

Safety practice

Investigation and bias – procedures

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Summary

Incident investigations often conclude that one of the causes was either that people did not follow a "good" procedure or that procedures were not fit for purpose. These findings are often based on an inflated opinion of what procedures can achieve. The reality is that procedures appear very low on the hierarchy of risk control and will only ever make a fairly modest contribution to safety. Avoiding hindsight bias when considering the role of procedures in incidents can mean that more effective recommendations can be made, leading to a set of procedures that provide effective support to competent people.

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Introduction

Most organisations will have multiple procedures. They include management system procedures, which usually describe how to perform high level processes; and operating and maintenance procedures, which usually describe how to carry out specific tasks. Procedures can make a valuable contribution to safety and allow learnings from incidents and other events to be recorded in a useful and accessible place. People writing them can take the time to consider risks and how best to control them, which is not always possible at the time a task is being performed. Also, standardising methods can avoid conflicts that arise if individuals perform tasks in different ways.

Procedures are often expected to perform a number of roles:

- basis for training and competence assessment;
- helping people when performing tasks so that they do not have to rely on memory;
- reference for performing risk assessments and other studies;
- addressing actions arising from safety studies where human actions are identified as barriers or safeguards.

It is easy to develop a mind-set that accidents cannot or will not happen if people follow the procedures they are given. This means that "failure to follow procedures" is often highlighted as a cause of incidents. Even in organisations that operate an effective no-blame culture this finding will often lead to a conclusion that either the people involved in the incident were at fault because they failed to follow a "good" procedure or the procedures were at fault because they were not fit for purpose.

This is a classic example of hindsight bias. The investigation team have the opportunity to examine the procedures that

were available at the time of the incident and compare them with what was done by the people involved. This allows them to read and re-read the procedure until they are satisfied that they understand what it says, and to cross reference with supporting information that may give a clearer indication of the intended spirit behind the procedure, that may not always be clear from reading the procedure in isolation.

People working at the sharp end rarely have the same opportunity to plan their actions. This may be because they do not have much notice that a task needs to be performed (i.e. they need to react to a situation) or because they have lots of other things to do and so do not have any "spare" time before they need to perform the task.

Failure to follow a "good" procedure

There are lots of reasons why people fail to follow procedures, for example:

1. they do not know the procedure exists;
2. they cannot find the procedure when they need it;
3. they think that the procedure does not apply to the circumstances;
4. they need to adapt the procedure due to the circumstances.

Items 1 and 2 (not knowing the procedure exists or unable to find it) should, in theory at least, be fixable. Better storage and indexing should make it easier for people to see what procedures exist and for them to find one when they need it. This can be combined with better training so that people can become more adept at searching for procedures. However, experience suggests that there is no easy solution, and whilst it is always simple to improve access to a particular procedure (i.e. the one involved in the incident) most organisations have many procedures and it is not simple to improve access to them all.

Items 3 and 4 (thinking the procedure does not apply or adapting to the circumstances) are often categorised as violations because people choose to perform a task differently to the procedure. But this conclusion during an investigation is often based on a failure to understand the context that the task was being performed and creates a perception of blame (even if this is not stated directly in the investigation report).

Item 3 (thinking the procedure does not apply) often arises because one procedure is provided to cover all possible scenarios. An example of this was a procedure that described the steps to take when returning a compressor to service after maintenance. The logic was that this is the worst case and so should cover every eventuality. But it included a lot of pre-start checks, aimed primarily at ensuring integrity of pipework, joints etc. (i.e. confirming the maintenance had been completed

correctly). Whilst, in hindsight, it was clear that sections within the procedure did apply to the normal scenario of starting the compressor from hot standby (i.e. following a brief shutdown), many did not. The operators' perception was that the procedure was not applicable because they did not think it was appropriate for them to be deciding which parts of the procedure they should follow and which they should ignore. Instead, they relied on memory achieved from prior knowledge and experience. However, some steps, which in hindsight were identified as necessary, were being missed. It was easy to conclude that this was a human failure because the procedure was technically correct, but the reality was that the way it was presented did not suit the scenario that the operator had to deal with.

Item 4 (adapting for circumstances) is arguably the area where hindsight bias is most prevalent because people investigating an incident find it difficult to understand the circumstances at the time of the incident. It is very easy to conclude that someone took a short cut; and if only they had followed the procedure the incident would not have happened. A particular challenge is that people react to situations based on their perception of what is happening at the time. People investigating the incident have more time to consider the options that were available and can select the most appropriate response because they are not having to react under pressure.

Often the people involved in the incident will look back at how they reacted at the time and conclude that if they had to deal with the same situation again they would do things differently. In one case a control room operator was interviewed as part of an investigation of an incident where he had decided to increase the speed of a compressor in response to a process upset when the normal, documented response was to shut down. He was clearly disappointed with how he reacted and said that he realised afterwards that he should have shut down far sooner. But he was relatively inexperienced in the role, and had not had to deal with this situation previously. His normal supervisor was absent and was being covered by another, who was taking a more hands-off approach because he not aware of the operator's inexperience and was more focussed on how the rest of the team were performing. There was (perceived) pressure to increase plant throughput because of problems earlier in the day and there were multiple plant restrictions due to a backlog in maintenance. When these factors were taken into account, the failure to follow the "correct" procedure was far better explained. In fact, the control room operator involved in the incident found it useful to have this pointed out as he could not fully understand why he had got things wrong at the time.

Procedures not fit for purpose

When an investigation finds that a "good" procedure did not exist, the obvious conclusion is that the incident would not have happened if one had been available. Hence, the underlying cause is lack of procedures (i.e. there was not a procedure for the task) or procedures are not of sufficient quality (i.e. the procedure for the task was not good enough).

