals who do not put themselves and others at risk
- Active measurement of safety performance, and reinforcement of positive behaviours
- Periodic review of safety culture and the implementation of safety improvement plans

These features are characteristic of a culture of continuous improvement, and safety performance improvement can be seen as part of the overall continuous improvement process within the business. There is nothing that makes safety improvement different from any other aspect of business performance improvement, but safety has to be seen as an achievable business requirement as much as the manufacture of profitable components or tonnes of product – and this is the real cultural challenge.

As with any improvement process, an assessment of the current situation is essential to provide the basis of a plan, and this has led to the development of safety climate assessment tools to gauge the prevailing attitudes to safety within organisations. The HSE has reviewed a number of such tools (HSE, 1999) dating back to the mid-’90s and based on paper or computer spreadsheet-based questionnaires. Use of these typically requires a respondent to answer between c 40 and c 300 questions, typically on a
Likert scale (e.g., ranging from “Agree strongly” to “Disagree strongly”), addressing the cultural characteristics identified above. Completed questionnaires are then returned for formal analysis. Such approaches have been used in the offshore and nuclear industries (Lee, Mears et al.).

2 ABB’s Approach to Safety Climate Assessment and Culture Change

2.1 Safety Climate Assessment

The approach to safety climate assessment that is presented here involves the collection of quantitative and qualitative information, through a questionnaire-based survey and interviews with people within the organisation being assessed. The questionnaire methodology builds on earlier approaches and requires respondents to position the organisation being assessed against a number of statements that map to a model that characterises the safety culture. Consistent with IOSH, 2004, the cultural characteristics considered are: leadership and commitment; employee communication, education and training; involvement of people in the safety improvement process; employee responsibility; risk-taking behaviour; measurement and reinforcement of safety performance; continuous improvement. Thus, for example, the questionnaire statement “managers work hard to ensure that people know what is expected of them in terms of safe working” is related to ‘communication, education and training’, whilst statements such as “where incidents occur that put people at risk, lessons are learnt and appropriate actions taken” and “when managers see people working unsafely or not following safety rules they take immediate action” are related to ‘measurement and reinforcement of safety performance’. Additional statements map to the other cultural characteristics identified above. The practical minimum number of statements is used in the questionnaire to facilitate rapid completion of the assessment, and around 20 statements are typically used in practice. Recognising the importance of demonstrated leadership and commitment, five of the statements are related to this cultural characteristic.

Participants in the climate assessment indicate their level of agreement with each statement using a 5-point Likert Scale (ranging from “Agree strongly” to “Disagree strongly”). All responses are then collected and mean responses for the organisation, or parts of the organisation, can be determined and displayed graphically. For example, it has been found helpful to assess and review the responses within particular employee groups (e.g., senior managers and front-line employees), geographical regions and individual departments. Results can be considered at the level of each individual statement, or at the level of cultural characteristics. Examples are presented in the first case study below.
The assessment can be delivered as paper hardcopy with the results collated by hand, or electronically
with the results collated automatically. The latter approach has been used to deliver assessment
internationally at remote locations.

The quantitative data generated from a climate assessment provide a useful indication of where an
organisation’s strengths and weaknesses may lie. But, we have found that quantitative data alone are
insufficient to make an accurate diagnosis of the cultural issues that an organisation faces, and we
believe that it is essential to speak to a company’s employees face-to-face to understand why they feel
as they do. The quantitative data may point to where there is an issue, but they do not indicate why or
exactly what the issue is. We therefore recommend the following approach:

• All personnel are asked to complete an assessment questionnaire, whether in hardcopy form
  or by e-mail
• We carry out a targeted structured interview programme with a subset of the workforce. The
  questionnaire is completed and the answers discussed with the group. This interview
  programme is best led by a specialist in people change and with a knowledge of industry best
  practice

The questionnaire itself provides the structure for the interview programme, and the quantitative data
already gathered can be used to help drive discussion. The interviews focus on the interviewees’
experiences and observations that have informed their views. Depending upon the size and nature of
the organisation, we have interviewed from 10% to 20% of the workforce, representing a cross-section
of the company’s employees. Data gathered in the first phase of the assessment both allow the
interview group to be more effectively targeted, and allow areas of particular interest to be identified in
advance of the interviews.

The interview programme embraces:

• Senior management
• Middle management
• First line managers and supervisors
• Front-line personnel
Senior manager interviews are usually carried out one-to-one, and those with front-line personnel, eg process operators, are usually carried out in groups of between three and six, to encourage discussion. In the latter case, one copy of the questionnaire is completed jointly by the group. We have found a high level of congruence between questionnaires completed by groups in interview with those completed remotely by personnel who have not been interviewed.

