Looking for higher standards

Behavioural safety - improving performance

Introduction

IOSH publishes a range of free technical guidance. Our guidance literature is designed to support and inform members and motivate and influence health and safety stakeholders.

Looking for higher standards. Behavioural safety – improving performance

This guide provides an overview of behavioural safety, demonstrating its links to improved safety performance. It provides a historical background and then looks at what we mean by behavioural safety and how it works. The guidance aims to help you decide whether a behavioural safety programme is suitable for your company and, if so, how to start the process. Case studies illustrate the business benefits of behavioural safety programmes. Links to more information and resources are also provided.

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Our materials are reviewed at least once every three years. This document was last reviewed and revised in January 2018

Contents

Introduction

Health and safety in the workplace is influenced by a number of factors including the organisational environment, managers' attitude, commitment to the nature of the job or task and the personal attributes of the worker. Safety-related behaviour in the workplace can be changed by addressing such influences.

One way to improve safety performance is to introduce a behavioural safety process that identifies and reinforces safe behaviour and reduces unsafe behaviour. Behavioural safety processes aren't a 'quick fix'. There are some fundamental elements to implement. These include policies, systems, assessing and improving management performance and operational factors, training and design.

First researched in the 1970s in the US, the behaviour-based safety approach emerged in UK organisations in the late 1980s and is now widely used in a variety of sectors in the UK. This guide introduces the background and basic principles of implementing a process which systematically addresses behavioural safety. Techniques to change behaviour are based on observation, intervention and feedback.

Business Benefits

A manufacturing company with 1,400 staff introduced a behavioural safety programme and gained:

improved productivity – the number of work days lost through injury per year dropped from 550 to 301 in four years

- improved public image – the company's managers have given presentations at major behavioural safety conferences
- staff development – many observers have improved communications and IT skills, and greater confidence.

(Source: HSE. Large business case studies 2003.
www.hse.gov.uk/business/casestudy/chep.htm

2 What is behavioural safety?

Behaviour is defined as an action by an individual that is observable by others. It's estimated that in up to 80 per cent of work-related accidents, employees' behaviour is a contributing factor, in the form of acts or omissions.[1] Behaviour can pave the way for different pre-existing factors to align into a negative event.

Employees engage in 'at-risk' behaviour at work to achieve a perceived benefit. For example:
- cutting corners to save time – how often do employees decide not to use personal protective equipment (PPE) because a task may only take seconds to complete?
- ergonomic factors – inappropriately designed machine controls may lead to the adoption of improvised and potentially dangerous methods
- accepted practice – "we've always done it that way"
- reinforcement by the actions of supervisors – "my supervisor turns a blind eye when we do this because it means we get things done quicker".

At-risk behaviour is also caused by employees misunderstanding, or being unaware of, the risks associated with a particular task. Some employees may even be more inclined to take risks than others.

A behaviour-based approach focuses exclusively on observable and measurable behaviours that are critical to safety. This is a task-oriented view of behaviour that treats safe behaviour as a critical work-related skill. The approach is founded on the belief that the routine application of safe behaviours will reduce accidents.

Behavioural safety recognises workers as human beings with a genuine interest in their own wellbeing, who contribute best when they engage and take ownership. The human element means that desired results are rarely instantaneous and require different management arrangements to complement proven engineered and procedural systems.[2]

Human behaviour can be categorised as reflex (or automatic), intended and habitual. The behavioural approach to safety focuses on the habitual category. Focusing on workers' behaviour in order to blame or punish them and responses of this kind are largely counter-productive. In any case, some of the behaviour associated with incidents is encouraged or accepted by management systems. The most effective approach is to identify and measure the safe and unsafe (at-risk) behaviours that are occurring in the workplace and manage them.

Measuring behaviour provides the health and safety system with a tool for proactive management. It's a well-established safety approach to correlate frequency with severity of injuries using accident triangles or accident ratios.

The traditional safety triangle shows that as severity decreases, frequency increases. It's simple to extend the triangle to include near-misses and unsafe behaviours (see Figure 1).

There are more major injuries than fatalities, more first aid cases than over-three-day injuries, and more near-misses and at-risk behaviours

than incidents of all kinds. At-risk behaviour is an early warning system for accidents.

