

ASSESSING OPERATIONAL EXCELLENCE

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ABSTRACT

Process safety management systems are mature. Regulations from organizations such as OSHA have been in effect for more than a generation and have not undergone radical change. Similarly with Safety Cases for offshore oil and gas — progress has been organic and evolutionary rather than revolutionary. This situation provides an opportunity for looking at new ways of building on the progress that has been made.

This paper outlines three potential areas that can help process safety build on the successes of the last 25 years. They are:

- Use of established management programs to improve operability as well as safety.
- Incorporate practical experience in an organized manner.
- Integrate safety management systems with other business programs.

Taken together these initiatives lead to “Operational Excellence”.

The first step in developing a process safety program is to conduct an audit in order to establish a baseline and to provide an estimate of the work that needs to be done. With regard to operational excellence it is suggested that that something similar is needed but it should be an *assessment*, as distinct from an *audit*.

Key features of an assessment are:

- It allows for subjectivity and opinions. Expert opinions are valued.
- There is no “right answer” to the questions.
- There is no need to answer all the questions.

This paper provides guidance to do with the development and use of an Operational Excellence Assessment system.

INTRODUCTION

Process Safety Management (PSM) programs are mature. For example, one of the most widely used standards — that from OSHA (the United States Occupational Safety and Health Administration) — became effective in 1992. That's 26 years ago — more than a generation has gone by; young people now entering the energy or process industries are younger than the PSM standard. Even the newer standards such as the Safety and Environmental Management System (SEMS) rule for offshore Gulf of Mexico operations use the same basic process safety structure — they did not introduce any radically new ideas or concepts. Similarly, the Safety Case approach to the management of offshore safety is mature. That methodology underwent major developments in the 1990s following the Piper Alpha catastrophe and the publication of the Cullen report (Cullen 1990). Since then improvements have been evolutionary rather than revolutionary.

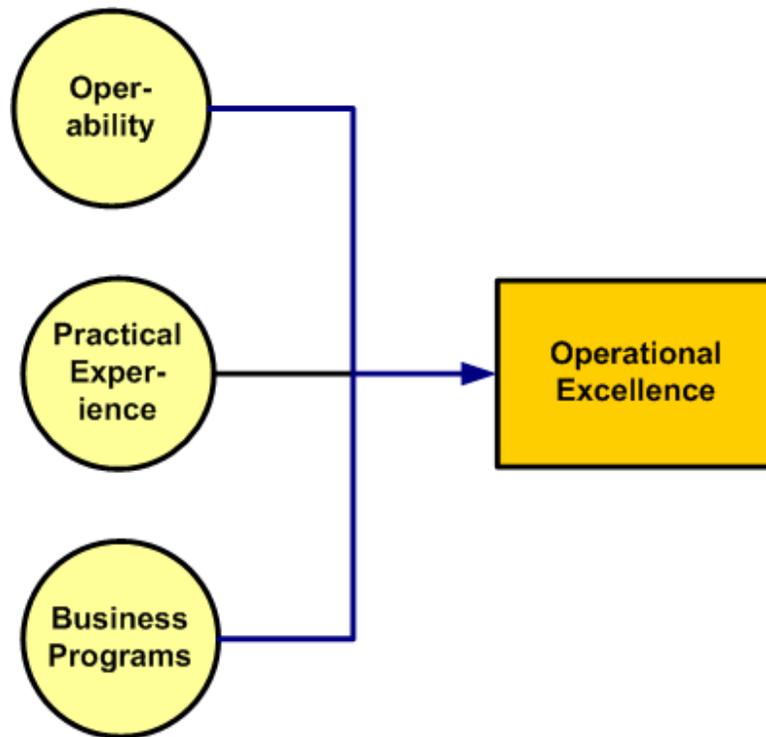
Improvements to the existing process safety standards will continue to be made in order to build on the successes that have already been achieved. Nevertheless, it seems unlikely that these programs, in their present form, will undergo fundamental changes

The maturity of process safety and safety case programs means that, if operating and design companies in the process and energy industries are to continue to improve safety performance then they will need to consider new strategies that build on the success of the established programs. Three ways in which new strategies could develop are discussed in this paper. They are:

1. The use of process safety management techniques to improve operability.
2. Means whereby practical field experience can be organized to provide useful lessons learned.
3. The integration of process safety programs with business programs.

