

Royal Society for the Prevention of Accidents

Learning how to learn from accidents

October 2015

1) Introduction

This resource has been developed by RoSPA to help you think about how well your organisation copes with accidents and incidents (unplanned, adverse events that can or do cause harm and/or loss) and its ability not just to stop them happening again but to learn lessons that will help it improve its overall approach to managing for better health and safety outcomes.

While it gives some guidance on what to do in the hours, days and weeks following an accident, its main focus is on 'operational readiness to investigate' and on optimising the conditions for good organisational learning, including from 'near misses' and dangerous occurrences. It is designed to support accident investigation training and further reading about the subject.

2) 'Windows on reality'

Accidents are preventable but only if you understand how and why they happen. Understanding these things is only possible through good investigation. It is no coincidence that businesses and sectors of the economy that have the best safety records also have the strongest and most developed approaches to investigating and learning from accidents.

However well you manage risks, your organisation can expect to have some unplanned, unanticipated events. Accidents damage people and they damage organisations - not just operationally as a result of business interruption and associated costs but they cause damage to morale and also to corporate reputation. Yet accidents are also 'windows on reality' and thus present important opportunities for organisations to learn lessons which, if acted on, will not only help prevent recurrence of the same kinds of events but will enable them to improve the way they manage risks generally. In practice however there can often be real difficulties in identifying and analysing the evidence, meaning that the 'glass in the window' can be difficult to see through!

Of course, when it comes to making things safer, we should all be trying to prevent accidents proactively using suitable and sufficient risk assessment (which in essence is investigating before things go wrong). In reality however our ability to foresee and forestall accidents is always limited, so when they do occur, we need to understand that they can actually be our one of our best teachers; although to be able to squeeze safety learning out of them, we need to learn how to listen to what they try are trying to tell us.

In fact, learning how to learn from accidents and incidents - particularly by overcoming some of the common barriers such as fear, blame and anxieties about reputational loss and legal proceedings that arise in their aftermath - and developing a culture of reporting accidents, incidents, unsafe acts and conditions - is all part of a much bigger culture change that is badly needed in so many of today's businesses.

The need to enhance the quality of learning from accidents remains one of RoSPA's key occupational safety and health issues. The truth be told however, it has been one of the hardest of all our policy priorities on which to make progress. Too many businesses seem to think they investigate accidents quite adequately.

It is a sad fact however that most accidents and 'near misses' are still not reported, either within organisations or to relevant enforcing authorities (often due to fear of consequences) - and consequently there is no investigation of any kind.

- Although there are organisations that do have really effective approaches to investigation and organisational learning from accidents, many businesses - often SMEs - still have no clear procedures for investigation (including managerial and worker involvement).
- And even when there are procedures, there are still no effective criteria to help decide on the scale or the level of investigation to be adopted. In most businesses this is still decided by the severity of resulting injury (often a matter of chance) rather than safety significance or learning potential of the events that produced it.
- Often investigators fail to gather all the relevant facts.
- And distortions can creep into evidence gathering and analysis due to uncritical biases. (We think we know what happened and thus we seek only that evidence which supports our suspicions. We stop our evidence search when we think we have found 'the cause'.)
- Little use is made of structured methods to integrate evidence.
- Many investigators tend to conclude the investigation too early and do not go far enough, often failing to think outside conventional rules and operating systems or just focusing on the errors of individuals without searching for 'root causes' such as weaknesses in health and safety management systems.
- And even where investigations are of reasonable quality, there can still be poor communication of 'lessons learned' and failure to track closure on resulting recommendations.

These problems are not unique to health and safety. There is always the danger with investigations of all kinds that they can be quite cursory and superficial, leading to recommendations for narrow, technically focused 'quick fixes' rather than 'root and branch' changes in risk management.

RoSPA believes passionately that there is a need to demystify investigation and promote ownership among managers and all other employees. But there is also a need to build on what has been developed already in organisations, rather than try to work from a blank sheet.

It is crucial that the habits of appropriate accident response are well established, if not ingrained, for example, through regular low level investigation of everyday smaller scale incidents. This is not just about improving safety or health. After all, most organisations need to have robust processes in place for investigating other kinds of mishaps and problems such as financial irregularities, quality issues, customer complaints and HR (Human Resources) issues.

3) Coping in the aftermath

Strong emotions

The aftermath of an accident is never a comfort zone for anyone. People will have been injured or worse still, lost their lives; witnesses will have been traumatised; some people may feel threatened, for example, by the possibility of being prosecuted, sued or disciplined. Often the desire uppermost in people's minds is to find an easy explanation for the accident, to clean up and move on. This is especially true when only damage has occurred and luckily no one has been hurt - although arguably 'near misses' are not just much more common than injury events but are usually much easier to learn from, precisely because there is less likely to be fear of prosecution and civil claims.

This sort of reaction is understandable. The strong emotions that arise in the wake of an accident can be a barrier to investigation and learning - but equally they can also be an ally, in that for a period after the accident, everyone's mind is focused on safety and the need to improve it. So to fully exploit this opportunity it is vital to approach accidents in a professional and systematic way; otherwise your organisation may not just be losing out when it comes to learning, you may also be storing up trouble for the future. All organisations, even ones that seem to be 'low hazard', need the right level of organisational and technical preparedness to cope with accidents and to move forward.

Readiness

The reason is simple. Unlike investors, customers, suppliers, clients or even enforcement agencies, accidents do not phone ahead for an appointment. Thankfully really bad accidents with serious consequences do not happen that often but when they do, they happen suddenly and without warning and thus if you are a manager and if you do not have rehearsed 'operational readiness' to investigate (the right policies, people, procedures, equipment etc in place), you will be left trying to improvise, making up your response to events as you go along. When you find out later that you should have acted differently, it will be too late.

Understanding agendas

Following an accident it is not unusual to find different parties all pursuing their respective agendas, often with the main focus on attributing fault and blame. This in turn tends to create an adversarial atmosphere that poisons relationships and prevents openness and learning. And even where the organisation does try to learn lessons, there can be some fairly fundamental errors such as a lack of clarity about purposes or agreeing terms of reference with the commissioners of the investigation – usually senior managers who are accountable within the governance structure of the organisation. And at the end of the process there can be little (or worse still, no) communication of lessons learned and poor implementation of necessary safety changes.

Leadership

To tackle these challenges accident investigation demands management leadership, not least because of the need to be able to be able to balance apparently conflicting

agendas within the organisation such as controlling liability while maximising safety learning, not to mention taking prompt remedial measures. And to enrich them and ensure that their lessons are taken on board, investigations need meaningful workforce involvement too. As with tackling any key challenge in business, people need to work together. You can only 'do safety' with people, not to them!

Prioritisation and scaling

Decisions are needed on how best to use limited investigation resources. Given the ubiquity of the unplanned and the unexpected in the workplace, any organisation committed to learning from accidents (and in which these things are regularly reported), would soon consume all their available resources if they investigated thoroughly and to the same extent, all the hundreds of such events that beset them. So there is always a need to prioritise investigation effort and to scale response, not just to respond to the seriousness or potential seriousness of outcomes but to exploit the different levels of learning opportunity which accidents and incidents can present.

Accidents resulting in fatal or life changing injuries or loss of control of a major hazard - will obviously attract significant investigation effort. But sometimes a moderate consequence accident, which is of a type that is very frequent, may merit the kind of in-depth investigation usually reserved for serious outcome accidents because it seems to offer an excellent opportunity to unpick underlying contributory factors and thus provide a case study from which much useful safety learning can be extracted.

Developing understanding

None of this is easy. It takes patience and commitment as well as time to perfect routines and skills. It means being able, often under pressure, to balance competing considerations. It means managers, safety professionals and safety representatives and front-line workers developing a more sophisticated understanding of accidents, including understanding the complex interconnection of conditional factors that surround them. These include technology, systems, and human factors, especially the complex interplay of all the various forms of human error in this context (slips/lapses, mistakes – skill and/or rule based - and violations - whether exceptional, routine or situational). Although on the surface accidents often seem simple, once you start to assemble the evidence surrounding them and try to understand in detail how and why they occurred, you quickly realise how complex and intellectually challenging they can be.

So above all there is a need for a vision of good investigation that enables everyone involved to commit to a level of openness, as well as rigour, that will enable them to uncover what has gone wrong - as well as how and why - and that will sustain investigation when the going gets tough – which it invariably does with accidents.

4) Getting clarity about objectives

Senior manager involvement

One of the reasons that many senior managers have problems with investigation is that they only tend to engage with them in a serious way when things have gone very badly wrong and people have been seriously injured. Investigation of less serious events is often left to people lower down the organisational hierarchy and

even serious non-injury events – which are much more numerous – do not always lead to senior managers being involved in finding out what went wrong, how and why.

So, given that serious accidents are rare, in organisations where the duty to investigate is delegated, the average interval between senior managers being involved in an accident investigation can be very long indeed and consequently the habits of investigation are not always well ingrained at this level. Too often, when managers are tasked with taking charge of an investigation, it is only after they have started to respond to events that they realise that they have entered a minefield, not least because it dawns on them that they are faced with having to deal with the needs of a number of quite different parties, each of which is likely to have a slightly different agenda.

How best can the senior manager be helped to be aware of this at the outset so they do not freeze like a rabbit in the proverbial headlights when the competing demands of different people and organisations start to emerge in the days following an accident?

Reconciling needs

The first point to get across perhaps is that there is rarely a perfect solution. Reconciling all the different needs of parties such as insurers, HR departments, lawyers, unions, production managers and so on - is never easy. It's often a bit messy and involves managers in overall charge doing the best they can in the circumstances. So if they find themselves confused in the early hours of a post accident situation, whatever the immediate pressures, it is probably worth their taking some time out at the very start of the process, perhaps in discussion with colleagues, to decide exactly what they are going to do to pick the right path for them and their organisation through this maze.

Where to start?

The most important thing is that, immediately following an accident emergency procedures should enable victims to receive prompt and effective help. Next, people and procedures should be in place so that the accident scene is made safe. But as far as possible, it should be secured and left undisturbed. Reconciling these two objectives is not always so easy but it is the kind of issue that ought to be covered in debriefing on emergency preparedness rehearsals, such as unannounced fire and accident drills etc.

Families

The next most important thing is that families and loved ones should be informed and steps should be taken to provide them with help and support. So managers need to be sure that they can quickly establish contact with them but they also need to remember that these people, who need help in the hours following a serious event, may well be seeking legal redress later on. And they may also be witnesses in any subsequent prosecution and so on. Supporting victims' families needs particular skills and sensitivity.

Witnesses

Like victims, witnesses to accidents are also likely to need help, particularly if they have been traumatised by violent events. But again it needs to be remembered that, whether they realise it or not, reflecting on and talking about their experiences with others is likely to adversely affect the accuracy of their recollections. It is widely acknowledged in many fields of safety that taking early witness statements can help to minimise the decay and distortion that that inevitably occur in our memory of events due to the passage of time and the sharing of experiences with others. This is not so much a consequence of deliberate selectivity or collusion on the part of witnesses but just the way memory and recounting history tend to work. But in the first hours after an accident, is close questioning of someone who has just witnessed a terrible event the most humane approach? Again skill and sensitivity are needed here.