The key to reinforcing safe behaviours (good habits) and removing or reducing unsafe ones (bad habits) lies in identifying the behaviours which are critical to safety and then in carrying out regular observations to monitor them. It's therefore a proactive safety management tool, in which the information is obtained without anyone being hurt.
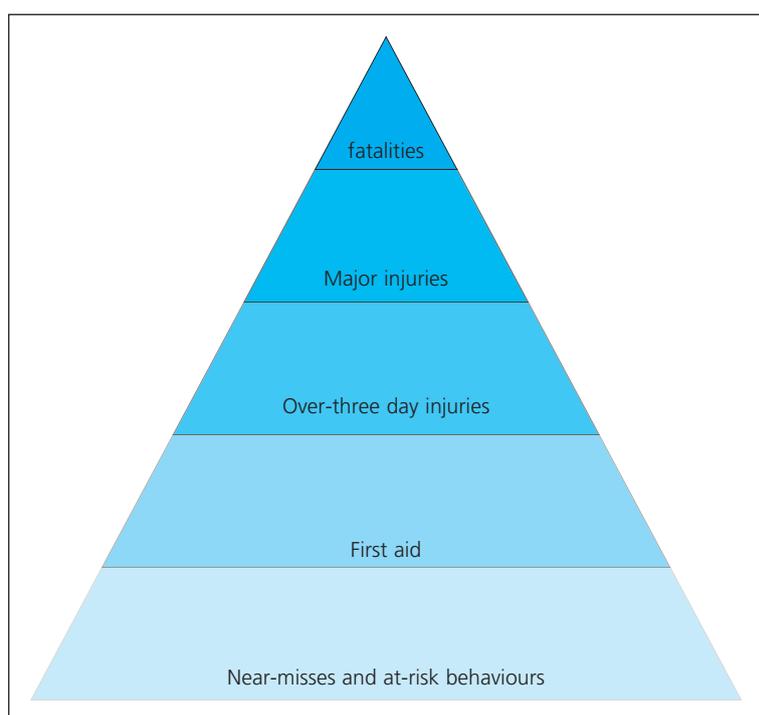

Figure 1: The safety triangle

3 Why do people fail?

Accidents can occur through people's involvement with their work. As technical systems have become more reliable, the focus has turned to human causes of accidents. It is estimated that up to 80 per cent of accidents may be attributed, at least in part, to the actions or omissions of people. This is not surprising, since people are involved throughout the life cycle of an organisation, from design through to operation, maintenance, management and demolition. Many accidents are blamed on the actions or omissions of an individual who was directly involved in operational or maintenance work. This typical but short-sighted response ignores the fundamental failures which led to the accident. These are usually rooted deeper in the organisation's design, management and decision-making functions.