A fundamental problem with people investigating incidents is that they have an over inflated opinion of what procedures can achieve. They tend to assume that procedures can be

written for every task, covering every eventuality, and that it is easy to impose rules that say a task cannot be carried out if a procedure is not available. But the reality is that real work is complex and unpredictable. We expect (need) people to adapt and use their initiative; working under time pressure and with limited resources. Very often there is simply not the time to find a procedure or physically it is impossible to read a procedure whilst performing the task.

The reality is that tasks are performed without reference to procedures most of the time; and most of the time there is no negative outcome.

The problem with assuming procedures are more effective than they really are is that every time an incident occurs a new procedure is written, or an existing procedure is expanded. Over time this results in a set of procedures that is unmanageable because there are too many procedures; and the procedures are long and wordy. This adds to the workload to review and update procedures, makes it difficult to find procedures when required and makes them difficult to use in practice.

Avoiding hindsight bias

When investigating an incident where it appears that someone did not follow an apparently "good" procedure it is important to consider what Performance Influencing Factors (PIF) may have influenced their behaviour. When PIFs are favourable, people are more likely to be reliable; and when they are unfavourable people are more likely to make errors or poor decisions.

When considering PIFs it is important to recognise that people act according to their perception of the situation, which may not be an accurate evaluation of the facts. When investigating an incident you need to recognise that you have a much better opportunity to identify and consider the facts; but you need to base your findings on how the people involved in the incident were likely to have perceived the situation they were presented with at the time. Things you should consider include:

- **Complexity of the situation** — how much information did the person need to determine what was going on and how likely were they to select the correct procedure to follow?
- **Predictability** — were there lots of potential outcomes and how easy was it to be sure that following the available procedure would have been appropriate for them all?
- **Signal strength** — how clear was the information needed to evaluate the situation and determine which procedure should be followed?
- **Time available** — did the person have enough time to identify the correct procedure, access it and read it whilst reacting to the situation?
- **Workload** — how many other tasks were going on at the same time and hence how many different procedures would the person have had to follow?
- **Perceived production pressures** — how likely was it that the person felt they were being encouraged to make short cuts to get the task done more quickly?
- **Special situation** — how likely was it that the situation would have been viewed as exceptional or an emergency,

so that it may be reasonable to adapt the normal rules and procedures;

- **Interruptions** — were there lots of demands on the person by the system (e.g. alarms) and other people that meant following a procedure would be difficult?
- **Available support** — how available was the person's supervisor to answer questions and give direction; or other team members to assist with workload?
- **Competence** — did the person involved in the incident have experience of the same or similar situations; and how well did they understand the system, its hazards and risks?
- **Previous occurrences** — had the same or similar situations occurred in the past and had the outcomes been the same or different?

If it appears that the incident occurred because procedures were not fit for purpose it is important to recognise that it is simply not possible to write procedures for every task, covering every possibility; and attempting to do this is likely to be counterproductive. The aim must be to make an objective evaluation of the underlying and root causes of the apparent weakness in procedures. Questions to ask include:

- Is the purpose of procedures clear and is it sensible; and does the procedure convey the potential consequences of performing a task incorrectly?
- Are procedures being developed in accordance with the defined purpose?
- Is the way procedures are expected to be used in practice clearly defined and being applied consistently?
- Are procedures being kept up to date and modified as the result of plant, process or organisational changes; and is this checked during audits?
- Are the people who perform the task actively involved in writing procedures?
- Is the required refresher training and competence assurance taking place at a suitable frequency?

This is not to say that updating existing procedures or even creating new ones should never be the outcome of an incident investigation — but it must be recognised that such an action is unlikely to address the underlying issues, and so will likely have only a limited effect.

Developing better recommendations

Avoiding the hindsight bias as described above should reduce the likelihood that investigation reports include recommendations focussed purely on either making people follow procedures or improving a single procedure (i.e. the one associated with the incident). That does not mean

that investigations should not make any recommendations related to procedures, but the focus should be on looking at all procedures as a whole and their role in supporting human performance.

It is important to remember that procedures appear relatively low on the hierarchy of risk control. Even the best procedures will only make a modest contribution to safety. Actions that can result in the elimination and reduction in hazards; and engineering controls should be emphasised first.

Procedures do not actually control any risk; it is actually what people do that provides the control. Hence, any recommendations to change procedures should be within the context of supporting competent people. In fact, people blindly following procedures without thinking about what they are doing is rarely safe; and we expect people to use their expertise and initiative to adapt to circumstances.

We should only develop good and useful procedures if we are clear about:

- what procedures should be provided;
- how people should use procedures.

This will vary depending on the task and the circumstances that have to be dealt with. In general terms:

- **Planned, high criticality tasks** — detailed mandatory procedures should be developed and they should be actively used every time the task is performed, which may include some form of check-sheet to aid people when performing to and make sure all steps are completed and objectives achieved;
- **Planned, medium criticality tasks** — detailed procedures should be developed but are intended for supporting training and assessment. The task should be performed as described in the procedure, but the procedure does not have to be actively followed every time the task is performed;
- **Planned, low criticality tasks** — guidance and generic procedures should be available, but competent people should have the freedom to perform tasks as deemed appropriate according to circumstances;
- **Unplanned/unexpected circumstances** — procedural support should be available to assist competent people to respond appropriately.

Based on this philosophy the recommendations from incident investigations should focus on the processes used to determine task criticality and other features that define the type of procedure to be used; and the means used to prepare people to perform tasks using competence, supported by the procedures provided.