The safety climate assessment therefore generates:

- A quantitative picture of the safety climate
- A qualitative understanding of the issues that underly the quantitative picture

In making a case for change, the quantitative results serve to highlight the areas in which there are issues, and the qualitative data enable possible underlying reasons to be identified. It is of course this qualitative understanding, reviewed against a knowledge of best practice, that provides the basis for defining the required improvement plan.

2.2 The Overall Change Process

Safety climate assessment is one step of a larger process to bring about safety performance improvement. The overall approach that is taken is termed B-SHARP\textsuperscript{TM} and is shown in Figure 1 below.

\textsuperscript{1} B-SHARP\textsuperscript{TM} = Behavioural Safety, Health and Accident Reduction Programme
Safety climate assessment itself is only part of the initial diagnosis. A knowledge of safety performance and the nature and root causes of accidents and incidents is also essential, before carrying out the interview programme. At the same time it is important to understand a business’s safety management system and structure, especially with regard to management responsibilities, and its arrangements for driving improvement.

Following completion of the climate assessment, we facilitate a planning event with the site or business senior team to build a shared understanding of the current safety climate and issues that have been identified through the assessment. The team reviews this understanding against the business’s needs and aspirations, and generates a high level plan for change, linked directly back to the gaps uncovered in the climate assessment.

Depending upon the issues to be tackled, delivery of change may involve some or all of the following:
- Clarifying roles, responsibilities and accountabilities
- Workshop cascade; roll-out of values, beliefs and behaviours across the organisation
- Management processes; implementing any missing key management processes and systems
- Involvement and engagement of management and employees
- Behavioural safety programmes
- Hazard spotting and risk assessment tools; eg unsafe acts and conditions, near misses, job safety analysis
- Workplace improvement teams

This breadth of options reflects the fact that no two organisations are the same. Different organisations have different needs, and whilst one organisation may be ready for a workplace behavioural safety programme, another organisation may not be ready. This could be because there is not yet sufficient backing for safety improvement at key decision-making levels, because the workplace culture is not sufficiently mature to support a behavioural programme, or because there would simply be more benefit to be gained from tackling hardware and procedural issues; in the last case, however, involvement of the workforce is not precluded, indeed this is a classic area for a shopfloor-based improvement team.

The essence of Continuous Improvement is “Plan, Do, Review”, and safety climate change can be monitored on a continuing basis to enable a progress review. The benefit of this is that the impact of the delivery programme can be tracked, and the plan revised to take account of the organisation’s changing safety perceptions and needs. An example of this is presented in the first case study, below.

As indicated, safety improvement can involve the use of behavioural approaches, and we have developed an approach termed Behavioural Safety Auditing. The Behavioural Safety Auditing System (BSAS) is a technique designed to promote discussion of safety in the workplace through the observation of safe and unsafe acts and conditions. The focus of this type of audit, also referred to as a Safe and Unsafe Acts Audit is to encourage and reinforce those behaviours that are critical to safe working. Teams of auditors carry out periodic audits of workplace activities, testing for compliance with safe working practices, and engaging with the workforce to develop their understanding of workplace hazards and the consequences of unsafe behaviour. Auditors are drawn from all sections of the workplace, and audits generate improvement actions that may relate to workplace conditions, working procedures, personal protective equipment, or management / workforce behaviours. The overall programme needs to be integrated with other site improvement activity, and a steering group
(Management Team) is usually established to co-ordinate activities. An example of a BSAS programme forms the second case study.

3 Case Studies

3.1 Safety Climate Assessment and Culture Change (With acknowledgements to M W Kellogg Limited2)

M.W.Kellogg Limited (MWKL) is a major international engineering and construction contractor designing and executing World-scale projects for the hydrocarbon-based process industries. Exemplary health and safety performance is critical to the business, and MWKL has received widespread recognition for its safety commitment. It has several years of ROSPA medals and has worked tens of millions of hours without a lost time incident on construction sites in different parts of the developing world. MWKL’s policies are acknowledged as being World-class, and it has been working on people-based safety for several years. However, in 2003, the business became increasingly concerned about its plateauing in safety performance. A slowing rate of improvement meant that it would be several years until it achieved zero accidents, if ever, and it needed to do something different if it was to achieve the step change in safety performance that it desired. The business therefore decided to complete a safety climate assessment so as to get a different perspective on the challenges it faced, and to allow it to focus effort where it would have greatest and quickest impact.

