

# Safety critical elements: overcoming human and organisational challenges

*It is important to put critical controls, which can prevent major incidents, at the heart of management and preventive activities, both for regulators and operators, writes Peter Wilkinson*

In the early 1990s, in the aftermath of the Piper Alpha disaster, and Lord Cullen's inquiry into it, the UK's Health and Safety Executive (HSE) set about implementing the subsequent Cullen Recommendations. Among the recommendations was a requirement to implement a safety case type of regime. This had a number of elements: a Formal Safety Assessment (FSA) which facilitated the identification of SCEs to prevent fires, explosions and to facilitate escape, evacuation

and rescue; and a safety case that included a safety management system to manage the FSA and SCEs.

Within HSE we had an internal debate, because we could not do everything at once – which should come first? Should it be the Safety Case Regulations to require a Safety Management System (SMS), or the regulations intended to prevent and manage major emergencies (PFEER), which included the identification of SCEs?



This was no mere academic question. Such was the eagerness and pressure to implement the Cullen Recommendations, whichever came first would receive a great deal of attention, probably at the expense of whatever came next. There was vigorous debate within HSE as to what we should do. As I was involved in HSE's work on the SMS in the immediate post-Piper Alpha era, you will not be surprised to hear I supported addressing the safety management system issue first. It seemed the most important, interesting and exciting thing to do. There was not a lot written on safety management at the time, and what did exist was not always of high quality.

***“In the context of organisational culture, values must be complemented with organisational practices to support them”***



But I was wrong! We should have developed the regulations which contained the requirements for the FSA first, which in turn permitted the SCEs to be identified. Had we done this we would have positioned the SMS as the enabler of the SCEs and FSA. The (very good) technical team developing the SCE concept would have benefited from our advice and we (in the SMS team) would have learnt more about the interactions between safety management and the SCEs. As it was, excellent but almost “pure” SMS guidance was written and legislation enacted. However, it was slightly detached in some ways from the SCEs, as the safety management requirements appeared in the safety case regulations and the SCEs in the PFEER regulations.

Post-Piper Alpha we focused on many fronts simultaneously, and mostly successfully. At the same time we were grappling with issues associated with the old prescriptive legislation, developing new regulations and guidance and building our new organisational structures and processes. Examples of the work at the time included managing the large number of exemptions needed from the old prescriptive legislation associated with fire pumps and

standby vessels. We were also delivering a much higher presence by HSE in terms of inspections, audits, conference presentations and so on. This presented major challenges around recruitment, training and maintaining our regulatory ethos. Developing the SCE concept was but one of many new developments. However, it was far sighted and arguably ahead of its time in common with some of the other innovations which flowed from the new regulatory approach.

However, since Piper Alpha, we have inevitably seen developments in our understanding of major incident causation and therefore prevention. For example, it was only after the Piper Alpha disaster, and after the concept of SCEs was conceived, that Professor James Reason produced his influential book *Managing the Risk of Organisational Accidents*, which included his familiar so-called Swiss Cheese Model.

Other improvements in our knowledge include a greater understanding of the role and meaning of organisational culture as applied to safety.

### **Does any of this matter?**

Does it matter that we now have a much better knowledge of these topics? I think it matters in so much that we now understand that the priorities we assigned (SMS first, FSA/SCE second) had ramifications that still impact what we do today in both regulators and in companies. Some of these impacts are summarised below.

- **SCEs viewed through the prism of safety critical equipment.** SCEs require performance standards typically characterised by the need to be drafted in predominantly engineering terms. What is the *functionality* of the SCE, what is its *availability* and *reliability*? What is the *survivability* of the Emergency Shutdown Valve? This language has encouraged a view that SCEs are predominantly about the engineering and are managed (or maintained) using the maintenance management system.
- **Organisational procedures and processes managed with less rigour than the engineering?** The language of SCE performance standards such as *functionality*, *availability* and *reliability* does not work well with organisational processes or procedures. However, major incidents invariably have human and organisational factors which could have been more rigorously managed. Does that mean that we should ask for a separate set of performance standards – managerial performance standards – in addition to the engineering-focused ones?
- **A less-than-integrated approach to SCEs, control or barrier management?** Does this approach to SCEs inadvertently encourage a focus on the engineering, at the expense

## “Perhaps we can shift our focus on organisational culture from the academic and intangible to the practical and observable?”

of other parts of the system such as the human and organisational factors (HOF)? Furthermore, the so-called Hierarchy of Controls (HoC) posits that an engineering control is better than a procedural control. However, is it not the case that engineering controls (such as an ESDV, for example) need to be maintained and used by *competent* people, using *procedures* within a suitable *organisational culture*?

It could be argued that we are already doing this. Possibly, but this article is suggesting that each control is looked at in a way that *integrates* at a critical control level, how in practice the engineering-focused performance standards are integrated with the process and procedural ones. An example of this can be found in the International Council on Mining and Metals' *Critical Control Management Implementation Guide*.

Currently, it is not uncommon to find that procedural or organisational controls are dealt with at a system level (such as the Competency Management System) rather than viewed through the lens of the critical control. Other industries have grasped this nettle and explicitly focused on the critical controls (a synonym for SCEs), and how they need to be managed in practice to integrate the engineering controls with the procedures and organisational processes.

- **Terminological confusion?** It is common to hear people in the offshore oil and gas industry (including regulators) talking about *Safety Critical Elements: Barriers* (as in a two-barrier policy in wells), *Defences*, *Measures*, *Controls* and so on. Regulatory guidance uses all of these terms. Do we need this plethora of language to say much the same thing? Could we not simplify this and just use “critical controls”?
- **The special problem of organisational culture.** One final thought relates to organisational culture. We all know its importance. Many of us have commissioned research from leading academics, think tanks, and human factors consultants. But how far has it got us? I am not sure, but that of course is not a reason to relax our efforts in trying to understand the problem better. However,

there are a number of ideas gaining greater traction in this area which I believe are important.

First, the Safety Institute of Australia has published its *OHS Body of Knowledge: Organisational Culture*, in which it says in the Abstract: “...safety culture remains a confusing and ambiguous concept in both the literature and in industry, where there is little evidence of a relationship between safety culture and safety performance.” This is a necessary caution which comes from a detailed literature review carried out by respected researchers.

Second, and on a more positive and intuitively attractive note, a number of respected commentators have pointed out that, in the context of organisational culture, *values* must be complemented with organisational *practices* to support them. You cannot have one without the other. Humans seem to be very good at identifying any mismatch between the two.

Furthermore, a focus on practices can influence the culture. One cannot see or touch values but practices can be seen and measured. Thus, a focus on risk controls, double block and bleed as a process isolation instead of a single valve isolation, for example, is a practical way to influence organisational culture. Perhaps we can shift our focus on organisational culture from the academic and intangible to the practical and observable?

### Conclusion

The work on SCEs was radical in its day. It represented a significant step forward in how we worked and was a great success. But the world has moved on. We now know much more about the management of safety in general and human and organisational factors in particular.

Have we properly integrated the knowledge gained post-Piper Alpha into our current managerial and regulatory strategies? ■

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