Other colleagues

Other management colleagues will need to be involved, not just because they want to be 'kept in the loop' so they can take early action to prevent a recurrence but because they may want to spot areas where they could have done more or where they may feel vulnerable. They may want to contribute but equally they may want to cover their tracks. They need reassurance that, while everyone is accountable for their actions, the organisation's prime objective is to gather facts not to apportion blame.

Front line workers and their representatives

Front line workers themselves (and their union representatives if they have them) will want to be kept informed as well. They will want reassurance that they are being given the full facts and that action is being taken to make things safe and to learn lessons. But equally they may have their own views on the significance of the accident and its implications. Union appointed safety representatives have statutory rights to investigate and thus may also be gathering information. They may be called on to act as witnesses. And they may also be thinking about what they might do to help injured members to claim damages later down the line. They need reassurance that the processes of investigation and decisions about any subsequent action such as disciplinary action or defending against claims for damages will be effectively separated from one another.

Insurers

Insurers will want early notification of any serious accident or incident. This will probably be a condition of any policy and there will be established mechanisms for doing this. But it needs to be remembered that the insurer's agenda includes retaining their ability to defend themselves against any future claim. While in general they will support the efforts that managers make to improve health and safety, when things have gone badly wrong and they may well be faced with having to settle a large claim, they will not want the client to admit liability or make things too easy for the claimant's lawyers.

Regulators

Then there are the regulators such as the Health and Safety Executive (HSE) or local authorities. Of course, they will need to be informed immediately if the accident involves a death, a serious injury, a significant injury to a member of the public or a notifiable dangerous occurrence. If the injury leads to more than seven days

absence from work, then a report has to be made to the enforcing authorities. And internal records have to be kept of all these events of course as well as of notifiable ill health conditions and of injuries leading to more than three days absence from work.

While they investigate nearly all fatal injuries at work, HSE inspectors investigate only a proportion of major injury events and much smaller proportion of the 'over seven day' injuries. Nevertheless the report goes on the organisation's record as does any enforcement action taken in the wake of an accident and this is also publically accessible via the HSE website.

In deciding what to do following an accident, HSE are guided by their Enforcement Policy Statement that helps them determine what sort of enforcement, if any, would be appropriate, including prosecution. Often they are keen to help managers. When accidents are novel or where they may have strong learning points for others, they may issue alerts to other businesses in the same sector etc. But equally they can quickly become adversaries, for example, if they decide to prosecute. HSE now charge for their investigation time via what is called 'Fee-for-Intervention'. How much managers seek to involve HSE in internal investigations often depends on such considerations. (See also Section 7 below.)

Lawyers

The organisation's lawyers too will want early notification of serious accidents and incidents, particularly ones that have been notified to the regulator. Most responsible lawyers will take the view that accidents need to be investigated promptly and properly, not just to try to avoid a repetition but from a claims perspective, to help clients to settle any cases where they are liable and to contest them when they are not. Others however may be keen to ensure that managers do not 'ease the glide path' for the plaintiff or the prosecutor. They may see their brief as the defence of their client's best interests. Consequently they may caution them against adopting an open, team based approach to investigation, even though this may be the best course if managers are trying to maximise involvement and buy-in from the workforce. And they may suggest clients seek what is called 'legal privilege' so that they do not have to reveal certain details of their own internal investigation to HSE or other authorities that may be prosecuting. They will also want to ensure that any of their client's employees who are interviewed by HSE 'under caution' are fully briefed and supported. Important as they are to assist the organisation, it is vital for managers in overall charge of the investigation process, to ensure that their lawyers, like other experts, are 'on tap but never on top'.

Other business partners

There are also many business partner organisations to be kept informed as well: clients will want to be informed and may choose to take a hand in the investigation process; fellow contractors, for example, will want to be kept abreast of developments; investors may require to be notified; equipment suppliers may need to be involved; safety, trade and professional bodies also perhaps.

Facts, fairness and openness

Those organisations that espouse a 'no blame policy' internally on the grounds that they are more anxious to learn than to punish, may seem to be putting prevention

clearly at the top of their priorities but it is actually quite a hard doctrine to live up to in practice and some argue that it militates (to some extent at least) against the idea of personal or group responsibility. When eventually the results of investigation are confirmed, discipline, if not punishment, may need to be reserved as a last resort for some people, for example, when it is clear that previous counselling and retraining have failed. But if you end up disciplining people arbitrarily following an accident, having said that there would be no unfair recriminations, then you will lose credibility and colleagues may not be so open in future. A 'just culture', based on facts and fairness, is likely to be more realistic but it is also hard to engender.

The media

Often managers may find that they are having to provide reports to the media and even to local political representatives such as MPs and councillors. Accidents, particularly if they are badly reported, can pose a major threat to corporate reputation. Being open and transparent may help to avoid accusations of 'cover up' later on but equally this can lead to information being used selectively and in ways that are damaging to the organisation's profile. The organisation's communications team also need to be brought fully into the picture from the very beginning.

Organisations often feel that they are forced to choose between a policy of 'telling it all and telling it early' or being quite selective in the information they release. Increasingly higher performing organisations, including those that succeed in the RoSPA Occupational Safety and Health Awards - seem to be favouring openness. Their reasons include:

- the facts will always come out in the end;
- any attempt to limit information (or worse still to dissemble) is likely to be sensed and cause critics to probe further; and
- a spirit of contrition and willingness to learn and improve may help to moderate the final judgment of the courts and the public alike.

Yet this path is not without its risks. Inevitably it will upset some colleagues. It might suggest, for example, that, if the organisation was so willing and able to learn after the event, it could have done so before (particularly if there had been precursor events). When it comes to tightening safety in the immediate aftermath of a serious accident, some advisers may feel bound to give excessively risk averse advice for PR rather than safety reasons and so on. So if one thing is clear in all this it is that while openness in the wake of accidents is the best policy, it is actually extremely challenging and demands clear sightedness and really good communications.

Remember the senior manager too

And finally there is a need to consider the needs of the senior manager in overall charge of the investigation process. When all the post event processes are over (and this can be several years if prosecution is involved), they have to be able to feel that they have done the best they could, both for their organisation and for themselves. After all, besides defending their own professional reputation, they have to be able to look at themselves in the proverbial mirror and feel that they have acted with integrity.

In practice it is not realistic for any one individual to have to bear the burden of balancing all these complex considerations, especially when the actual business of dealing with the aftermath of an accident can be distressing enough in itself. Unless they are unusually lacking in emotion intelligence, those who have had to inform relatives of the loss of a loved one, attend an inquest or be questioned by enforcing authorities under caution, will bear the resulting mental scars to some degree for the rest of their lives (although in the future these may actually serve to strengthen their conviction that safety is important and needs to be properly managed). So it is the responsibility of the organisation itself to lay down good guidance on how its managers should act and be supported, particularly following serious accidents and incidents.

In summary responding successfully to accidents demands of senior managers, wisdom, courage and above all leadership – not things that you buy off the shelf.

5) Thinking harder about accidents

Avoiding over-simplification

There are two very common errors in the way many people perceive accidents. Either they see them, at one extreme, as rare, chance events and combinations of circumstances which are beyond both prediction and control or, at the other end of the spectrum, they see them as quite simple events with single causes. In reality nearly all accidents – even seemingly mundane ones – turn out in their detail to be as complex as they are preventable.

And much time is wasted trying to define the term ‘accident’. The word derives from the Latin *accidere* (literally ‘to fall down, upon, at or near’). Accidents can have positive as well as negative outcomes. (‘My wife and I met by accident’ or ‘Penicillin was discovered by accident’ and so on.)

But failure to understand the complexity of accidents can lead both to missed opportunities for prevention as well as over-simple and inappropriate prescriptions to improve safety and reliability.

One of the reasons for an over-simple, uni-causal view of accidents among many non-experts is that few lay people have ever had to undertake an accident investigation. Investigation is not only challenging in itself but can also be a great learning experience for those involved (a powerful form of in-service, hands-on health and safety training). Good investigations, particularly where they are senior manager led and team based (with the health and safety professional acting as ‘process doctor’), not only provide sharp lessons from the real world but they also serve to refresh everybody’s understanding of effective health and safety management by making them examine its absence.

Those who take part in disciplined and structured investigations, quickly come to realise that most accidents result from the interplay of a variety of events and conditional factors. There is usually a lot going on and a lot that needs to be uncovered and taken into account. But as mentioned above, the value of many investigations can be distorted and stunted by the (often unconscious) operation of ‘stop rules’ (stopping the investigation as soon as an apparent ‘cause’ is found) and

biases (seeking only that evidence that confirms a pre-existing theory about what happened, where, when, how and why).

Digging deep enough

So one of the most common problems is that investigators fail to go back far enough in their evidence search to establish in detail, not just what happened in the last five seconds before the accident but what was happening in the last five hours, five days, five weeks, five months or even five years beforehand.

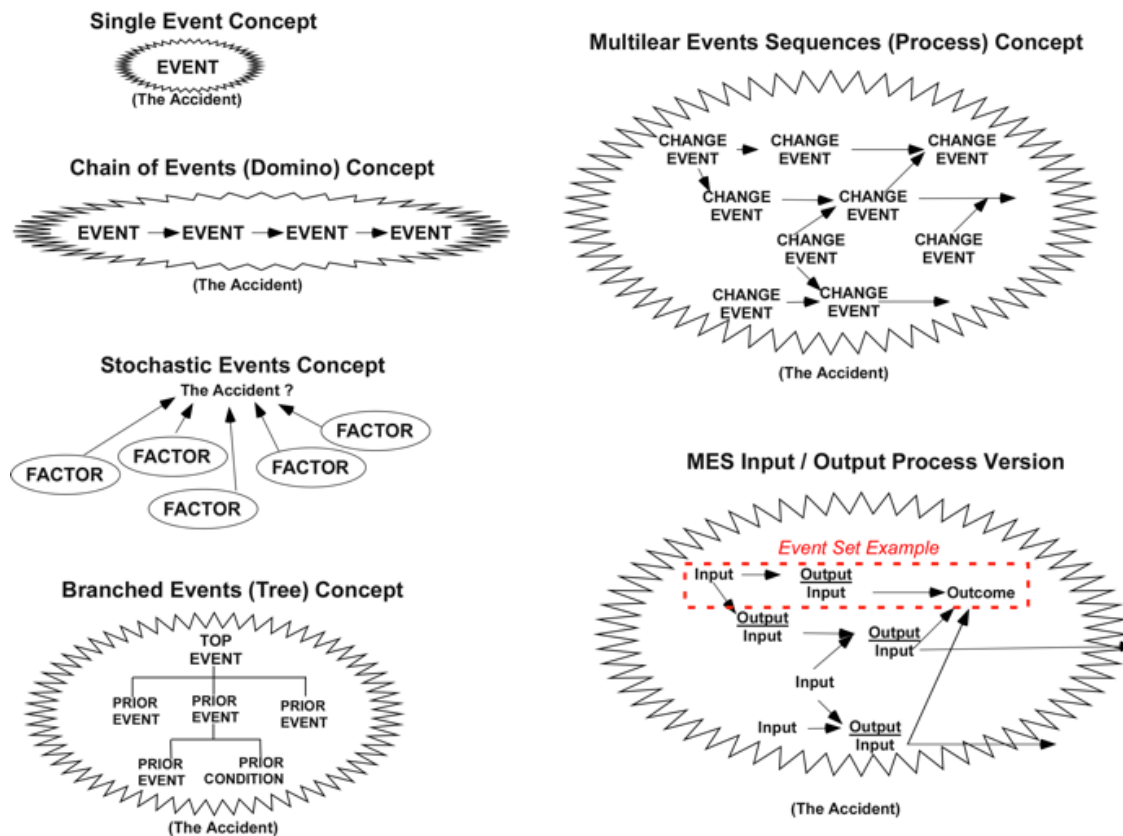
And when they have gathered all the evidence they can, they may make little or no use of structured methods to integrate evidence to help form and test hypotheses and search further for any missing data or clues. Often therefore they can fail to examine underlying job, technological or organisational factors that have led up to the event. This can lead all too easily to blaming the victim, not least because of a weak understanding of the complexities of human error and the various ways in which this interacts with other factors in contributing to accidents.

