Bridging the divide - OHS and process safety

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Abstract: The occupational health and safety field is well established, with a number of professional bodies, undergraduate programs and a comprehensive body of knowledge. Conversely, the process safety field has evolved largely over the past 40 years as an engineering discipline, with a focus on engineering solutions. Both of these fields utilise a risk management basis for decisions and actions. But both fields still largely operate independently of each other. There is much to be learned from sharing knowledge and responsible collaboration to deliver safer plants and operations from an OHS and a process safety perspective. This paper will explore how we can bridge the divide between OHS and process safety to achieve better safety outcomes. This includes better education and information flow between both professions as well as leveraging off existing systems to advance process safety.

Keywords: process safety, OHS, commitment

Introduction

There are many different fields of practice in safety. The most prevalent is the Occupational Health and Safety (OHS) generalist. The OHS Body of Knowledge (Pryor, 2012) defines the OHS generalist as a role that applies "a multidisciplinary body of knowledge in a unique way to provide enterprises with advice on the organisational arrangements that will lead to the systemic and systematic management of OHS to prevent work-related fatality, injury, disease and ill health." There are then many specialists that support these people, such as occupational hygienists, occupational ergonomists and occupational medical professionals to name a few. Traditionally process safety specialist have developed in the engineering field and have therefore remained separated from traditional OHS. This separation has resulted in the disciplines developing separately, and in some instances produced negative safety outcomes.

Milestones in OHS development

The development of OHS as a profession is closely linked to the development of safety related legislation. In 1802, the United Kingdom introduced the Health and Morals of Apprentices Act. This was the first step in managing child labour and working hours. In 1833 the Factories Act allowed for the appointment of inspectors to monitor factories and their workers. The legislative development continued in other nations, with legislation being introduced for coal mines in New South Wales in Australia in 1854, and a factory legislation in Victoria in 1873 (Pryor, 2012). In the United States the Safety Appliance Act was enacted in 1893, focusing on train safety. The industrial revolution introduced hazards not previously seen in society or the workplace. To manage these hazards, the various acts started to establish what was acceptable in society for worker safety. This then started the development of the OHS profession, as a means to address the expectations.

These developments largely focused on the individual hazard to the worker, such as entanglement, burn and amputation, as well as illness caused by exposures. Initially guarding was used to protect the workers, and in 1937 there was a move to start to focus on training and supervision of employees as a means to prevent incidents (Sankey, 1937). Following on from this there was a focus on injury treatment and then the focus shifted to industrial psychology looking at ideas such as accident-proneness (Pryor, 2012).

This evolution through engineered solutions to procedures and compliance followed by psychology has driven OHS forward. In more recent times we have seen the development for formal risk assessment frameworks and the introduction of duties on persons in the legislation. The latest developments in OHS are challenging the existing paradigm, and suggesting that there is a different way to look at safety. This new paradigm defines previous safety as 'Safety I' and the new paradigm as 'Safety II'. (Hollnagel, 2015).

While the merits of each phase can be debated, it is clear that they have contributed to where OHS is today. This field is well established and recognised.

Milestones in process safety development

The origins of process safety concepts can be dated back to the early 1800s with E.I. duPont's black powder factories being constructed with separation distances and blast zones, though modern process safety is said to have been established in the 1960s. This is because in the 1960s we started to see more larger scale facilities being constructed, resulting in the potential for greater consequences. Improvements in process safety were driven by learnings from major incidents.

The 1974 Flixborough incident introduces management of change and blast proof control building. The 1976 Seveso incident expanded hazard identification and risk assessment as well as leading to the goal base Seveso directives. Bhopal in 1984 highlighted the need to consider inherently safer design principles. Piper Alpha in 1988 raised awareness of permit to work systems and lead to goal based offshore regulation in the North Sea. Further understanding of management of change, particularly organisational change as well as alarm management came out of the Longford incident in 1998. The Texas City refinery explosion in 2005 further highlighted building safety as well as understanding process safety and lead metrics. In 2009 and 2010 the Montara and Macondo incidents highlighted the need for better regulatory oversight as well as identifying issues in

decision making and biases. Lastly in 2010 the Pike River coal mine explosion highlighted issues with the production verses safety paradigm (Kerin T. , 2016).