MWKL operates internationally, in a number of different locations, with its sites having potentially many different cultural issues. An approach was needed that:

- Could be completed for each location, quickly and cost-effectively
- Focused effort to maximise impact

The views of the workforce needed to be gathered to understand the culture properly, but it was impractical to interview large numbers. An electronic remote survey process was therefore developed. This allowed:

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2 This work was first presented at an IChemE meeting in 2004 (Fitzgerald and Marchant)
• An initial picture of the safety climate within MWKL to be constructed very quickly
• Areas of opportunity to be targeted for improvement
• An appropriate cross-section of the workforce to be identified for interview

whilst also minimising the need for time-consuming and costly overseas travel.

The B-SHARP™ questionnaire was delivered via email to 1700 employees in six countries, with a return rate of 54%. Broad themes were identified from the data, and a sample of employees subsequently interviewed to explore the underlying reasons behind the responses.

![Figure 2 – Safety Climate Profile for M W Kellogg Limited](image-url)
Typical output from the assessment is shown in Figure 2. This portrays the relative strengths and weaknesses within the organisation by cultural characteristic and level within the organisation. Note that higher scores indicate stronger levels of agreement with the B-SHARP™ statements, and that these equate to more positive perceptions. We note that the lowest scores are associated with the Communication and Training, and Risk-Taking Behaviour characteristics and that senior management scored the organisation consistently higher than did other sections of the workforce. Further detailed analysis of the responses to individual statements in the B-SHARP™ model provided the basis for more precise targeting of potential issues that were then explored in face-to-face interviews to gather more specific information about employee’s views.

The assessment outputs were reviewed with MWKL’s management team at a planning workshop, and priorities and plans established to bring about improvement. Areas addressed included improvement planning, communication, performance management and workforce involvement, with specific actions to:

- Build workforce ownership of safety (through a programme of workshops for all employees)
- Establish and communicate required management behaviours (including use of a performance review process setting safety-related objectives for all personnel)
- Review and clarify management responsibilities

MWKL subsequently rolled-out across the organisation a workshop programme to raise safety awareness and gain buy-in to shared ownership and responsibility for safety. The impact of these actions was seen in an increase in the numbers of near-misses reported, increased involvement of personnel in auditing activities, along with a continued zero lost time injury performance.

A follow-up e-survey was completed in 2004. The change in response to the 20 statements of the B-SHARP™ questionnaire between 2003 and 2004 is shown in Figure 3. Statistical analysis using appropriate t- and chi-squared tests indicated that responses to fourteen of the statements were more positive in 2004 than they were in 2003, confirming that MWKL had succeeded in engaging its workforce
in safety improvement. Circled pairs show where the change was not significant, i.e. where no statistically significant improvement had been achieved and where more targeted action was needed.

Analysis of the results by level within the organisation indicated which sections of MWKL’s workforce had responded most positively to the change programme. This analysis confirmed the effectiveness of the workforce communication programme, whilst at the same time illustrating that middle managers had not altered their perception of the safety climate. Senior managers, perhaps appreciating the scale of change required, responded more negatively.

Using these data, the existing improvement plan was updated to address:

- Management responsibility and clarity, focusing on middle and senior management
- Measurement and reinforcement of safe behaviour
- Communications, education and training – including phase 2 workshops specifically for safety improvement teams
- Risk taking behaviour – focusing on critical behaviours for safe working

MWKL plans to review its safety climate again in early 2005 in order to monitor progress and enable its improvement plan to be developed further.

Figure 3 – Change in Response to the 20 Statements of the B-SHARPTM Model, 2003 to 2004
3.2 Introduction of a Behavioural Safety Programme

In addition to its consultancy business, ABB operates a number of manufacturing sites in the UK, and is placing considerable emphasis on driving forward safety improvement at these locations. In the UK, the business is aligning its Occupational Health and Safety Management System with the requirements of OHSAS 18001, and plans to make increasing use of behavioural approaches to safety.

Following initial discussions at senior level in the second half of 2003, ABB Low Voltage Systems in Sunderland decided to adopt a Behavioural Safety Auditing programme to drive improved safety awareness and performance. This programme was initiated at the site in January 2004.