Understanding error

Despite the focus on the complexity of accidents in the current teaching of health and safety professionals, there are still far too many practitioners who seem to be drawn all too easily to simple explanations and quick fixes. After all, it is often much easier in an investigation to point the finger at poorly performing individuals as being the prime authors of their own or others' misfortunes – rather than to seek out other potentially more significant causal factors.

All too often in safety we hear the mantra '*Most accidents are caused by human error*'. But it would be strange indeed if they were not. (Remember old adages such as 'to err is human' and Robert Burns's, 'the best laid schemes o' mice an' men gang aft a-gley!'.) Respected figures in the health and safety field such as Professor Richard Booth and the late Trevor Kletz have both observed wryly that to say that over 95 per cent of accidents are caused by human error is about as useful saying that 100 per cent of falls are caused by gravity!

PERCEPTIONS OF THE ACCIDENT PHENOMENON

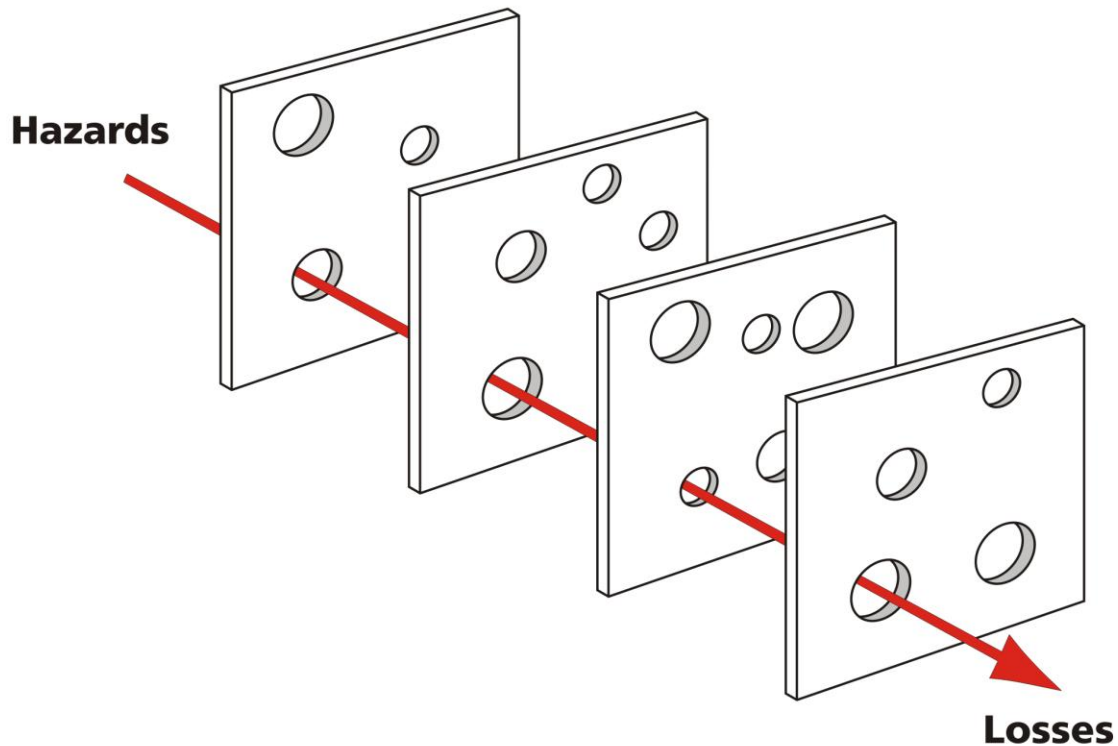


Over-simple explanations of accidents in turn stimulate a ready appetite for trying to improve safety performance by harsh discipline, retraining, repetitive behavioural safety programmes or even use of screening techniques to weed out allegedly less reliable individuals.

Of course any serious student of accident causation has to acknowledge that errors by individuals do indeed form part of the explanation of most accidents. For example, major infamous industrial disasters such as Piper Alpha, Bhopal and Chernobyl were all initiated by the erroneous actions of teams and/or individuals. Yet in all these cases subsequent investigations showed that the most significant causes were firmly rooted in weaknesses in technology and management systems.

In the case of Chernobyl, for example, any suggestion that person factors and not the entire Soviet nuclear system were the root cause of the accident would have been seen as utterly one-sided, if not ridiculous. On the other hand, Chernobyl in particular led to an acceleration of interest worldwide in human factors in nuclear safety and a new search for ways to ensure the reliability of the man/machine interface.

Over the last three decades, particularly as a result of the work of people such as Professor James Reason (famous for his 'Swiss Cheese' model), we have made big steps forward in our understanding of human factors and their relationship to other kinds of pathogenic safety weakness in organisations such as latent errors embedded in technology and systems.



Human error itself is understood as a complex phenomenon, comprising: ‘slips’ and ‘lapses’; ‘mistakes’ (which can be skill and/or rule based); and ‘violations’. The latter can be ‘exceptional’, ‘routine’ and ‘situational’ – as explained in HSE’s guidance on human factors – HSG48. In turn these forms of error can combine in various ways (e.g. Professor Steve Stradling’s road safety dictum ‘Error plus violation = crash!’) together with job and organisational factors.

Other ‘person’ factors in accidents can include not just things such as personal attitudes to safety but impairments (poor general health, poor sleep quality, poor eye - sight, stress, drugs, alcohol etc) and distraction factors (poor communications, monotony, information or task overload, interruptions etc).

Accident proneness?

Despite these advances in understanding of safety, the assumption that most accidents are simply the result of carelessness and/or wilful rule breaking just will not fade away. Currently there seems to be a worrying resurgence of interest in the idea of ‘accident-proneness’. The suggestion here is that some people are more likely to have accidents as a result of absent-mindedness, clumsiness, carelessness, impulsivity or a predisposition to risk-taking.

Although there is substantial research into personal risk taking, a number of studies have cast doubt on whether ‘accident-proneness’ actually exists as a distinct, persistent and independently verifiable syndrome. It was largely discounted by the Robens Committee in 1972 as a result of the evidence submitted by Andrew Hale and others. If empirically it seems that some people in certain settings do have more accidents than others, this is certainly not explained just by personality traits. Personality variables are no doubt important but individual ‘injury proneness’ is just

as likely to be associated with a variety of other non-personality factors such as inexperience, lack of knowledge and skill, younger age, poor sleep hygiene and poor physical fitness, eyesight etc. Emotional factors too can also contribute to accident involvement: for example, depression or anxiety which can result in loss of concentration etc. The idea of the 'careless' or 'accident prone' worker also lies to some extent behind the attraction that many safety practitioners feel towards some of the less sophisticated behavioural safety (BS) programmes which are still on offer.

Behavioural safety

Typically BS programmes tend to target violations. Yet often, in the training of BS observers, trainers can neglect to explain that violation is only one error type and that in turn violations can interact with many other factors. So in the context of an investigation, just concentrating on rule breaking without looking at everything else is not really the best way forward (again, see HSE's guidance, HSG48). Often BS programmes are introduced on the assumption that all the options for improving safety by improving technology or organisation have been exhausted. And yet time and again investigations show that there are still many things that could have been done to make work equipment or management systems safer. It was back in the 1980s that research by HSE's Accident Prevention Advisory Unit showed that about 75 per cent of the accidents they studied were due to failure by management to put reasonably practicable measures in place and under a quarter were due to failure by employees to follow procedures.

BS programmes clearly have their place in the drive to reduce accidents but not as stand-alone interventions and only once proper health and safety management systems are well established.

Uncertainty, complexity and humility

Prevention is hard enough when we think that we fully understand hazards and associated risks and we know the control measures needed - but accident investigations, particularly of novel kinds of accidents, often remind us sharply that 'we don't know what we don't know' and that clearly we don't have all the answers.

Accidents test organisations and relationships as well as our assumptions and prejudices. Understanding the unplanned and unexpected is a real challenge and if undertaken seriously, investigations should not just teach us lessons about safety but teach us humility too. So, if we are honest, the more thoroughly we investigate, the greater should be our awareness of the limitations of our current understanding.

Even though it may be accepted formally that accident causation is multi-factorial and safety solutions must be multi-stranded, there is always a danger – particularly if investigators do not fully understand this – that they will tend too easily to reductionism, ascribing disproportionate significance to those causal explanations which support the case for safety prescriptions that lie within their particular intellectual comfort zone (for example, engineering, organisational management, psychology etc).

However good we get at preventing disasters large or small, we need to recognise that we will all fail from time to time. The challenge is not just to reduce the frequency and scale of safety failures but, when they do occur, to confront such failures

honestly, welcome them even, as opportunities to deepen understanding and increase our ability to prevent them in the future. Accident prevention is always an incomplete science. Its practice is even patchier. We make progress slowly, often taking one step back for every two taken forward.

Investment

Another key point to remember - particularly when thinking about the time and other resources that have to be devoted to investigation - is that accidents should always be regarded as an investment. This may sound strange but remember, when you've had to pay for the time, trouble and money involved in having an accident (see appendix two), logically you should try to maximise your return by learning and applying the lessons it can teach you about how to enhance safety and prevent recurrence. Accidents in this sense (especially high potential but non injury accidents) are a fundamental safety resource. But it would be a brave director or Government minister who would be prepared to say, *'I'm very sorry we've had this accident but I'm really excited about what we are going to learn from it'*.

6) Investigation in outline

Key questions

Ideally, any competent investigation should not only be concerned with determining what happened, where, when, how, to whom and with what consequences, but why it happened – in order to enable any necessary recommendations to be made about improving prevention. Investigation needs to be approached systematically and professionally, otherwise the immense waste represented by accidents will be compounded if investigators use up valuable time and other resources without being able to advance understanding of what needs to be done to stop things going wrong in future.