There are different types of human failures, such as errors and violations: see Figure 2.
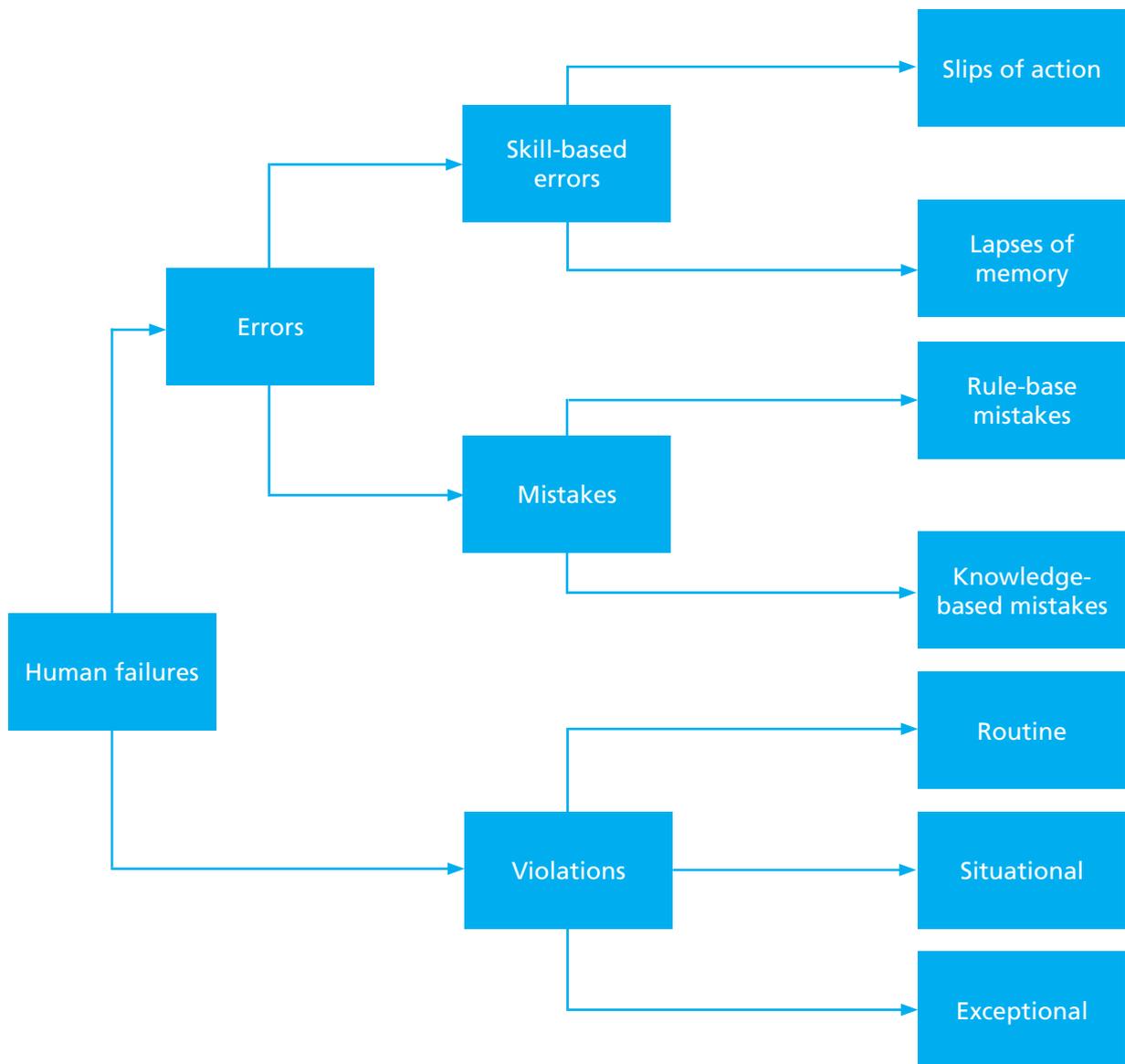
Figure 2: Types of human failure

3 Why do people fail?

Human error is an action or decision which was not intended, which involved a deviation from an accepted standard, and which led to an undesirable outcome. Errors fall into three categories: slips, lapses and mistakes.

A violation is a deliberate deviation from a rule or procedure. It is an intentional but usually well-meaning failure where the person deliberately does not carry out the procedure correctly. It is rarely malicious (sabotage) and usually results from an intention to get the job done as efficiently as possible. Violations often occur where the equipment or task has been poorly designed and/ or maintained. Mistakes resulting from poor training (that is, people have not been properly trained in the safe working procedure) are often mistaken for violations. Understanding that violations are occurring and understanding the reasons for them are necessary if effective means for avoiding them are to be introduced. Peer pressure, unworkable rules and incomplete understanding can give rise to violations.

Slips and lapses occur in very familiar tasks needing little conscious attention. These tasks are called 'skill-based' and are very vulnerable to errors if attention is diverted, even momentarily. Slips are failures in carrying out an action in a task. They are described as 'actions-not-as-planned'. Lapses cause us to forget to carry out an action, to lose our place in a task or even to forget what we had intended to do.

Mistakes are a more complex type of human error where we do the wrong thing, believing it to be right. Rule-based mistakes occur when our behaviour is based on remembered rules or familiar procedures.

Knowledge-based mistakes occur when we misdiagnose or miscalculate a problem, resulting in the incorrect action.

Understanding these different types of human failure can help identify control measures, but you need to be careful that you do not oversimplify the situation. In some cases, it can be difficult to place an error in a single category – it may result from a slip or a mistake, for example. There may be a combination of underlying causes requiring a combination of preventative measures. It may also be useful to think about whether the failure is an error of omission (forgetting or missing out a key step) or an error of commission (doing something out of sequence or using the wrong control) and acting to prevent that type of error.

The likelihood of these human failures is determined by the condition of a finite number of 'performance-influencing factors', such as design of interfaces, distraction, time pressure, workload, competence, morale, noise levels and communication systems.

Example: Herald of Free Enterprise Transport sector 1987

This roll-on-roll-off ferry sank in shallow water off Zeebrugge, killing 189 passengers and crew.