The manner in which these three approaches can be used to create “Operational Excellence” is shown in Figure 1.

Figure 1



1. OPERABILITY

Process safety management programs are not fundamentally *safety* programs — they are programs that help all employees control complex industrial processes such that operating conditions stay within safe limits. If this goal is achieved then not only will safety improve but so will profitability because there will be fewer problems with off-spec products, wasted energy and increased maintenance costs.

Many articles and papers have been written discussing this link between safety and operability. But generally these articles are structured along the following lines, “If we improve safety then operability improvements will follow”. But this insight can be looked at the other way around, *i.e.*, if the principles of process safety are used to improve operability then safety will also improve. So, for example, if the Management of Change program is directed toward reducing waste and re-work in order to improve profits, then safety improvements will follow.

2. PRACTICAL EXPERIENCE

A second step in the development of an Operational Excellence Assessment program is to incorporate and to systematize practical experience as shown in Figure 2.

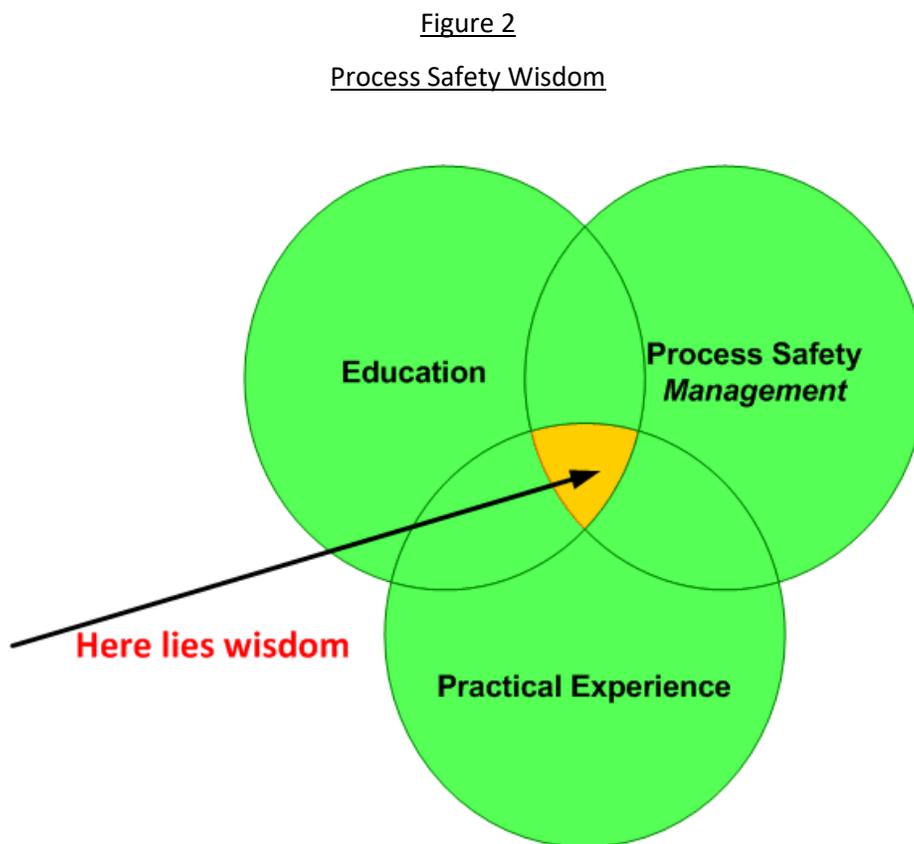


Figure 2 is a Venn diagram that shows three elements of an overall safety program. They are:

1. Direct education or book learning;
2. The management principles of process safety; and
3. Practical experience.

All three are needed — each is a necessary but not sufficient condition for success. When combined we achieve “process safety wisdom”.

Of the three elements the practical experience aspect has not generally received the attention given to the other two elements. It is difficult to organize and systematize the experience of people who have “seen it all before” — the graduates of the “School of Hard Knocks”. (One way of doing so may be to stress the importance of stories and anecdotes that can supplement reports and analyses.)