These latter incidents went beyond identifying only direct root causes, but also started to indentify cultural, organisational and human factors that led to the incidents. This resulted in process safety starting to engage more with sociologists and psychologist to better understand how improvements could be made beyond just engineering design. While there have been significant engineering advancements, that have resulted in safer designs, incidents continue to happen, suggesting we are still missing something in process safety management.

The overlap

There are many instances where there is an overlap between OHS and process safety tools or requirements. Some examples include safe work systems, management of change, procedures and training to name a few. This overlap can be a very valuable starting point to raise awareness. A detailed example is given in the OHS Body of Knowledge *managing process safety* chapter (Kerin P. P., Managing process safety, 2017) utilising a liquefied petroleum gas tanker as an example. An excerpt is shown here in Table 1.

Table 1 difference and overlap between OHS and process safety when considering a liquefied petroleum gas road tanker (Kerin P. P., Managing process safety, 2017)

Concept	Process Safety Specialist	Overlap areas	Generalist OHS Professional
Safety in design, including systems	Integrity of tank and delivery hoses, excess flow valves, breakaway protection on hoses, pressure relief, tanker overfill safeguard, electrical immobilisation, interlocks, earthing integrity during load transfer	Truck chassis design, load capacity, crash protection Site design, deluge cage design, gas and fire protection Shared understanding of requirements to ensure 'fit for purpose' design	Driver access to cab, posture issues in cab seating, weight and manoeuvrability of delivery hoses Dashboard design

Ideas to leverage

There are a number of ways in which we can bridge the gap, leading to better safety outcomes. These include cross discipline awareness, utilisation of existing tools, and structural considerations.

Cross discipline awareness

There are two angles to consider with cross cultural awareness. It is necessary for OHS professionals to have a greater understanding of process safety but it is also necessary for process safety professionals to have a greater understanding of OHS. This is because a singular focus from either group can introduce hazards and result in poor safety outcomes.

There is always an issue with resourcing, regardless of what part of an organising you are in. Shared resources can be leveraged to improve safety outcomes. As an example, there are usually multiple OHS personnel in an organisation that is geographically spread, while there will be less process safety specialists. Providing some basic process safety knowledge to OHS professionals means an organisation has more eyes looking at process safety. This is not to say that the OHS professionals should be solving the process safety issues, but should know enough to recognise a potential issue and raise it with the process safety professionals. The OHS Body of Knowledge process safety chapters are a starting point for this knowledge sharing. (Kerin P. P., Managing process safety, 2017) (Kerin P. P., Process hazards (chemical), 2017).

Conversely when a process safety professional is on site or undertaking a review, the ability to recognise an OHS issue and call in OHS professionals also adds value to the organisation. The recently published OHS Body of Knowledge *Managing process safety* (Kerin P. P., Managing process safety, 2017) chapter references two examples, where decisions made by one group in isolation resulted in additional hazards being introduced. In both cases, a holistic approach could have minimised these additional hazards.

Utilisation of existing tools

Due to the longer history in OHS, there have been many stages of evolution in tools and communication techniques. OHS professionals have also been working on the concepts of engaging workers in safety for longer and have learnt what works and what may be less effective. Some specific examples include safe work systems, worker interaction models and safety shares. All of these tools exist in one form or another within OHS systems. It is possible to extend them to include process safety elements, so that process safety is not an 'add on' to the business, but integrated within an existing way of working. A suitable knowledge of process safety is required by those using the tools, so training and coaching in this area is still important. It is also vital for participants to understand why process safety is important. If this is not understood, it is easy to gloss over or skip the harder questions, which could result in missing a vital piece of information.

Safe work systems are widely used in facilities that have both major hazard and OHS risks. A safe work system will have both OHS and process safety controls required to keep both the worker and the facility safe in the course of maintenance activities. As the safe work systems are most often owned by the operations or OHS functions, it is important to ensure that appropriate process safety considerations are included. To ensure that the systems are working, there should be a spot check process on permit that are in service as well as closed. This helps to show that the system is working or what improvements need to be made. These checks should look at both the OHS and process safety controls that are referenced.