On the day the ferry capsized, the Herald of Free Enterprise was working the route between Dover and the Belgian port of Zeebrugge. This was not her normal route and the linkspan at Zeebrugge was not designed specifically for the Spirit-class vessels: she used a single deck, preventing the simultaneous loading of vehicles onto both E and G decks, and the ramp could not be raised high enough to reach E deck. To compensate for this, the vessel's bow ballast tanks were filled. However, the ship's natural trim was not restored after loading. Had Herald of Free Enterprise survived, she would have been modified to obviate the need for this procedure.

It was normal practice for the assistant bosun to close the doors before moorings were dropped. However, he had returned to his cabin for a short break after cleaning the car deck upon arrival and was still asleep when the "harbour stations" call sounded, and the ship dropped her moorings. The First Officer was required to stay on deck to make sure the doors were closed. The First Officer said he thought he saw the Assistant Bosun approaching. He was seriously injured in the disaster and the court concluded that his evidence was inaccurate. It is believed that, under pressure to get to his harbour station on the bridge, he had left G deck with the bow doors open in the expectation that the Assistant Bosun would arrive shortly.

The court also described the attitude of the 1st Bosun, believed to have been the last person on G deck, as most unfortunate. Asked why he did not close the doors given there was no one else there to do it, he said it was not his duty.

The Captain assumed that the doors had been closed since he could not see them from the wheelhouse owing to the ship's design and had no indicator lights in the wheelhouse.

The immediate cause of the sinking was the failure to close the bow doors before leaving port. There was no effective reporting system to check the bow doors or any failsafe system in place. The formal inquiry reported that the company was 'infected with the disease of sloppiness'. Commercial pressures and friction between ship and shore management had led to safety lessons not being learned from previous incidents: in October 1983 the Assistant Bosun of the Pride had fallen asleep and had not heard "harbour stations" being called. The result was that he neglected to close both the bow and stern doors on the sailing of the vessel from No. 5 berth, Dover.[3]

There were a number of human factors associated with this example:
- The Assistant Bosun not closing the bow doors. **Error – Skill-based error – Lapse of memory.**
- The First Officer expecting that the Assistant Bosun would close the bow door, without him confirming this to be true. **Error – Mistake – Knowledge-based mistake.**
- The Captain assuming the bow doors had been closed, despite not having any confirmation from his crew. **Error – Mistake – Knowledge-based mistake.**

4 Behavioural safety approaches in industry

Behavioural safety approaches were first developed and applied in the US in the 1970s. Komaki *et al*[4] provided one of the early studies of the application of behavioural approaches to improve occupational safety in the food manufacturing industry. Their study demonstrated that defining safe working practices through behaviour and then reinforcing them positively offered a way of promoting safe behaviour at work.

Krause and Hidley[5] combined the work of Komaki et al with lessons from the quality management field and recognised training, the use of process indicators, feedback and

employee participation as key factors for providing a sustainable continuous improvement process.

Krause *et al*[6] found that immediate peer- to-peer verbal feedback was the most effective way of achieving behavioural change in an industrial

setting. After this, Krause carried out several behaviour- based safety interventions in chemical companies that were proponents of total quality management. Sulzer-Azaroff[7]

also showed that in order to change behaviour successfully, you need to understand the factors that give rise to and support safe and unsafe behaviours.

From the 1980s, safety initiatives based on the observation of safe and unsafe acts or behaviours were implemented in Europe. Several studies have been conducted in different UK industrial sectors, for example, in construction,[8,9] manufacturing,[10] nuclear energy[11] and research.[12] In addition, the Health and Safety Executive (HSE)[13] has provided case study examples.

5 How does behavioural safety work?

It's possible to recognise a number of common features across the various systems.

- **Leading from the top.** Top management needs to 'buy into' the programme to ensure commitment and resources for the organisation.

- **Significant workforce participation.** Full engagement of the workforce in the programme is an essential part of behavioural safety. Without this engagement, it's difficult to make improvements.

- **Targeting specific unsafe behaviours.** The programme focuses on the small number of unsafe behaviours that are responsible for a large proportion of an organisation's accidents or incidents. These can be identified by systematically examining the organisation's accident and incident records. Getting employees and management working together to understand the reasons for unsafe behaviours and to identify and agree targets for change helps to promote ownership and agree common behavioural measures.

