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Modelling the Reporting Culture within a Modern Organisation

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Research shows that there are many factors that can influence the operation of a “Reporting Culture” within organisations, ranging from the attitudes to the workers, to the methodology implemented, to the managerial attitudes within the organisation (Reason, 1998). Understanding and modelling these factors may help develop an optimum reporting system. Historically, research has focused on the concept of “Near Miss Reporting” which is based on the idea of identifying the “bottom” of the safety triangle concept put forward in Heinrich (1941) which suggests that for each accident there are dozens of near misses, and identifying these near misses will hopefully allow faults, errors, design problems to be assessed and mitigated before they can allow an accident to develop. Reporting near misses is a key factor in a proactive Reporting Culture.

Before any improvement strategy for the reporting culture or system can be developed an organization should be able to understand its current practices and the key influencing factors around them. Therefore in the current paper we start by presenting a model based on a real world case study developed to highlight areas where improvements can be made. Concurrently, a model of best practice is also to be developed as a terms of comparison with the current practice to help generate recommendations to improve reporting. The model could also potentially allow any new practice to be assessed before it is tested in the real world.

The mapping of current practices was based on a number of semi-structured interviews with both managerial staff and the day-to-day staff in a pharmaceutical company. This was undertaken to determine the culture within the organisation, the reporting process, the factors that influence the reporting culture, etc. The data from these interviews allowed the drafting of a model detailing the reporting process and structure within the organisation. In modelling these processes a software tool called SCOPE was used to create a visual model of the main reporting tasks and the actors and equipment involved. The tool also facilitated the mapping out of relationships between actors, managers, resources, information systems, KPIs etc. Those relationships and the factors that than can influence these entities can then be analysed using a preliminary hazard analysis and an information-mapping module within the tool. The expected benefit of the work is the improvement of reporting practices in the organisation and the validation of the factors influencing reporting.

1. Introduction

1.1 Background

Learning from mistakes or previous incidents has long been seen as a method of improving the safety level within organisations. To safeguard against human errors, past operator experiences can be collected and utilised to improve safety (Tsukada and Kotani, 2001). Within the aerospace and process industries there have been a number of efforts to achieve this, ranging from Near Miss Reporting to more proactive methodologies of data collection such as day-to-day reporting. Accident reports commonly suggest that often before a loss or accident someone had detected an anomaly but had not reported it using a reporting system (Leveson, 2011). Organisations generally rectify this shortcoming by implementing a series of short term “fixes” such as improving training or implementing Behavioural Based Safety approaches (Leveson, 2011).

Within the aerospace industry there have been developments to include reporting within the safety culture of the organisation (Gramopadhye and Drury 2000). There is pressure for the regulators to maintain a good safety culture as a sound aviation maintenance and inspection system is seen as important to maintain a safe reliable organisation (Federal Aviation Authority, 1991).

Accidents such as American Airlines Flight 191 where an unsafe maintenance procedure was the cause of a catastrophic failure (National Transportation Safety Board, 1979) or the Flixborough disaster where unsafe maintenance procedures were employed leading to a leak of flammable product demonstrate the requirement for a risk assessment that collects data dynamically, and allows the risk assessment to be dynamically reviewed.

1.2 What is the Reporting Culture?

Reporting culture can be considered to be part of the organizational safety culture as a whole (Reason 1997). Safety Culture emerged from the social and behavioural psychology of the 1950s and 1960s (Cox and Cox, 1991). There have been a number of different definitions of safety culture, for example in Uttal (1983) safety culture (then referred to as Corporate Culture) is “a system of shared values (what is important) and beliefs (how things work) that interact with a company’s people, organizational structures, and control systems to produce behavioural norms (the way we do things around here)”. This definition was also used in Reason (1998) as the definition of Safety Culture. An alternative definition of organisational culture is given in Schneider (1987) where organisational culture is defined as the underlying assumptions about the world and about human nature. Schein (1973) describes safety culture as: “the basic assumptions that are invented, discovered or developed by a given group and then taught to new members”. Eurocontrol (2006) describes safety culture as “ways of doing things around here.” There is a considerable belief in industry that improving the safety culture will make an organisation more effective in preventing accidents (Baram and Schoebel, 2007). Safety Culture is frequently seen within industries to be a factor of improving safety awareness and responsibility (Porkka et al., 2013).