There are a series of stages that should be discernible in almost every kind of competent investigation (and not just ones related to health and safety failures):

1. taking prompt emergency action (e.g. providing first aid, making things safe);
2. prompt reporting within the organisation and to relevant agencies and securing the scene (preventing disturbance of vital evidence);
3. initial investigation to decide on the level of investigation required (e.g. according to safety significance, learning potential etc), establishing terms of reference etc;
4. establishing the investigation team and allocating responsibilities in the investigation process;
5. gathering the evidence (establishing the facts by gathering physical evidence, conducting witness interviews, identifying documentation etc);
6. analysing and integrating the evidence (putting the facts together), identifying gaps in the evidence (significant unknowns) and seeking further evidence and/or clarification (for example, by studying previous events that may be relevant);
7. developing and testing hypotheses - what happened, where, when, how, to whom with what consequences; and why etc (again looking further evidence if necessary);
8. generating conclusions and recommendations;

9. communicating recommendations; and
10. tracking closure with stakeholders.

Purpose influences approach

The way in which any particular investigation proceeds (and this includes what evidence is sought and how) will be determined by circumstances and also by the main purposes of the investigation.

- If an investigation is carried out by enforcing authorities they may well be looking for evidence to demonstrate a breach of legal duty.
- If it is being carried out by the organisation's insurers they may well be seeking evidence to show that their client had done all that was reasonably practicable and they the latter were not to blame.
- If it is being carried out by a health and safety adviser focused mainly on the prevention of recurrence, they may be concerned primarily with evidence that shows how the events and circumstances underlying the accident unfolded and combined to result in the kind of harmful outcome which needs to be prevented in future.

Superficially all three kinds of investigation can look very similar but in reality the objectives of the investigator in each case will influence their approach.

Operational readiness

As already stressed, to say that accidents strike without warning is an understatement. So, as pointed out in section 3 above, all organisations need well thought out and well rehearsed processes for responding to them effectively, especially in the early stages.

RoSPA has worked with the Noordwijk Risk Initiative to help establish some of the main elements needed to ensure 'Operational Readiness to Investigate' (visit <http://www.nri.eu.com/toppage4.htm>). Here are some key considerations:

1. Ensuring the ability of staff to recognise that something significant has happened;
2. Raising the alarm;
3. Undertaking rescue, first-aid and making safe;
4. Informing families (initial, plus updates);
5. Preserving/managing the scene;
6. Notifying occurrences, RIDDOR etc;
7. Initial review, collecting (early) statements;
8. Informing management colleagues and workforce representatives (initial, plus updates);
9. Informing workforce (initial, plus updates);
10. Informing customers (initial, plus updates);
11. Informing insurers, lawyers and regulators (initial, plus updates);
12. Informing the public and media (initial, plus updates);
13. Assigning the level of investigation;
14. Developing terms of reference and agreeing these with commissioners;
15. Selecting the investigation team;
16. Enabling/advising/protecting the team;

17. Managing the team;
18. Liaising with other investigation teams;
19. Cataloguing evidence;
20. Recording visual data;
21. Collecting documents and logs;
22. Collecting equipment and material evidence;
23. Collecting environmental evidence;
24. Interviewing witnesses;
25. Structuring what happened, to whom, when, where and how;
26. Developing alternative lines of enquiry;
27. Formulating/evaluating/testing hypotheses;
28. Identifying controls and barriers;
29. Identifying root causes;
30. Writing reports;
31. Developing remedial actions;
32. Reviewing the investigation;
33. Debriefing the team;
34. Debriefing affected staff/others;
35. Managing recommendations; and
36. Returning, archiving or disposing of evidence.

The very worst time to begin considering organisational readiness is in the immediate aftermath of an accident. Preparedness needs planning. And planning means taking time out, for example, to review how well the organisation coped with some of its recent accidents and incidents - or better still running drills and rehearsals to test investigation response and capability. Often rehearsals of emergency procedures stop following the raising the alarm, rendering first aid, evacuation, making safe stages - and do not go further. Even in the very highest performing organisations, not all the requirements for readiness will be in place. There are some very basic 'must have' elements but all are capable of development. Readiness in this sense is a journey not a destination.

Essential elements

Some essential elements however must be in place if an organisation is to have a base from which to proceed. These include training and instruction of staff and managers on how to recognise significant health and safety failures and what steps to take immediately to: raise the alarm; contain the situation; ensure delivery of rescue and first aid (and other mitigation measures); make safe; evacuate if necessary; and secure the scene.

And those responsible for advising on, conducting and overseeing investigations may need appropriate training in essential investigation skills such as data gathering, including witness interview techniques and methods for collating and integrating evidence. (Many of these skills are readily transferable beyond accident investigation into other areas such as investigating failures in service delivery, quality, environment and other kinds of operational failure.)

Investigators also need have access to adequate financial and other resources, including equipment and technical support services, for example, to help capture essential data before they are lost or to conduct specialised analyses.

Above all, there is a need to ensure that there are processes in place to guide the way investigations proceed and to ensure a robust link between their outcome and any necessary revision of risk assessments, based, for example, on an understanding of why risk assessments for the activities concerned were inadequate, their conclusions had not been properly implemented or they had been allowed to degrade.

Benchmarking with other businesses, to 'share and compare' information on 'organisational readiness to investigate' (as well as on the conduct and outcome of specific investigations) can also be very useful. But as with all joint investigation work within the business, this sort of business-to-business requires cooperation and trust.

Manager led, team based investigation

As a result of its 'key issue' work, RoSPA has become convinced that one of the ways forward to enhance accident investigation in UK businesses is to promote a much more energetic approach to team-based learning from accidents and incidents. For example, investigations involving trade union safety representatives and employees generally, as well as people from various specialist and management roles, can be extremely powerful, especially if they are led by senior managers and supported by health and safety professionals who act as facilitators or 'process doctors' rather than actually undertaking the bulk of the investigation work.

If the health and safety adviser investigates in isolation and then simply presents their findings and recommendations (often in written form) to senior managers to digest and implement, she/he may well have missed gathering the perspectives and thoughts of colleagues, and may also have failed to secure the level of ownership and understanding within the business necessary to drive subsequent safety change.

The team approach obviously demands maturity and trust. Team members have to agree to work responsibly and collectively but if it is properly structured and well led, team based investigation can help to:

- provide access to 'expert' shop floor knowledge, particularly about operational issues;
- support the building of trust and the development of 'just' (open, fair) cultures;
- develop participants' understanding of risk management in practice;
- promote learning about how to investigate in general; and
- create ready made workforce 'champions' who can provide informal support for securing closure on recommendations.

It can also help team members – especially senior managers - to understand how investigation can provide a further means of checking safety management standards. (By sampling operational reality, investigation can act as a complement to formal audit of management systems.)

RoSPA's experience suggests that team-based investigation works best where organisations have clear and well-used 'near miss' procedures. Daily informal investigation and remediation of lower risk safety issues and problems is important in creating a positive climate for more structured investigation when major health and safety failures occur. Everyone understands that, in such circumstances, the response is simply a scaled-up and more intensive application of the investigation and remediation processes which go on every day.

Trade union safety representatives

Where they are appointed by recognised trades unions, safety representatives (but not non-union Representatives of Employee Safety) have the right to carry out their own investigations of notifiable accidents, dangerous occurrences and cases of work related disease. They can do so independently (although there are some restrictions around evidence relating to individuals and evidence that might be used in legal proceedings) but many safety representatives carry out their investigation functions as members of the overall investigation team.

7. INVESTIGATION IN PRACTICE

Initial response

On being alerted to an accident the organisation's response should be quick and appropriate – from the major unplanned, potentially adverse event to the minor injury or near miss. The needs of victims at this stage are paramount but account also needs to be taken of requirements of the subsequent investigation.

As already stressed, the first actions in the event of an accident will be to arrange for first aid and rescue and then to arrange protection of the site. This means striking the right balance between making things safe, not disturbing the scene too much and safely gathering perishable evidence.

So anyone who is at the scene of an accident in the early stages needs to understand, as far as possible, the needs of the lead investigator(s), including their ability to gather information, which, if lost, could adversely affect the investigation and its conclusions.

The following checklist should be of use to those who are earliest at the scene of the accident:

- Ensure your own safety and that of others;
- Call for assistance and give key information to the emergency services about location, numbers injured etc.;
- Attend to the injured, administer first aid if appropriate;
- Arrange for isolation/protection of the site;
- Where safe and possible, take action to limit further danger/loss etc;
- Record what has happened after initial walk-through or survey;
- Start to gather any perishable evidence that may be affected by weather, time, other activities etc.;

- Identify witnesses plus their locations etc. and gather their names and addresses, contact details etc. ;
- Take photographs of the scene, including close ups of damaged equipment, dial/display readings, scattered debris etc.;
- Log action taken with details of time and place; and
- Communicate to managers immediately responsible for the site/activity.

Essential kit?

Having the right equipment hand is important. A well-prepared accident investigation kit should include all the materials needed to gather information at the event scene, together with a prompt list of key steps that need to be taken. Investigators need to tailor their kits to their particular needs but these might include, for example:

1. Digital camera with spare batteries
2. Video camera, spare batteries, tripod
3. Digital voice recorder with spare batteries
4. Tape measure (up to 50 metres)
5. Specimen containers
6. Sealable plastic bags
7. Clipboard and writing paper
8. Copies of accident report forms
9. Disposable gloves
10. High visibility barrier tape
11. Cans of fluorescent marker spray paint
12. High quality torch and spare battery
13. Magnifying glass
14. Stanley knife
15. Tweezers
16. Marking pens
17. Ruler
18. Protractor
19. Felt pens/biros
20. Statutory declaration forms
21. 2 x portable flashing amber lights
22. First-aid kit
23. Water
24. Identification tags
25. Paper towelling
26. Danger and out-of-service tags
27. Compass
28. Small marker flags
29. 3 x lock-out devices and padlocks
30. Bag to carry kit in.

In addition to these items, investigators may also need to carry, as appropriate, coverall disposable suits, eye, head and respiratory, high visibility waistcoats and so on.

An investigation room?

A suitable equipped and secure space to enable the investigation team to work efficiently and effectively can be very important. Team members need an environment where they can work undisturbed and in confidence, posting photographs and diagrams on walls or tables and using equipment such as white boards and flip charts. Such a room, if it is suitably secure, can also be used for the safe storage of evidence.

Early reporting

It is important that the early reports of accidents contain information that is as accurate as possible. Individuals gathering such early information, should liaise closely with those within their organisation who are responsible for carrying out reporting to statutory bodies like the HSE as well as other parties such as trade associations who need to ensure that their industry sector benefits from good data. Investigators of exposures that may be hazardous to health, such as asbestos, should ensure that good records are kept of exposed personnel and the exposure levels.