- **Observational data collection.** Trained observers regularly monitor their colleagues' safety behaviour against agreed measures. Making an observation is like taking a photograph – it provides a snapshot of a moment in time. The greater the number of observations, the more reliable the data become, as the employees' true behavioural pattern can be established. It's important to understand the context of the observation data, including the number of observations and the number of people observed. Additionally, more frequent observations increase the probability that the level of safe behaviour will improve, as people tend to alter their behaviour if they know someone is watching. A variable feature is who carries out the observations and how often – generally, if everyone participates in observations, it promotes a collective sense of ownership of the process.

- **Data-driven decision-making processes.** The data from the observation process allow you to measure safety performance. You can then examine trends in these data to identify the key operational areas that need improvement. It's then possible to reinforce employees' safe behaviour positively, while taking steps to correct unsafe behaviours.

- **Organised improvement intervention.** The planned intervention often begins with briefing sessions in the work areas and departments that will be involved. Then volunteer groups, such as a steering committee and observers, are brought together. They then receive training in observation and feedback techniques. The project team oversees the development of the process in the organisation, from the initial analysis of accident and incident data through to monitoring performance, setting goals and reviewing progress.

Business Benefits

Partly through introducing a behavioural safety programme, one company achieved 285 days without a "lost-time injury", a huge milestone in their safety performance. They have also saw a significant increase in near-miss reporting on site.

(Source: HSE. Case Studies 2007 www.hse.gov.uk/involvement/casestudies/springfield.htm

5 How does behavioural safety work?

- Regular, focused feedback on continuing performance. Feedback is the key ingredient of any type of improvement initiative. In behavioural safety systems, feedback usually takes three forms: verbal feedback to people at the time of observation; visual feedback on charts displayed in the workplace; and weekly or monthly briefings where detailed observational data are provided about specific employee behaviours. In combination, these forms of feedback provide a basis for targeting focused improvements.

- A requirement for visible continuing support from managers. It's vital that managers show visible leadership and commitment to the process. They can demonstrate this by: allowing the observers enough time to make their observations giving praise and recognition to staff who work safely encouraging employees to report health and safety concerns providing the resources and help needed for improvements promoting the initiative whenever and wherever they can.

Figure 3 outlines the key stages in setting up a behavioural safety programme.

Business Benefits

One company implemented BSAFE – a proprietary behavioural-based safety system. They achieved a £250,000 per year saving in steam leaks through identifying and making repairs and BSAFE contributed to a 32% reduction in their insurance premiums.