In Reason (1997) five components of safety culture were identified:

- **Informed Culture** – This is the system that collects data from events like accidents and near misses and integrates them with proactive measures such as safety audits, suggestions etc. This requires active involvement from all levels within an organisation to develop a safety culture, which is informed and provides a realistic image of the level of safety within the organisation.
- **Reporting Culture** – This is the organisational climate where workers will be willing to report near misses and accidents openly and honestly. There are many factors that influence this that will be discussed later. It is also intrinsically linked to the concept of Just Culture.
- **Just Culture** - This accounts for the fact that humans will make mistakes and is a policy where honest mistakes can be reported without any fears of ramifications in the hope of improving safety. However the “justness” has to be balanced by both sides so dangerous acts of negligence also have to be dealt with accordingly through culpability agreements etc. (Dekker, 2012)
- **Flexible Culture** - This is a culture that can manage safety related changes easily to meet changing demands, such as an increased requirement for output, new legislation or equipment failure.
- **Learning Culture** – This draws appropriate conclusions from any safety information collected along with the desire to implement changes to procedures and equipment as deemed necessary

Safety Culture has to be supported by management within the organisation; they can support a “good safety culture” by investing in and publicising workplace reporting systems (Johnson, 2003). If an organisation is seen to be seeking information on failures its safety record may appear to be worse than it would be without a reporting system (Johnson, 2003). Reason (1997) argues that more reports is a positive factor than a number of negative reports as there is more information on risks within the organisation that can be used to mitigate any potential organisational failings. Phimister et al. (2003) describes the following stages for incident reporting: Identify – Report – Prioritise - Causal Analysis – Solution Identification – Dissemination – Resolve. The Phimister et al. (2003) model reflects other research which emphasises the importance of correct dissemination and feedback as an integral part of the reporting structure (Williamson, 2013). People will not make reports if their submitted reports appear to go into a “black hole” with nobody responding to it, management have to provide adequate feedback to the reporters, this gives the impression that their reports are valued by management (Leveson, 2011).

2. Approaches to Reporting

Reporting is increasingly being accepted as an intrinsic requirement for any safety management system (McDonald et al. 2000). As a result of this there has been research into some of the factors that can positively and negatively influence reporting.

Management role in reporting has been seen as a primary factor for the uptake of reporting within an organisation (Reason, 1998). Research within industry has shown that the main barriers to reporting can include: the fear of being blamed, disciplined, embarrassed, or found legally liable (IMO, 2008) and these are most prevalent in an organisation that features a “blame orientated” culture (IMO, 2008). Other potential barriers are: unsupportive management attitudes such as complacency about known deficiencies (“it has happened before with no real consequences, so it won’t pose a future risk”), insincerity about addressing safety issues and discouragement of reporting of near-misses. Williamsen (2013) provides five fatal flaws that could undermine the reporting culture:

1. Upper management believes in the program and provides financial support, but managers are not engaged and do not know how to be
2. Safety professionals, who have the technology to be successful, struggle to effectively teach the organisation which is intuitive to them
3. Supervisors, who do not want workers to get injured but do not want more non-value added (questionable worth) work forced upon them
4. Hourly employees, who want to be safe, wonder “what’s in it for me” for reporting a near miss
5. Data management can be a red herring. When no or few reports are received, there is no data to analyse and problems remain unknown.

Kotter (1996) discusses several barriers that can prevent organisational change. In moving from a non-reporting organisation to an openly reporting culture, one of the barriers discussed is the organisational “status quo” and how organisations can become comfortable with near misses. Near Misses have no injuries, minimal property damage, and they leave little or no evidence; as such it is easy (often desirable) to ignore them (Williamsen, 2013). As a result there is the possibility that workers will have no reason to believe that these reports will be viewed positively and acted upon.

Leveson (2011) suggests that a poorly designed reporting system that involves additional steps such as logging onto a web-based system, one that is not part of normal operating procedure or environment, or a poorly designed form that requires reporters to add a lot of extra information, or a form that is not flexible enough to allow them to enter the information they want to provide can discourage people from taking part in the reporting process.

There are several methodologies that can be used to help overcome these barriers and establish a positive reporting culture within an organisation. In Peterson (1993) there are six criteria of “safety excellence” that can be put into place to improve the safety culture.

1. Top management is visibly committed to the process
2. Middle management is actively involved in the program
3. Supervisor performance is focused
4. Hourly employees are actively participating
5. System is flexible to accommodate site culture
6. System is perceived as positive by the hourly workforce

A common result of accident investigations is to suggest that organisations improve their reporting system to provide additional training in how to utilise it. However this response may be effective in the short term but people will eventually revert back to their prior behaviour (Leveson, 2011).

Research, such as in Leva et al. (2010), highlights the benefits of implementing reporting as part of day to day operations; day-to-day reporting allows front-end personnel to act as a form of auditors of their organisation continuously and allows the level of risk within an organisation to be constantly monitored (Leva et al. 2010). There have been other developments in reporting methodologies; Wiegmann and von Thaden (2003) developed the “critical event reporting tool (CERT)” which was a form developed to collect event related information and to provide a free text way for pilots to think about and document the reasons why an incident occurred and the factors leading up to it (Wiegmann and von Thaden, 2003).