Initial investigation

Other parties such as enforcement authorities or insurers may well be investigating in the wake of an accident. It is important to remember however that the principal investigation is the one conducted the organisation that is immediately responsible for the activity. An early review of the event is necessary to capture the circumstances and to decide on the remit and the resources required for the main investigation. The gathering of evidence is crucial to a good investigation and early action and planning will be required to check that transient physical and witness evidence and documentation is secured. And if the initial investigation suggests that there is an urgent safety problem or failure that may have implications elsewhere, others, both within the business and outside, will need to be made aware of the issue and provided with accurate information. Enforcers such as the HSE or trade associations, for example, may need to post alerts for other businesses.

For those more significant accidents where enforcing authorities become involved, investigators will need to liaise with them to ensure that both parties can work effectively and that they can understand each other's requirements and timescales, their remits and the arrangements needed to ensure cooperation, effectiveness of both sets of investigations and also to optimise resources, e.g. the sharing of non-confidential evidence such as photographs.

For other lower level events the organisation should ensure that the appropriate lead investigator and support team is selected. For example, the initial response manager who might be empowered to also set the remit.

Early review and scaling the level of investigation

The purpose of an early review is to enable managers, advisers and others such as safety representatives, to assess the level of the investigation needed and to agree the details of the remit. A good investigation report needs to address the matters that the commissioners of the process have identified but these can and often do change as the investigation uncovers issues not apparent during the initial review.

The level of complexity and level of effort devoted to the investigation should be related not just to the scale of the actual loss, or potential loss had circumstances been slightly different - but also to the learning opportunity presented by the event. Simple tools and decision-making algorithms can be devised to help here. As already mentioned, sometimes it pays to investigate apparently simple and less threatening events in some depth, for example, if they appear to be typical of widespread minor accident problems.

If the person who is going to lead the investigation team is available early on, they too can visit the accident scene, liaising with key colleagues at site level. Visiting the site at the same time of day as the accident, when light and other environmental factors are likely to be similar, may also be of benefit. The lead investigator will be taking an active role in supporting investigation team and any technical experts and their involvement in the development of the remit can bring benefits. They should be encouraged to suggest improvements to the team's terms of reference, for example, if new evidence makes this appropriate.

Some of the information which will be useful for decision-makers at this stage includes:

- an outline description of events leading up to the accident;
- photographs, diagrams, drawing etc;
- a catalogue of all evidence already gathered and logged;
- an initial view of causal and conditional factors;
- immediate improvements needed to prevent recurrence; and
- an assessment of the timescale of the investigation.

The purpose of the initial review is to make a 'best guess' only at what really happened, to whom, when, where, how and why - and the nature and severity of outcomes. It is not however to determine immediate and underlying causal factors at this stage which investigators must then concentrate on to the exclusion of other issues. The aim is to set the general direction but also to allow those conducting the investigation to look wider and deeper if they need to.

8. EVIDENCE GATHERING

Gathering of information and evidence

Once events have occurred it is not possible to 'stop the film' as it were and 're-wind'. The tide of time has flowed on and the task of the investigator is to piece together, from the fragments of evidence left behind, exactly **what** happened, **where**, **when**, to **whom** and **how** to begin to understand **why**. This can be difficult and it is necessary not just to be persistent and accurate but sceptical too. A detailed description of the work activity immediately before the event, especially noting anything unusual, is essential in order to identify things that were different to the norm. But equally it needs to be remembered that very often the detail of operations can vary from what is prescribed in specifications or work instructions. So an important consideration is the identification of differences or even conflicting accounts of what was actually taking place at the time of the event. This can be important in suggesting further lines of enquiry and other pieces of evidence that will assist the creation of a full and accurate picture.

Time and effort spent on information gathering should be proportionate to the scale of the investigation. As stressed above, if all unplanned events in an organisation - from the most trivial to the most dramatic - are investigated in great depth, time and other scarce resources, which ought to be devoted to solving other health and safety issues, will be wasted. That said, it is important that all reasonable lines of enquiry are pursued. Because things change, including people's recollections, it is important that information gathering should begin as soon as possible. Systematic recording of all information gathered is very important and needs to be well structured, setting out how it was obtained, what is known - and very importantly, what is not known.

Good evidence gathering, evidence preservation and recording are the foundations of good investigation.

Photographs, video, diagrams and sketches

Good photographs, for example, of features that may change, degrade or be moved are very important. The need for enough close up shots, for example, of equipment damage and other details, views from different angles (including the site as whole), need to be considered. Good, sufficiently high resolution images which relate to likely causal factors, as well spillages, damage and debris (including their nature, extent, location and extent of dispersal) - are likely to be important, as will be details such as model numbers of pieces equipment and also anything that can confirm conditions at the time of the event. Where necessary, devices such as a ruler or a common object such as matchbox should be included to provide a sense of scale. Traditionally film cameras have been used to ensure authenticity of images but where digital cameras are used, a statement confirming no editing may be necessary and the date and time should be set. Video too can be useful as can any CCTV or mobile phone video footage which records activity at the site either before, during and after the accident. Mobile phone cameras offer great advantages in the wake of an accident but the easy transmission of digital images can also pose challenges in controlling data that should be held in confidence.

Organisations need to establish protocols for the gathering, dissemination and secure storage of photographic images.

Diagrams and sketches are important too, for example, to show the layout of a workplace, or to explain a process or the paths travelled by individuals and vehicles. Details need to be recorded of features such as lighting and the general state of housekeeping and conditions at the time such as the weather, the state of surfaces and so on. Evidence gathering at the scene and recording should not be limited to only that which seems relevant immediately. Measurements need to be recorded.

Personal and injury evidence

All witness statements [see below] need to be logged as well as any voice recordings at the scene. Descriptions of work activities being undertaken need to be recorded. Personal injury details and descriptions of injuries can be obtained (subject to respect for medical confidentiality and consent). A description of the agent and/or materials that caused the injury and how it made contact and/or how the injury came about - should be recorded as should any first aid and internal accident reports, occupational health and other personal records.

Safety measures

It is also important to gather and record evidence about safety processes and equipment that should have been and were actually in place at the time of the event, noting anything unusual or any departure from normal on the day or in the period preceding it. In this context relevant documentation may include things like: relevant risk assessments; safe systems of work; permits-to-work; personal protective equipment records; vehicle and component maintenance records; equipment instructions and maintenance records; service and infrastructure maintenance records; and routine test results. It may be important to identify not just training and competence records but the content of training as well as its timing and appropriateness for those involved. Details and records of refresher training/'tool box talks' and briefings on specific risks on the day need to be recorded.

The latter includes not just things like relevant communications and work arrangement records but the minutes of appropriate planning/safety meetings, voicemail messages and Emails, task and job lists, work rotas and schedules, hours worked, work instructions, communications with contractors and so on. Details of targets and piecework and bonus arrangements may be important in assessing performance versus safety issues.

It is also vital to gather information (including any records) about all relevant precursor events, not just near misses such equipment failures or spillages but relevant unsafe acts and conditions or any unusual event apparently involving similar elements.

Another source of such data can be observations in routine inspection reports or findings noted in periodic monitoring and/or audit reports or any document that relates to detected health and safety shortcomings of any kind.

It is important to think about the full range of evidence which the investigation team will need in order to be able to understand all the safety and health protection measures which should have been in place at the time of the event and what was actually in place and happening in the run up to the event.

Costs

RoSPA recommends that all investigation reports should include a section on the immediate and delayed costs of the events being investigated, if for no other reason than to support the case for proportionate spending to implement recommendations. There are strong arguments therefore for including finance staff in the investigation team (see appendix two). Any data that will assist cost estimation should also be collected.

Witness evidence

In most investigations witness evidence accounts for the bulk of the data to be analysed. Witness statements are very important to the investigation of what happened and those witnesses deemed important should be identified as soon as possible. First hand accounts are especially useful but others with a more remote involvement can add vital information for the identification of underlying causes.

Witnesses may be asked for statements (which should be signed and dated) and/or they may be interviewed. A list of those for interviewing could include:

- those directly involved;
- eye witnesses;
- those who made relevant communication before, during and after the event;
- supervisors and managers and others employed in the system of work that was employed at the time of the accident; and
- those who designed and operated the safety systems that were intended to regulate the work associated with the event.

Interviews should be conducted as soon as possible after the event, while accommodating shift working and medical requirements. Accurate records of interviews should be kept. This will help to avoid the influence of memory loss and contamination (conscious or unconscious) through conversations with others. Consideration should also be given to the number and composition of the interview panel, so as get the right people involved while not inhibiting the process. Employees should also have the option of having a friend or representative present.

The panel should have a clear strategy to help inform the interview process. It could be, for example, to gather information on what happened, where, when, to whom, how and why, and to note the gaps in information to be filled. This will help to keep the process focused and enable the strategy to be reviewed after each interview.

Interviews can be used to gain new information, confirm existing evidence and to test hypotheses. Plenty of time should be taken to plan each interview so that they are adequately resourced, well structured and targeted for the individual, while remaining flexible to respond to the situation. Preparation should include anticipation of difficult situations and interviewees who may be unwilling to talk, or may be distressed or may try to intimidate the investigator.

As stressed earlier, the aftermath of an accident can be a difficult time for everyone involved. Employees and others may face significant pressures from colleagues and others and also experience divided loyalties that in turn may affect the completeness or accuracy of their answers to certain questions. Interviewers should be aware of this and where appropriate, develop additional lines of questioning to gain accurate evidence or identify inconsistencies.

Interviewees can feel under pressure to give an answer (even though they do not remember the details) or feel under pressure to give the 'right' answer. They may worry about being blamed or having to face threats to their employment or even prosecution or worry about 'telling on' others. They may be afraid of senior managers. If they saw events at first hand they are likely to have been traumatised or shocked. And they may have already faced several interviews, some of which may have been challenging.

Interview good practice

The ability to interview people effectively ought to part of every manager's skill set (at recruitment, at appraisal, in disciplinary settings and so on) but in practice interview techniques are not always well taught.

Arranging the right setting and setting the right tone for interviews, for example, are quite important in order to put interviewees at ease and to provide reassurance.

Rather than using a remote (and possibly intimidating) head office location, consideration should be given to using a local office or a non-work related location or even the witness's own home. Even the dress style of the interviewer can influence the way the interviewee can feel about the process. Care and preparation are needed for dealing with interviewees who have disabilities or responsibilities for child/elder care.

Particular skill and sensitivity are needed when interviewing those who have been bereaved.

It is important to make the purpose of the interview clear (e.g. 'to establish the facts to prevent a recurrence and not to allocate blame') and to explain how the interview will run. Before starting to pose questions, interviewers need to try to create an informal atmosphere and build a rapport, rather than making the interview feel like a courtroom or disciplinary hearing. On the other hand, there is also a need to explain properly the level of confidentiality and the way the evidence gathered may be used and any other legal issues.

Interviewers should introduce themselves and explain their roles. They should remember the importance of body language and personal demeanour that supports the purpose of the interview, such as maintaining a relaxed state, facing the interviewee square on with an open posture and leaning forward to encourage, maintaining good eye contact and avoiding frowning.