(Source: HSE. Case Studies 2003 www.hse.gov.uk/business/ casestudy/huntsman.htm
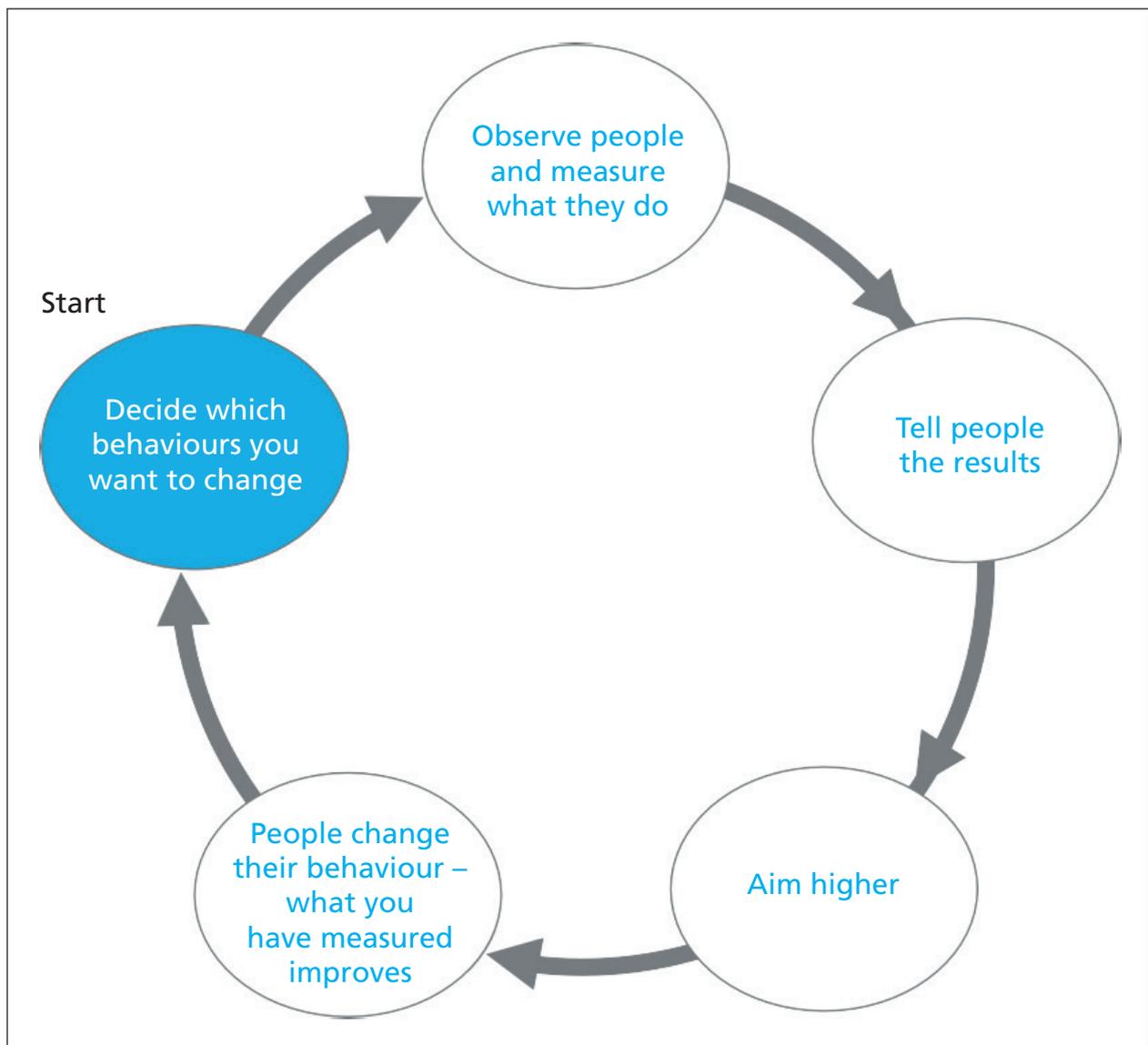

Figure 3: Implementation of a behavioural safety programme

Start

Decide which behaviours you want to change

Observe people and measure what they do

Tell people the results

Aim higher

People change their behaviour – what you have measured improves

6 Making the choice – is behavioural safety the right tool?

Below are some key questions that you need to consider before going ahead with a behavioural programme. If you answer "yes" to these, it suggests that your organisation may be ready for a behavioural safety intervention.

- Is a significant number of accidents or incidents caused by the behaviour of front-line employees?
- Do most employees and managers want to reduce the current accident rate?
- Will managers be comfortable if employees become more involved in health and safety?
- Do managers and employees trust each other?
- Do managers accept their role in health and safety management?
- Does the organisation have enough resources for the process (eg, time for training and observations)?
- Is the physical environment in the workplace well controlled?

Behavioural safety programmes have made a substantial contribution to improving health and safety performance in several industrial sectors. But there can be problems with introducing them, such as the following.[14]

- Workforce concerns, including: issues about 'spying' on co-workers seeing the programme as another initiative that won't last worries that workers will be blamed for accidents disagreements over safe practices.
- Management issues, including: not enough management support for the approach expectations of a 'quick fix', leading to a loss of commitment when improvements come more slowly organisational changes that may lead to low morale and loss of key players autocratic management style inconsistent behaviour of managers when enforcing agreed safety behaviours and rules.

- Questions of programme suitability, including: using an 'off the shelf' solution that may not suit the culture of the organisation inappropriate training materials not involving all supervisors in the process, leading some to abandon their responsibility for safety using the programme to address unrelated issues conflicts with payment and reward schemes.

7 Opting for a behavioural safety programme – what next?

Check that employees have an appropriate level of knowledge and skills for their jobs – are they competent?

Bring together a small group of people, including managers, supervisors and workers, to:

- discuss how behaviour influences the organisation's health and safety performance
- find out how much support there is for a behavioural safety programme
- identify activities or tasks with 'at-risk' behaviours
- develop ways of measuring safety-critical behaviours
- recruit and train observers
- establish baselines
- set realistic but challenging targets for improvement

- carry out observations, give feedback on the results to employees as appropriate and review
- make sure staff stay involved in the programme by giving constructive feedback on undesirable behaviour and praise for desirable behaviour
- use the data you gather from the process to improve performance further.