1. Direct Education

The first circle — direct education — is the simplest to define and understand. For example, if a hazards analysis team questions the volumetric capacity of a pressure safety relief valve then someone with an education in fluid flow can calculate the rating of that valve and determine if it meets requirements or not. Direct education is also needed when responding to regulatory requirements. In order to find out if a facility is in compliance with a regulation or standard a person simply needs to read the relevant documents and apply them to the current situation. That person does not need to understand the principles of process safety nor how those principles are applied in day-to-day situations.

In this context, it is important to distinguish between education and training. Education teaches someone about the principles of a system, training teaches them how to perform a task. For example, someone who is trained as to how to start a pump knows which buttons to press and which gauges to read. But someone who is educated in pump operation will be able to figure out what to do when things go awry — say when the pump won't start or when it makes a funny noise.

In the early 1990s the well-known Yale professor of literature, Harold Bloom, said

Information is endlessly available to us; where shall wisdom be found?

He wrote those words before the explosive growth of the amount of information that is available on the Internet. In the context of process safety his words could be rewritten as, *Information is endlessly available to us, where then shall process safety wisdom be found?*

Given that so much information is now available to use what is needed is not more information *per se* but the ability to sort through and sort this information, recognizing that most of that information is repetitious and occasionally misleading, but also recognizing that there are some gems out there.

This information then needs to be digested so that general principles can be developed from this vast sea of knowledge.

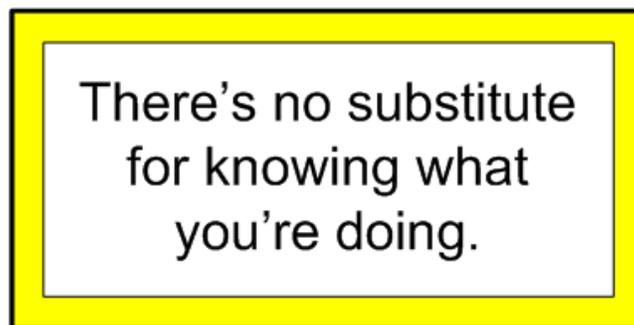
2. Process Safety Management

Process Safety Management programs are organized around elements such as Management of Change, Process Hazards Analysis and Operating Procedures. The knowledge needed to create these management elements is largely built on the experience of seasoned professionals. So, for example, they understand that many occurred because process conditions were changed without proper control or oversight. Based on this insight these professionals will develop the framework for a Management of Change program. Or they may recognize that inadequate training can lead to problems, so they develop the framework of a generic training program.

3. Practical Experience

The third of the elements shown in Figure 2 is Practical Experience, which can be expressed in bumper sticker form, as shown in Figure 3.

Figure 3
Bumper Sticker



Education and an understanding of management principles are a vital and necessary part of any process safety management program. But they are not sufficient because they are general in nature — they cannot cover the details of every situation; they cannot provide specific guidance for specific situations.

People who have worked at a facility or in a design office for many years generally have a good, almost intuitive, understanding of what works and what doesn't. "They know what they are doing". In particular, they have learned from their own mistakes and from the mistakes of the people with whom they work.

Experience enables you to recognize a mistake when you make it again.

One large energy/chemical company demonstrated this insight in an ingenious manner. When a young professional first entered that company, no matter what their job was, who their boss was, and regardless of the tasks to which they were assigned — their paycheck said, "Training Department". This was a neat way for the company to tell its new employees that they were not actually making a contribution because they knew very little about what they were doing in the "real world".

Industrial, practical experience includes not only a hands-on knowledge of industrial processes and equipment but also how to work with colleagues, subordinates and bosses; understanding the realities of client/consultant/contractor relationships; the resistance that managers can have toward spending money on safety; problems at the management/union interface; and how government agencies actually enforce regulations.

OPERATIONAL EXCELLENCE

Process safety programs do not operate in isolation; companies have many other management initiatives that aim to improve their overall efficiency and profitability as illustrated in Figure 4, which has three concentric circles. The inner circle is process safety management and related programs such as SEMS and Safety Cases. Going beyond process safety is the topic of Operational Excellence. It builds on the foundations of process safety management, but also includes activities and management programs

that are to do with overall operations. And going beyond Operational Excellence is the topic of Business Excellence, which incorporates a full range of business activities.