Where there is more than one interviewer the roles of each should be well planned. Interviews may be assisted on occasions, by the use of diagrams, pictures and maps and the playing of recordings - so having the right equipment available is important also.

As stressed above, where a witness is a trade union member, they would normally be entitled to an observer from the union, and where they work for another employer (and it might be beneficial) consideration should be given to one of their managers being present during the interview. It is important however to avoid this other person becoming an active participant and intervening to answer questions or influencing the witness.

Interviewing witnesses as a group can be a useful option in some circumstances but the balance of advantages and disadvantages needs to be considered. On the plus side, where there is an atmosphere of trust, underpinned by a 'just culture', a group interview can help to draw a fuller picture – for example, where one person's comment may trigger the thoughts of another. On the other hand, group interviews can induce 'group think', for example, causing individuals (consciously or unconsciously) to alter their recollections of events to conform to a group memory or where blame is wrongly pointed in a certain direction, to be intimidated into supporting this. So information gathered from group interviews needs to be compared with that also gathered from individual interviews.

Effective questioning

Interviewers should be aware of the use of different techniques and types of questions to get different results.

Closed questions, such as those starting with '*is*', '*are*' and '*do*' may gain a factual answer and be used to test accuracy but are also liable to close down discussion.

Open questions, on the other hand, starting with '*what*', '*why*', '*could*', '*how*', and '*would*' can be used to open up discussion and perhaps set a more relaxed environment.

Leading questions such as; '*I assume that...?*' are likely to be of little value in an investigation and can distort recollections.

Questioning that takes the interviewee back into the accident situation, even exploring their senses – sounds, smells, light and dark etc., can help build a picture in their mind that will bring their memory to life.

The style of questioning is very important. Encouraging phrases can be used to expand on discussion, such as '*Tell me more...*'. Talking more slowly can help to take the interviewee back to the scene. Allowing the interviewee adequate time to respond to questions gives time for reflection. Pauses, if not short periods of silence, can also be used to enhance the interview too, by providing an incentive and opportunity for the interviewee to speak more.

Investigators may wish to explore further a commonly used and structured approach to interviews called PEACE (Plan, Engage, Account, Closure and Evaluate) which uses two distinct techniques at different stages of the interview to obtain information from both cooperative and reluctant interviewees. These techniques are 'conversation management' and 'cognitive interviewing'.

'Conversation management' encourages the spontaneous disclosure of information by building a rapport, asking mainly open questions, avoiding confrontation and appearing to only seek an understanding.

'Cognitive interviewing' takes the interviewee back to the accident situation, allowing them to report everything and giving them time to do this. It involves 'context reinstatement', taking the witness to the scene in the present tense and appealing to their senses (for example, sounds, colours and people) and 'temporal order of recall', that is, changing the order of events to work backwards. It also employs change of perspectives to enable the witness to see the event through the eyes of another.

Asking 'why?'

To ascertain underlying causes of accidents it can be helpful to keep asking 'why?' to lead back through the events and circumstances surrounding and preceding them.

'Why?/Because' questioning, for example, can be useful but it can lead in different directions, so the validity of each answer needs to be considered carefully before the next 'why?' is asked.

For example, (with interviewee thinking about environmental factors):

Q1. Why did the person slip?

A1. *Because the floor was wet?*

Q2. Why was the floor wet?

A2. *Because it has to be washed every twenty minutes for hygiene reasons.*

Q3. Why does it have to be kept clean for hygiene reasons?

A3. *Because it becomes contaminated with waste.*

Q4. Why does it become contaminated?

A4. *Because material falls off the production line.*

Q5. Why does material fall off the production line?

A5. *Because it is not enclosed.*

Or alternatively (with interviewee thinking about organisational factors):

Q1. Why did the person slip?

A1. *Because they were hurrying.*

Q2. Why were they hurrying?

A2. *Because the job was behind schedule.*

Q3. Why was it behind schedule?

A3. *Because delivery of material for the day was late.*

Q4. Why was it late?

A4. *Because there had been a crash on the motorway.*

Q5. Why was there a crash on the motorway?

A5. *Because it was foggy.*

Or again (with interviewee thinking about person factors):

Q1. Why did the person slip?

A1. *Because they were not wearing the non-slip shoes issued to them?*

Q2. Why were they not wearing them?

A2. *Because had a medical condition that made them uncomfortable.*

Q3. Why did they have this condition?

A3. *Because they had not been to the doctor.*

Q4. Why had they not gone to the doctor?

A4. *Because they were at work all the time and also had sole child-care responsibilities.*

Q5. Why did they have sole child-care responsibilities?

A5. *Because their partner had recently walked out on them.*

All these questions and answers are likely to be useful. 'Why/because' questioning can continue until appropriate underlying causal factors and other contributory factors are identified, but care has to be taken to differentiate facts from suppositions.

It is important to remember that even apparently simple accidents result from the conjuncture and concatenation a wide variety of events and conditional factors. The task of the investigator is to uncover these and structure them in a way which aids understanding of what might be done not just to prevent the event happening again but where possible, to improve safety more generally.

This is why it is important to adopt a sceptical approach and to focus on the completeness of evidence.

To identify gaps in the events leading up to an accident, it is often useful to ask the interviewee to explain again from a different perspective and order, e.g. going backwards through the events. Confirming the recollection of the interviewee by summarising the interview and then asking the interviewee to comment may also assist.

9. EVIDENCE INTEGRATION

Timelines

The raw material of evidence gathered from the environment of the accident, from documents, recordings and so on and from witnesses, needs to be brought together in a systematic and structured way to help to the team answer with reasonable certainty what happened, where, when, to whom and how, with what results – and why.

In its simplest form this can be done by a clear and simple written narrative, addressing each of these fundamental questions carefully and concisely. Short paragraphs help as does distinguishing clearly between actions of people and conditions. But to enable all investigation team members to agree on the nature, relevance and sequence of events and the conditions surrounding them, a more structured approach can help and should always be considered when investigating serious accidents.

The use of a timeline can assist in developing the summary of events, especially when there is a complex set of factors in the period before the event and there is a need to follow the different aspects in some detail. An example could be a timeline diagram showing the sequence of operator's actions and communications and the simultaneous operation of the plant or organisation, perhaps showing these separately but in parallel so that they can be compared with each other.

Such factors do not all need to be considered to be causal at the stage of developing the timeline but they should assist in building the overall picture.

A simple example of the inputs to the timeline might be, for example:

Time	Action	Comment
0600	Crane driver mobile telephone discussion with supervisor	After lorry had stopped, brakes and chocks put in place, straps removed, and safety huddle to discuss lift.
0610	Slings attached	Using tested approved slings
0612	Instruction to crane operator to commence lift	From site supervisor using mobile telephone
0613	Instruction to driver to	From signaller

	continue	
0614	Accident	Load hits ground and injures signaller

This sort of timeline can be extended backwards as far as is necessary to describe the factors occurring in the hours, days, weeks, months - even years - before the event which might have as bearing on what occurred as well as where, when, how and why.

Reconstruction of the events on paper, in diagrams or using models can also be useful in filling gaps in evidence. White boards and large flip pads can be used to chart the sequence of events and conditional factors.

Investigations may well require iterative processes as new information raises the need to go back to check or challenge earlier evidence and repeat some earlier work. Investigators should keep an open mind to maximise the benefits of such iteration.

It is important to be open, honest and objective throughout the investigation and to avoid snap judgements and pre-conceived ideas. The focus should be on accident prevention rather than placing blame since the latter is likely to lead to defensive responses.

10. IDENTIFYING ‘CAUSES’

The idea of ‘cause’

A dictionary definition of the word ‘cause’ is ‘*a person or thing that acts, happens, or exists in such a way that some specific thing happens as a result; the producer of an effect*’. But investigators invariably find that it is as impossible to point to a single cause of an accident as it is to distinguish between conditions which made it possible and the actions (or inactions) of people which seemingly brought it about.

It is often much more useful therefore to identify the ‘causes’ (plural) of accidents and for ease of understanding to divide them into ‘immediate’ and ‘underlying’ causes. And in turn it may also be useful to try to search backwards in a chain or web of causes for a ‘root cause or causes’ which seem particularly significant.

As it is necessary to consider all the ‘causes’ leading up to an accident, it is useful to work backwards from the moment of the accident through the history of the potential causes that eventually led to the final event.

The immediate cause may be the error/unsafe act or condition just before the accident and usually there would be only one such immediate cause, which in the case below is the ‘slip’.

A member of staff in a food factory wearing inadequate footwear, running on a walkway, slips on a patch of oil and damages her knee.

‘The underlying causes’ of the event above may be:

- lack of supervisory resource;
- no policy for preventing contamination;
- no signage of slipping hazards;
- poor lighting;
- no provision/use of suitable footwear;
- time pressure to get to a new location;
- no training;
- personal problems with fitness, weight and balance;
- fatigue;
- distraction; and
- so on.

The significance ascribed to any particular underlying cause often depends on the perceived ability of one or more of the actors in the situation to have acted differently, including modifying aspects of the environment or the organisation of tasks etc. It is useful to identify 'causal factors' which can be understood as any condition, event or behaviour that was necessary for the occurrence of an accident and which, if avoided or eliminated, would have prevented it happening. These can then be distinguished from 'contributory factors'.

The underlying causes that are further back in the organisation's processes, such as lack of appropriate training, when addressed, are likely to have the biggest impact on preventing future accidents. On the other hand, immediate causes that may not seem significant may also have lateral applications in other operations, so wider benefits can be gained in addressing them, e.g. early cleaning of spillages.

During investigations, other factors that were not causal to the accident, but which should be addressed, may be identified and these may also lead to recommendations.

It is not uncommon to see in investigation reports into lower level accidents 'no fault found' or similar comments but, to prevent recurrence, it is necessary to look further. An understanding of human factors should lead to consideration of necessary underlying causes such as distraction, fatigue, fitness, motivation and competence.

The analysis on the causes and factors should be summarised in the 'conclusions' section of an accident report (see below) and this then leads to the development of the recommendations.

Investigation techniques to determine causes

The structure and methods of investigation and the central component, the causal analysis, will vary for different types and scales of accidents but certain principles apply to all. There are some underlying principles that are useful to understand and follow when investigating any incident.

Determine what happened and how. This involves determining the key events that happened in the sequence leading up to the accident (and sometimes events directly following the accident too). It involves identifying what happened, who was involved,

when, where and how. It involves determining the key failures, whether they are people's actions or equipment or system failures (or all three).

Determine why it happened. For each of the key events, determine why they occurred. As stressed above, it is often useful to keep asking 'why' in order to identify underlying causes.

Consider causes from the perspective of the individual, the job and the organisation of work activity. Care should be taken before claiming that something is a 'fact'. The gathering of good evidence is essential to optimise the ability of the investigator to ascertain these facts as much as possible.

What?

- Sequence of events
- Who? Where? What? When? How?
- Determine the error/violations and other failures (e.g. equipment failures)

Why?