ABB’s Sunderland operation involves manufacture and assembly of electrical equipment. The hazards involved arise from:

- Operation of mechanical equipment
- Manual assembly of components (cuts to the hands were a particular problem)
- Manual handling of components
- Live Electrical Testing
- Lifting to unload and store components
Introduction of the Behavioural Safety Auditing System (BSAS) approach at the site has involved the following process:

- Establishing a cross-functional Audit Management Team to drive the BSAS programme for the Site (this team is responsible for establishing the audit standards, setting up the audit programme, and managing the outputs of audits)
- The Audit Management Team identifying the critical behaviours for safe working, and proposing revised site standards for PPE
- Gaining management commitment to the proposed standards and publicising these standards
- Training Auditors in the B-SHARP™ Behavioural Safety Auditing techniques
- Launching the audit programme and publicising it
- Progressing corrective actions arising from audits
- The Audit Management Team reviewing periodically the progress of the programme so that issues can be tackled

The approach taken has allowed the workforce itself to select those behaviours that it sees as critical, and at which the audits should be targeted. Our approach to generating this list of critical behaviours is to review incidents, risk assessments and personal experience with the Audit Management Team using a mapping process to highlight critical areas and so draw out critical behaviours and the personal protective equipment (PPE) requirements to be audited. Subsequent training of the BSAS auditor team involves formal classroom training, role-play and hands-on experience in the workplace.

Initial output from the BSAS audit monitoring package is shown in Figure 4. This shows that the majority of unsafe acts were connected with personal protective equipment (PPE) and job methods, i.e. non-compliance with PPE requirements and established job methods, and served to drive the initial improvement actions. A “safe working” measure, derived from the number and severity of unsafe acts observed is also calculated and displayed (see Figure 5). This indicates that most unsafe acts were being carried out in the Main Assembly (1) area, allowing improvement resource as well as BSAS audit effort to be targeted.
Figure 4 – Distribution of Unsafe Acts, by Category, at ABB’s Sunderland Factory

To help ensure sustainability of the programme, BSAS auditing is now integrated into the site’s safety improvement planning processes as part of the OHSAS 18001 implementation. It addresses the need for continuous improvement and is currently generating corrective actions to tackle areas such as:

- Reviewing job methods to provide safer access to work at awkward levels
- Improving access to work areas to reduce congestion for the workers
- Making personal protective equipment standards more visible to increase compliance
- Improving housekeeping and storage provisions

The impact of the programme has been seen in a number of ways. Within six weeks of the start of the programme, the workforce had brought about a marked improvement in housekeeping on the plant and by the end of November 2004 (10 months after launch of the programme), the total number of injuries in the Main Assembly area was running approximately 25% below 2003 levels (on greater or equivalent hours worked). PPE compliance had improved markedly; gloves were being worn more often, and this
was witnessed by reduced hand injuries. The behaviour of the workforce with regard to the BSAS audits had also changed; they no longer waited until an audit was carried out before tackling issues, and had become more proactive with regard to safety.

Figure 5 – % Safe Working by Work Area at ABB’s Sunderland Factory

4 Summary and Conclusions

This paper has emphasised that the process of safety improvement is not fundamentally different from any other aspect of continuous improvement. Measurement of safety performance is as important as measurement of any other parameter to be improved, and safety climate assessment has been shown to provide information that can be used to define high-level improvement plans, monitor their impact,
and be used to help revise those improvement plans. It is important to speak to an organisation’s employees in any climate assessment, since their underlying views must be accessed if the underlying reasons for survey responses are to be understood and improvement action directed where it is needed. Such climate assessment need not be onerous however; it is our experience that an assessment for a reasonably large site (a few hundred people) can be completed within one to two weeks. It is important that workforce expectations are not raised inappropriately by carrying out an assessment, and that the senior team at the site is committed to acting upon any shortfalls identified; this does have implications for the timing of any assessment. Safety culture is complex, and safety culture change requires time. All organisations have different cultural circumstances, and the appropriate intervention should be selected with care, taking account of where the organisation is in its cultural development.

The Behavioural Safety Auditing System (BSAS) generates data that can be used to drive safety improvement day-to-day, providing a system for capture and resolution of safety-related actions. BSAS maintains the involvement of the workforce, and can be used to provide a leading indicator of safety performance. In the example presented in this paper, BSAS has been written into the site’s OHSAS 18001 implementation and is a cornerstone of its approach to continuous improvement in safety. Again, timing of BSAS introduction is critical; if a behavioural safety programme is launched too soon, it may lack the support of the area management or the workforce, and risks failing. A BSAS programme can generate large numbers of improvement actions, which have to be seen to be acted upon in order to maintain workforce commitment. If too many engineering and procedural issues are identified, the business may be unable to resource and resolve them quickly enough to maintain the programme’s credibility in the eyes of the workforce. In these circumstances, it may be better to take an improvement team approach, providing a small group with the resources to improve the working environment in a more selective and focused way. This will raise the profile of safety, and can be a precursor to a broader-based behavioural safety programme.
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References


**IOSH** – “Promoting a Positive Culture”, Institution of Occupational Safety and Health Technical Guidance, August 2004