The case study on pages 15–16 gives a practical example of how to implement a behavioural safety programme.

Case study
Using a behavioural approach to improve safety in aircraft manoeuvring areas (apron)

The study was carried out in aircraft manoeuvring areas of a major UK airport for a US-based international airline, with approximately 400 employees including support staff.

Procedure

Management briefing
During the planning stages, line managers and HR staff received a briefing to explain the philosophy behind the behavioural approach, outlining their role and why their commitment is important.

Developing measures of safety performance
The company identified safety-critical behaviours from accident records and interviews with key people.
It developed measures for critical behaviours in three areas of concern: manual handling, vehicle operations and general ramp safety.

Training the observers and observing safety performance
Initially 35 observers were trained to observe and measure their colleagues' safety performance and provide verbal feedback. They represented both managers and employees and were drawn from all operations. The key reasons for choosing them were that they were respected by their peers, were committed to improving safety and had good communication skills. The observations took around 20 minutes and took place at different times to make sure that they reflected a true picture of safety performance.

Determining a baseline
Straight after the observers were trained, they collected data for four days. In total, 60 snapshots of safety performance provided a baseline figure for each of the three areas of concern. The company then set targets for improvement on the basis of these figures.

Establishing improvement goals at the end of the baseline period, all observers and representatives from senior management attended a goal-setting meeting. Here they decided goals that were challenging but achievable for improvements in safety performance across the three measured categories. They also discussed any barriers to improvement identified during the baseline observations.

Feedback and follow-up
Following the goal setting, the observers posted feedback charts around the apron and gave short PowerPoint presentations in staff rooms throughout the day and through the internal computer network.

On average, they carried out 110 observations each month. They displayed the results of the observations every week and included information on the issues that had improved the most and those that had the worst scores.

More observers were trained to provide extra cover during busy periods and holidays, to replace observers who had left the programme and, more importantly, to cascade the programme throughout the apron operation.

Results
During the first 19 months, the proportion of behaviour observed as safe increased from an average of 70 per cent to 79 per cent (see Figure 4). Over the next five years, the programme evolved to address other safety issues and received two ground handling awards. The company's insurers have also recognised the programme's importance through reduced employers' liability premiums.

Conclusion

This study shows that applying a behavioural approach to safety is effective for ramp operations. Despite recent economic trouble in the sector, the scheme had positive effects on safe behaviour, work methods, communication and industrial relations, as well as reducing the occurrence of accidents and related costs.

Source: United Airlines and Heathrow behavioural case study 2005 Robin Phillips CFIOSH (personal communication)
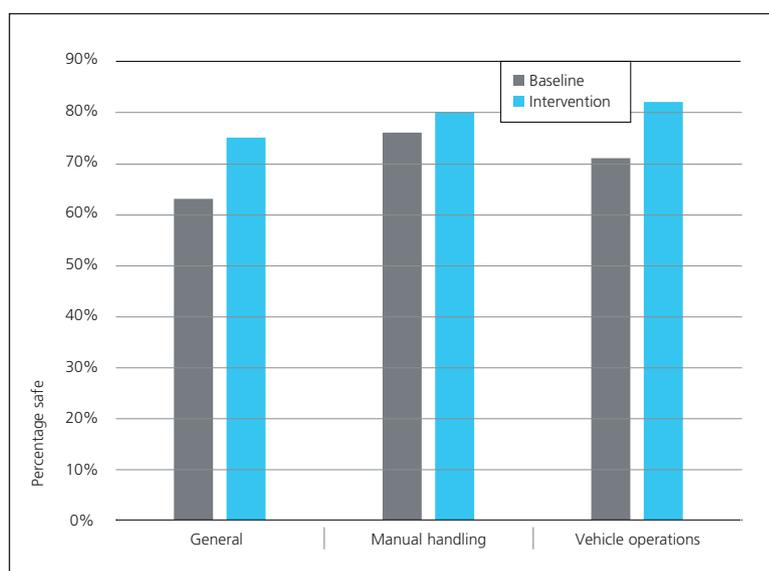

Figure 4: Percentage improvement across the three intervention categories in the case study

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DVDs on promoting safe behaviour in the workplace are available from:
- Out-Takes
  info@outtakes.co.uk
  t + 44 (0)20 8289 2466
  www.outtakes.co.uk
- Human Focus International info@humanfocus.co.uk
  t +44 (0)1737 246331
  http://safetyonlinecourse.co.uk.

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