- Ask 'why?' for each of the events
- Keep asking 'why?!'
- Consider individual, job failures (e.g. equipment and organisational causes of failures)

Remember

- Identifying the cause of errors and violations will help you to tackle and resolve the real issues

There are a number of different approaches to structuring underlying causes, each with its own training requirements. There are commonalities between these methods and it may be useful for investigators to combine these in order to give a flexible approach to suit different types and complexities of investigations.

RoSPA does not aim to promote any particular method of analysis, but some of the more commonly accepted approaches include:

- STEP (Sequentially Timed Events Plotting)
- AcciMap
- Fish-bone diagrams
- Fault tree analysis
- SCAT (Systematic Cause Analysis Technique)
- MTO Analysis Accident investigation
- ECFA (Events and Conditional Factors Analysis)

Analysing 'error'

As stressed in section 5 above, it is important that investigators have an understanding of why people make errors in order to consider why accidents happen. Everyone, regardless of knowledge, experience or training can commit errors and human errors can result from understandable, predictable aspects of the environment in which we work. Developing an understanding of human error is essential to help investigators understand the range of underlying causes that can

contribute to unsafe acts and unsafe conditions. This will enable investigators to develop more robust recommendations for managing and mitigating the likelihood of accidents occurring in the future.

There may be contributory factors relating to the individual, job and the organisation which may create unsafe working conditions. Examples include:

The individual

- Distraction
- Fatigue
- Fitness
- Knowledge
- Skills and experience
- Motivation

The job and workplace

- Equipment
- Workload
- Communication
- Procedures
- Environment

The organisation

- Safety culture
- Organisational change
- Leadership
- Systems

Individual factors, such as fatigue, stress, shift work, and competence can adversely affect safe performance at work.

For example, fatigue can lead to slower reaction time, loss of concentration, reduced ability to judge speed and distances and result in variations in performance.

Knowledge, skills and experience can also affect performance at work. Someone new to a job may lack knowledge which in turn may lead to slower decision making and difficulty in coping with complex tasks. However, having many years of experience does not necessarily mean that a person will perform more reliably.

Experienced operators may become complacent or over-confident which might contribute to an inability to perceive risks. As well as technical ability and knowledge, non-technical skills (such as situational awareness, co-operation and working with others and workload management), are also important and can make the difference between safe and unsafe performance.

Job and workplace factors can impact the worker. Factors such as poor usability of equipment (e.g. operator controls or design of workstations), environmental factors (e.g. heat, noise, and vibration), and high and low levels of workload may all have a detrimental effect on performance at work. The complexities of communication,

planning and teamwork in any business may also lead to misunderstandings that could lead to accidents occurring.

Organisational factors can also influence human performance and behaviour at work. Organisational culture, leadership and supervision may impact people's decisions and actions. The safety culture within an organisation may undermine desired performance for a number of reasons, such as management prioritising performance over safety.

The investigator should be aware of these contributory factors, both to assist in building the full picture of underlying causes and in making appropriate recommendations. Considering these factors during an investigation will help to ensure that all potentially relevant factors are addressed.

Some of these contributory factors can be directly observed, others need further questioning or data collection (e.g. reviewing competence management, materials or work procedures), to gain a complete understanding of how the person behaved during the event and why.

11. THE INVESTIGATION REPORT

Investigation report

The objective of an investigation report should not only be to report accurately on the accident mechanism and its causes and to formulate recommendations to improve safety, but also to demonstrate that the investigation has been conducted with a high level of professionalism. Investigators need to be sure that their analysis and conclusions are based on firm evidence and are therefore not counterfactual.

The report, which is addressed primarily to those who commissioned it (usually senior managers), should be clear, easy to read and factual and should address the requirements of the remit (the importance of which is stressed in section 6).

For example, 'factors for consideration' should be based on the 'summary of events' which in turn should be based on the evidence described before it. The 'conclusions', including the immediate and underlying causes, should be based on the issues discussed in the 'factors for consideration'. Then the 'recommendations' should be linked back to the above items and specifically to the conclusions and, the relevant immediate and underlying causes.

Suggested report structure

A suggested sequence of sections is as follows:

1. Executive summary
2. Introduction, terms of reference, team methods etc, leads to -
3. Evidence, e.g. photographs, downloads and interviews – leads to
4. Summary of events, e.g. timeline - leads to
5. Factors for consideration, e.g. human factors – leads to
6. Conclusions, including causes, e.g. explanation of underlying causes, leads to
7. Recommendations

Necessary appendices can be included to support the above.

In addition to these headings it is useful to include:

- the date, time and location of the event;
- a brief description of the nature of the event;
- a statement on the purpose of the investigation (relating to the remit); and
- a description of the environment and geographic features, e.g. site configuration and weather.

Diagrams, plans, maps and photographs are useful and appendices can include a summary of the evidence, names of the investigator/s. The investigation is likely to have more impact if it is completed quickly and thoroughly and the report is published within the timescale set in the remit.

Data protection issues

The Data Protection Act (DPA) is aimed primarily at protecting individuals from misuse of their personal details. It becomes relevant to those involved in accidents and their investigation when details could be passed on to a third party that may use this information for other than matters directly relating to the accident investigation.

Most of the potential problems in relation to the DPA can be avoided by not including names of individuals in an accident report or other documentation that may be made available to third party organisations.

Recommendations

Recommendations are advisory rather than mandatory but they are likely to be issued within a management framework that will expect the recommended, or similar, action to be taken. The investigation will be productive to the extent that the real causes of unsafe acts and conditions are accurately identified, evaluated and corrected. The number of recommendations is not important. Their quality, relevance and practicability in addressing the causes of the event and the unsafe acts and conditions that preceded it are.

One systematic model for achieving this is the use of 'SMART' recommendations. There is some variation about what these letters stand for but the following is generally accepted:

Letter	Meaning:	Brief explanation
S	Specific	A clear description of what is required and who is responsible is necessary for any action to take place. Each recommendation should only address one issue.
M	Measurable	If it can be measured then its level of implementation can be reviewed
A	Attainable	If it is not attainable it

		should not be recommended
R	Relevant	It should relate to the circumstances of the accident and how to prevent recurrence.
T	Time-bound	Timescales for stages and completion will allow monitoring of progress

The analysis within the report will have identified risk controls that failed or were not present or had an impact on the undesired event. Recommendations should be considered that address these and meet the SMART criteria above and should aim at making demonstrable improvement. Report authors need to ask whether their recommendations will:

- be effective in reducing or eliminating the identified risk?
- be objective and balanced and free of judgmental and emotive language
- are it reasonably practicable?
- deliver potential improvements which are broadly roughly proportionate to the impact of the change required?
- be acceptable to those who will be affected by implementation?
- be sustainable over time?
- not introduce new risks in another area, e.g. increased maintenance in a high risk environment?

Prioritising of recommendations may be appropriate, e.g. via a timescale or the monitoring process. If there have been similar events, this may suggest urgent action. Where there are multiple implementers, the lead body needs to be made clear. And where reviews or research are recommended, it needs to be made clear how the outputs should be used to improve safety.

Hierarchy of recommendations

Recommendations can be considered that apply at all three levels (organisation, environment/technology and behaviour) and reflect the accepted hierarchy for addressing hazards (elimination, reduction, isolation, control, and adaptation through training and protection). And the likely effectiveness of these should be considered, along with the potential costs. For example, investigators might consider:

1. eliminating the deficiency to prevent an accident from the same cause, (e.g. a change of component);
2. accepting that there is a risk of failure but adjust the system to reduce the likelihood of recurrence (e.g. more restrictive operating conditions); or
3. accepting the difficulty in eliminating and controlling the risk of failure and reduce the consequences, (e.g. use of protective equipment, better emergency arrangements etc.).

Often options lower in the hierarchy can be considered as immediate solutions with ones higher up to be implemented when time and other resources are available.

Proportionality of recommendations

The potential costs for implementing any recommendation should generally be proportionate to the expected benefit and the investigator should be able to demonstrate an awareness of these costs and benefits. There may be a need to underpin particular recommendations with structured cost/benefit analyses. Immediate costs, however, should not be the only factor to be considered. Public confidence, staff morale, risk of prosecution and other similar factors may need to be considered as well of course as the cost of a recurrence.

Targeting of recommendations

Recommendations should be addressed to the appropriate post holders inside and outside the organisations with prior dialogue so that there are no surprises. This dialogue should include relevant experts to assist in getting the recommendation right. There may also be a need to include 'local actions' or 'corrective actions' in addition to overall recommendations and it is important that these are clearly differentiated and defined. But where it is identified that there is a systemic failure to apply a certain kind of control across an organisation, (e.g. a short cut that is against operating rules but which management tolerates), the action should be a suitable organisation-wide recommendation.

Investigations can also reveal unsafe conditions that are not directly related to the accident but nevertheless should be addressed, possibly via recommendations, in the interests of improving safety.

HSE's HSG245 *'Investigating Accidents and Incidents'* refers to the need to review related risk assessments and where the investigation reveals weaknesses in these and competence assessments, then recommendations relating to altering and improving these may be appropriate (e.g. re-assessment of risk of slipping on a walkway after several similar accidents).

When considering recommendations, public as well as worker behaviour should be considered (e.g. in designing a new walking route consideration should be given to risks such as alcohol related crime - lighting/ supervision - or unsuitable footwear - adequate surfaces, and so on).

Review of the draft report

Before final release and/or presentation, the draft report should be reviewed against the remit. Investigators can benefit from constructive feedback on draft reports and records of these can be a useful element in post accident reviews and developing investigator competence.

Communication of recommendations

However well crafted and supported by good evidence, recommendations will not be effective unless they are presented and explained to those who will have responsibility for implementing them - as well as to those whom they will affect.

Presentations of recommendations of investigations into serious accidents should always be made to the appropriate senior management grouping, often the board of directors and consideration given to how key findings and conclusions in turn will then be cascaded down to other managers and staff in the organisation. As mentioned in Section 6, team based investigation allows team members also to act as ambassadors for change, often through explain the reasoning behind necessary changes to their peers.

Good, well-targeted and well-communicated recommendations will be more easily managed through acceptance, implementation and tracking.

To learn lessons systematically, organisations need high-level review processes. Once lessons have been learned, the benefits will be gained through, for example, updated technology, procedures and training and briefing of staff and changes to monitoring and review processes. Developing effective ways of ensuring closure (actions being closed out) is essential as is checking that revision of risk assessments has been effective.

12. MOVING FORWARD

Learning from investigations

Good accident investigations, recommendations and reports are essential for all organisations in whatever sector, to learn from operational experience and to gain deeper insights about gaps in health and safety management systems and culture.

Good investigations also enable organisations to 'learn how to learn' from health and safety failures. Organisations need to understand that they will also benefit from better knowledge of accidents if they, in turn, commit to improve their approaches to investigation, including the way these generate recommendations and reports. The consequence should be lessons being learned, improvements made, fewer accidents and so reduction in losses. They will also be in a much stronger position to learn and share experiences with others, including from accidents and incidents outside their company.