Worker interaction models are used for a number of purposes. Where there is a model that requires discussion on safety matters in a one on one basis, this can be modified to incorporate process safety topics. This can be used to raise the awareness of process safety as well as identify potential problems. Implementing this type of addition to an interaction process does require up skilling of the people having the discussion to understand the process safety implications and why they are important. By incorporating process safety in here, process safety can be integrated without the introduction of a new system.

Safety shares are a way of showing organisation commitment by ensuring each meeting is started with a brief discussion on safety. There does need to be care taken with this model, as it can sometimes lead to a tick box mentality on safety by talking about something irrelevant just to cover the agenda item. Sometimes a better model is to have specific safety share meetings, rather than having every meeting, regardless of topic started with a safety moment. Process safety can however leverage off the concept by ensuring that relevant process safety information is available for these moments. For example in a facility that operates at high pressures, a brief discussion on how well the pressure relief devices are working from maintenance testing records would be more relevant that a discussion on wearing seatbelts in cars. While seatbelts are a valid safety topic, it is not as relatable in the workplace where no driving is done, but where pressure control is vital.

Structural consideration

There are multiple schools of thought on how safety resources in an organisation should be structured. In terms of where safety sits in an organisation structure, some believe that safety should report to the most senior role, others believe it should sit under the human resources or operations functions. In terms of how the safety personnel are structured, some believe process safety should sit with the engineering function while others believe it should be incorporated into the OSH function. The author believes there is no right or wrong structure and has worked under several of the models discussed. The vital element for any model is clear lines of communication and accountability. There are advantages and disadvantages to all options.

Firstly, considering the functional structure, Table 2 highlighted disadvantages and advantages. Leveraging of the advantages while managing of the disadvantages could result in better safety outcomes.

Table 2 Functional Structure

Structure	**Disadvantages**	**Advantages**
Safety executive	• Large size of executive • Executive may be OHS and not understand process safety or vice versa	• Potential to input safety considerations for business decisions • Safety seen as a non negotiable like production
Safety in human resources	• Process safety is about more than people • HR executive may not be able to convey appropriate safety messages	• Small size of executive team
Safety in operations	• Operations as master may sideline safety for production	• Deep engagement in operational aspects of business

Table 3 looks at the disadvantages and disadvantages of the different structures of the safety groups. Again, leveraging of the advantages while managing of the disadvantages could result in better safety outcomes.

Table 3 Group Structure

Structure	**Disadvantages**	**Advantages**
Process safety in engineering	• Possible lack of engagement with OHS • Segregated from operational	• Professionals influencing engineering designs within the group • Maintaining continued

	pressures	engineer professional development
Process safety in operations	• Possible lack of engagement with OHS • Difficulty in influencing operations when embedded within it	• Professionals at the worksite and accountable for operations
Process safety in OHS	• Possible lack of engagement with engineering and operations • Technical field 'lost' within general disciplines	• Integrated approach to managing safety • Leverage common systems, such as safety management system for process safety implementation • Leverage off multiple resources in an organisation looking at process safety

Conclusion

Both process safety and OHS incidents continue to occur, so something must change if we are to address this. One potential remedy is to bridge the divide between OHS and process safety and start to leverage improvements from both. This will not solve all the issues, but it offers a chance to address some.

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Presenting author biography

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After graduating with honours in mechanical engineering, Trish spent several years working in project management, operational and safety roles for the oil, gas and chemical industries.

Trish's passion for process safety saw her take on advisory committee roles with the Plastics and Chemical Industries Association (PACIA), WorkSafe Victoria Major Hazards Advisory Committee and represented the Australian Chamber of Commerce and Industry (ACCI) to Safe Work Australia.

Trish currently sits on the board of the Australian National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) and is a member of the Mary Kay O'Connor Process Safety Center steering committee.

Trish is a Chartered Engineer, a registered Professional Process Safety Engineer and Fellow of IChemE. She holds a diploma of OHS is a graduate of the Australian Institute of Company Directors (GAICD) and a Fellow of Engineers Australia (FIEAust).

Recent awards include the Engineers Australia – John A Brodie Medal – for best paper at the Asian Pacific Confederation of Chemical Engineering Congress 2015 (incorporating Chemeca). The award recognises Trish's peer reviewed paper on *Process Safety Competency*.

Trish now leads the IChemE Safety Centre, a global industry consortium focused on advancing process safety.