The opportunity and the challenge for the process safety community is to structure their programs so as to align with the larger business objectives.

Figure 4
Operational Excellence



OPERATIONAL EXCELLENCE ASSESSMENTS

In response to this opportunity to create Operational Excellence an Assessment system has been developed. Details of the system are provided in its User Guide (Sutton 2018). It is built around the following features.

- It consists of questions to do with the effectiveness of a facility's safety systems.
- The questions are not audit questions — they do not look for a “Yes/No” response. Instead they call for a graded response ranging from ‘0’ (missing or inadequate) to ‘4’ (excellent).
- There are no “right answers” to the questions. The response is intended to identify ways in which operability and safety can be improved.

- Unlike an audit, there is no need to answer all the questions.

It is important to grasp the distinction between audits and assessments.

Audits

All management programs — including process safety programs — must be audited on a regular basis — typically every three years. Audits sometimes fail to provide sufficient information to managers who are looking to achieve operational excellence. Moreover, audits that are limited to an evaluation of safety programs provide little assistance when looking at related management challenges, such as increasing production or improving profitability.

The philosophy behind process safety programs is that they are performance-based rather than being compliance activities. And many auditors do, in fact, seek to supplement their findings with insights based on their own experience and knowledge. They do not limit their findings to compliance. But, when they do so, they are strictly speaking not actually auditing — they are conducting an assessment or review.

Assessments

In spite of the non-prescriptive nature of process safety programs, the reality is that audit programs do, in fact, often focus on compliance with the wording of the regulation rather than on effectiveness. For example, the following statement is taken from the OSHA standard to do with operating procedures.

The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting <an> . . . Initial startup;

Given this standard an *auditor* could go to a facility, walk outside with a senior technician, point to a compressor and say, “Show me the procedure for starting this compressor.” If the technician produces that procedure in a timely manner and if it can be shown that the procedure is up to date

then the audit requirement is satisfied. Moreover, if the auditor does find a deficiency then is not required to come up with a solution. His task is limited to finding gaps between “what is” and “what should be”. An auditor’s job is to objectively uncover deviations from the standards — no more, no less.

The auditor needs to be skilled at conducting audits, and he or she certainly needs to have a working knowledge as to how energy or process facilities work. But he does not need to be an expert in the matter being audited. He simply needs to know enough to determine if the audit requirements are met.

An *assessor*, on the other hand, approaches the operating procedures for starting the compressor with a different set of questions such as,

- Is this procedure too long?
- Is it too short?
- Can it be used outside at night in the pouring rain?
- Is it written at the correct grade level?
- Have the instructions from the compressor manufacturer been incorporated into the startup procedures?
- And — the most important question of all — does anyone actually use this procedure, or does it sit on a shelf or a hard drive quietly gathering dust?

There are no right or wrong answers to these questions — except for maybe the last one. One person may consider the procedure to be the right length, another may disagree. Such a disagreement, as long as the parties remain polite to one another, is healthy. It forces everyone to examine the usefulness and relevance of the procedures and to determine if they are actually helping to make the facility safe and profitable.

Another difference between an assessment and an audit is that the assessor’s opinions and suggestions are welcome. He or she is considered to be an expert on the matter in hand, so his opinion is an important part of the discussion. (In practice, many auditors do offer advice and

opinions. However, it should be understood that, when they do so, they are crossing the boundary between audits and assessments.)

If a company does decide to develop an Operational Excellence program then the first step is to assess the current status of the various activities and management programs and to identify areas of strength and of relative weakness.

CONCLUSIONS

This paper also provides a background to the Operational Excellence Assessment system that is described in the User Guide already referred to. Further information to do with such a system can be found at the web site <https://iansutton.com>.

CITATIONS

Cullen, D. *The Public Inquiry into the Piper Alpha Disaster*. Department of Energy, HMSO Cm 1310, London. 1990.

Sutton, Ian. Operational-Excellence-User-Guide.

https://iansutton.com/operational_excellence/Operational-Excellence-User-Guide.pdf. 2018.