Developing leadership

Although (as already stressed) the ability to investigate why operations are not proceeding as they should be (and many of the techniques involved such as interviewing staff) should all be part of every manager's skill set, remarkably few managers receive any formal training in investigation. Interviewing people effectively at recruitment, during performance appraisal and in disciplinary processes, is a key part of most managers' jobs but often little support and coaching is provided to help them with these tasks.

Health and safety professionals too can benefit from refreshing and extending their understanding of investigation. Managers, health safety advisers and safety representatives can all benefit from taking time out for investigation training and to reflect on their own organisation's approach to responding to and learned from unplanned events. These can involve not just personal injury accidents happening in

fixed workplaces but events happening off site such as occupational road accidents or threats and assaults experienced by staff working out in the community.

The investigation of incidents involving occupational health damage demands slightly different approaches, particularly if what are being investigated are conditions that have arisen not from sudden single exposures to harmful agents but those that are due to low level harmful exposures occurring over a period of time.

The most important thing though is that investigations should ultimately be owned by those in a position of leadership within the overall governance of the organisation. This is usually the board of directors. The board, helped by the board level director responsible for leading health and safety, should undertake periodic reviews of investigations and not just those with more serious consequences. But boards need to review not just the conduct of particular investigations and their outcomes, nor indeed simply implementation of recommendations but whether operational readiness to investigate can be improved including leadership of the investigation at all levels. There is always a lot to consider, for example: investigation training (enhancing understanding of error, dispelling myths etc), workforce involvement, fine tuning procedures, reporting, development of incident databases, sharing investigation outputs, for example, via safety alerts.

From time to time board level directors can benefit from being involved personally in investigation teams. On the other hand the worst thing directors can do is to remain aloof from investigation of apparently minor events but when serious accidents occur, use their authority to sweep subordinates aside and take personal charge. Respecting and being willing to play their part as part of an established and competent team is a key part of director competence in this context and important in building and reinforcing overall health and safety culture.

Directors also need to take responsibility for informing other parties connected with the investigation process and/or its outcome about the organisation's overall approach as well its policies. Such parties can include solicitors and insurers, the emergency services, health professionals, investors, unions, trade associations and business partners, including contractors. It is important that the organisation itself takes the lead here and is not led by the agendas (often conflicting) of others. But as discussed in section 4, this is not always easy, which is why mature and competent director and senior manager decision-making is often needed to find the right path.

There are many other issues that need review such as working with victim's families, helping both the organisation and individual members of staff to survive the justice process (which can be protracted), repairing hearts and minds and rebuilding morale not to mention corporate reputations

Where RoSPA can help

RoSPA can offer accident and incident investigation training which gives course delegates a broad understanding of the accident investigation process, looking at the benefits of accident prevention and puts the emphasis on practical training exercises and real-life case studies. These courses are suitable for line managers, supervisors, safety representatives – and anyone with the responsibility for investigating accidents. The knowledge and skills gained enable organisations to meet their moral

and legal obligations to investigate accidents and incidents and to learn from safety failure.

RoSPA carries out accident investigation training at venues in Birmingham, Edinburgh and County Down. These courses are also available within a company and RoSPA's investigation training can be tailored to individual organisational requirements and processes. Course fees include all accident investigation training materials, lunch and refreshments.

Roger Bibbings

Partnership Consultant,

28th October 2015

APPENDICES

1) THE LAW AND ACCIDENT INVESTIGATION: A BRIEF OVERVIEW

While employers have duties to notify authorities of notifiable accidents diseases and dangerous occurrences and keep records and while they must to review and keep risk assessments up to date, there is no specific requirement to investigate accidents and incidents. The duty however is implicit within employers' general health and safety duties. Regulation 5 of the Management of Health and Safety at Work regulations requires that *"Every employer shall make and give effect to such arrangements as are appropriate, having regard to the nature of his activities and the size of his undertaking, for the effective planning, organisation, control, **monitoring and review** of the preventive and protective measures."* 'Monitoring' in this context embraces investigation.

There are specific requirements for investigation in the following regulations:

- Gas Safety (Management) Regulations 1996
- The Railways (Safety Case) Regulations 1994
- The Ionising Radiations Regulations 1999
- Control of Major Hazard regulations (COMAH) Investigation reports

The Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR) requires employers to keep a record of any notifiable accident (death, major injury or incapacitation lasting more than 7 days), dangerous occurrence or other notifiable injury that keeps workers off work for more than three days (not counting the day of the accident but including weekends and rest days). HSE advise that where the employer is required to keep an accident book (more than 10 employees), this will be adequate to comply with the latter. Such records have to be available

Under the Safety Representatives and Safety Committees Regulations 1977 trade union appointed safety representatives (but not non-union Representatives of Employee Safety) have the right to investigate notifiable accidents, diseases and Dangerous occurrences.

Some HSE guidance on investigation is contained in their suite of on-line guidance

'Managing for Health and Safety'. This states:

"Health and safety investigations form an essential part of the monitoring process that you are required to carry out. Incidents, including near misses, can tell you a lot about how things actually are in reality.

- *Investigating your accidents and reported cases of occupational ill health will help you uncover and correct any breaches in health and safety legal compliance you may have been unaware of*
- *The fact that you thoroughly investigated an incident and took remedial action to prevent further occurrences would help demonstrate to a court that your company has a positive attitude to health and safety*
- *Your investigation findings will also provide essential information for your insurers in the event of a claim. "*

HSE and Local authority Inspectors also have statutory rights to investigate. HSE warranted inspectors. They have a statutory right to enter premises and they can assess relevant documents held by employers, interview people and observe site conditions, standards and practices where work activities are carried out under the duty holder's control.

An HSE investigation may range from an enquiry by a single inspector about a minor incident or complaint to a large enquiry involving a team of inspectors. It can include all those activities carried out by enforcing authorities in response to an incident or a complaint to: gather and establish the facts; identify immediate and underlying causes and the lessons to be learned; prevent recurrence; detect breaches of legislation for which HSE is the enforcing authority; take appropriate action, including formal enforcement.

HSE have extensive powers, to gather evidence, seize articles and substances, prohibit hazardous operations and interview witnesses under caution. They also are required to undertake cost recovery' (fee for intervention) to offset the costs of investigation.

2. INVESTIGATING COSTS

When it is suggested that investment in additional health and safety measures should be curtailed, investigators may need to assemble evidence to help demonstrate that improved control of avoidable losses due to accidents and work-related ill health is not only cost effective but can have an even more important part to play in contributing to the bottom line than increasing sales and turnover, especially when markets are depressed.

The importance to business of cutting the waste and disruption caused by easily preventable accidents has long been understood but costs to business of health and safety failures are not always included in the investigation remit. Accidents and ill health cost the UK economy over £30 billion annually - over £1,150 per employee per annum – although under half of these costs are borne by employers. (A very high proportion of the longer tail costs are borne by the Exchequer and by victim's

families.) Nevertheless the impact of uninsured losses on employers arising from health and safety risk management failures is very substantial indeed. Relatively few businesses however seek to track those costs systematically and to identify opportunities for spend-to-save investment.

Cost to employers per case – average appraisal value estimates (£ in 2012 prices)

	Non financial human cost (rounded)	Financial cost (rounded)	Total cost (rounded)
Fatal injuries	-	129,300	129,300
Non-fatal injuries	-	1,400	1,400
7 or more days absence	-	4,800	4,800
Up to 6 days absence	-	110	110
Ill health	-	4,100	4,100
7 or more days absence	-	8,500	8,500
Up to 6 days absence	-	120	120

Source: HSE Cost model

The HSE/Institute of Directors guidance for directors (INDG417) suggests, for example, that, as part of their overall monitoring role, boards should be tracking these costs. RoSPA recommends that all investigation reports should include a section on costs of the events concerned, if for no other reason than to support the case for proportionate spending to implement recommendations.

There are strong arguments therefore for including finance staff in the investigation team to harness their expertise and to help boards to take an overview.

Budgetary restrictions can make long-term savings less attractive, especially when health and safety are competing with other investment options that will show earlier returns. Also, expenditure on one budget may well produce savings in another for which the first budget holder is not responsible. And, very significantly, management information may not be good enough to track all the 'below-the-water-line' costs associated with accidents. Indeed many large organisations still have great difficulty in simply tracking data on basic things like staff attendance and absenteeism.

HSE's famous 'iceberg' model suggests that for every one pound of accident loss regained via insurance somewhere between eight and thirty two pounds are accounted for as uninsured losses. But a systematic failure to cost accident, ill-health and material damage can lead to the perception in many firms that such losses are small or even non-existent, even though very significant sums of money are literally draining out of the organisation down many tiny gutters. And this lack of awareness can be reinforced, particularly in small and medium sized firms, by the fact that the average interval between serious accidents is very long, meaning that the serious investigation of unplanned events is likely to be a rarity with the result that there are

fewer opportunities to reflect on the true costs of accidents - that is, until a very serious event occurs, such as a fire or the loss of a key worker, which then literally spells the end of the business.

In 2000 HSE published and promoted a 'Ready Reckoner' supported by case studies to drive home the business case for better health and safety management". It gave information on the business and economic costs from not managing health and safety adequately. Interactive tools were provided to allow businesses to work out what these costs may be to their organisation, including an incident cost calculator form to help record the real costs of incidents in a business. These were withdrawn however as part of the Coalition Government's health and safety 'reforms' Other online tools are still available however, including the U.S. OSHA 'Safety Pays' programme (<http://www.osha.gov/dcsp/smallbusiness/safetypays/index.html>) which is designed to assist employers in estimating the costs of occupational injuries and illnesses and the impact on a company's profitability.

3.) SOME REFERENCES, LINKS AND FURTHER READING

- 'Modern accident investigation and analysis' by Ted S. Ferry 1988 John Wiley and Sons
- 'Investigating Human Error: Incidents, Accidents, and Complex Systems' by Barry Strauch, Ashgate
- 'Human Error' by James Reason, Cambridge University Press
- Accident Investigation Techniques, 2nd Edition Jeffrey S. Oakley ASSE
- **Managing for Health and Safety** (HSG65). (Provides a general discussion of accident investigation). Free to download
- **HSE 'Investigating accidents and incidents** - a workbook for employers, unions, safety representatives and safety professionals' (HSE Ref. HSG245). Free to download
- **Reducing error and influencing behavior** HSG48 HSE
<http://www.hse.gov.uk/pubns/books/hsg48.htm>
- **Human factors in accident investigations** – HSE
<http://www.hse.gov.uk/humanfactors/topics/investigation.htm>
- Railway Safety Standards Board Accident Investigation Board Guidance. Part 1 The role of the senior manager. Part 2 The development of policy and management arrangements. Part 3 Practical arrangements. Supplement – Taking a risk based approach to investigations.
(<http://www.rssb.co.uk/improving-industry-performance/safety-management-systems/accident-investigation-guidance>)
- Video / DVD **Accident and Incident Investigation**. Pub. Training Video Associates
- Video / DVD **So It Won't Happen Again**. Pub. National Film Board of Canada (distrib. Educational Media International)