To collect the most accurate data from an event a reporting system has to be completed as soon after the event as possible; Ericsson and Simon (1980) suggest the process of recalling an event is limited by the capacity of the short-term memory to the point where only the most recent experiences are directly reachable. Implementing a reporting system that fits into the day-to-day operations of the organisation and is filled, as a matter of routine will improve the quality of reporting within the organisation.

2.1 Modelling Reporting

One method that can be used to analyse a reporting system is to model the process using a task modelling technique. It is intended to use "SCOPE". SCOPE (Leva et al., 2011) is a software tool and a methodology that creates a visual model allowing an in-depth analysis of a task to be completed. By allowing relationships between actors, managers, resources, information systems, KPIs etc. to be included in the model, the relationships and the factors that can influence these entities can then be analysed using SCOPE. Leva et al. (2010) suggest that task modelling such as SCOPE can be utilised to map the current process within the industry, and to allow the task analysis of the reporting system to take place. This will allow analysis of the organisation's reporting system to take place. The expected benefit of the work is the improvement of reporting practices in the partner organisation and the validation of the factors influencing reporting.

2.2 Description of the Case Study

The reporting cultures within different domains will be studied using this approach. So far the reporting system within a process industry organisation has been successfully modelled after interviews with management staff, currently the models have not received input from the reporting staff however this is planned for the future. A second case study is planned with an organisation from the aircraft maintenance overhaul industry; a similar approach will be followed, and this will allow the current practice between two companies representative of two different industrial sectors to be analysed and compared.

2.3 Research Methodology

This study forms part of an overall research project; which intends to implement an action research methodology to study current reporting standards within various industries and to develop and test a best possible practice for risk reporting within an organisation. Initially the current practice was modelled and to achieve this a series of site visits were completed and a series of semi-structured interviews with management took place to determine the current reporting system.

The data from these interviews was coded and used to develop a series of models using SCOPE that will allow the current practice to be represented visually. The next phase will be to survey reporting staff to determine the cultural attitude and to seek validation of the model from the people using the system.

2.4 The Models

The information from the interviews was used to develop a series of SCOPE models detailing the process; there are too many to include in this short paper, however an example is shown in the Figure 1. SCOPE uses an adaptation of the standard Business Process Modelling iconography. Figure 1 shows a decision that will be taken by a Safety Manager, regarding the classification of an incident where a Good Save (near miss) would be treated differently by management, which is indicated by the deviation flow, each deviation flow will then lead to two different sub-graphs which indicate the processes for dealing with good saves and incidents.

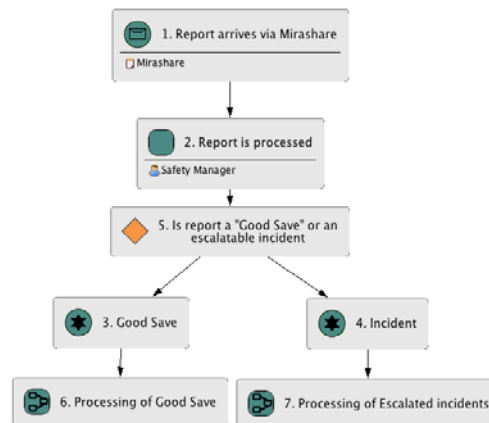


Figure 1 : SCOPE model showing a decision process within the reporting system

The SCOPE model allows the relationships between actors, information flows etc. to be studied, and areas of vulnerability (tasks which can affect the whole process) can be explored using the SCOPE models.

Node	Deviation	Antecedent	Consequences	Critical Gate	Safeguards	Sev.	Like.	Risk	Recommendation
2 Report is processed	People Availability Safety Manager Not able to process report	People Availability Ill Health	Efficiency No reports handled	Is report a 'Good Save' or an escalatable incident	People Availability Have other staff to assist	1	4	4	N/A

Figure 2 An example of a HAZOP from SCOPE

The model produced with SCOPE can be utilised to analyse the reporting system within an industrial partner. Workshops will be held with management staff and with reporters to assess the reporting system and identify ways of streamlining and improving the system. SCOPE will be implemented both to assess the current reporting structures and to assist in the development of a new day-to-day reporting system. SCOPE also allows for a preliminary hazard analysis to be completed showing potential areas for improvement within the reporting system, an example is shown in Figure 2. In addition, SCOPE allows for a visual description of the information map showing information and means of communication shared among users so as to help highlight areas of a system where vulnerabilities in the information flow can be found, and identify ways of mitigating them. An example of an information map is shown in Figure 3. The map shows that the reporting system success is heavily dependent on the reporters, safety management, culture and the supervisors; this backs up existing literature into this area, as discussed earlier on in the paper.

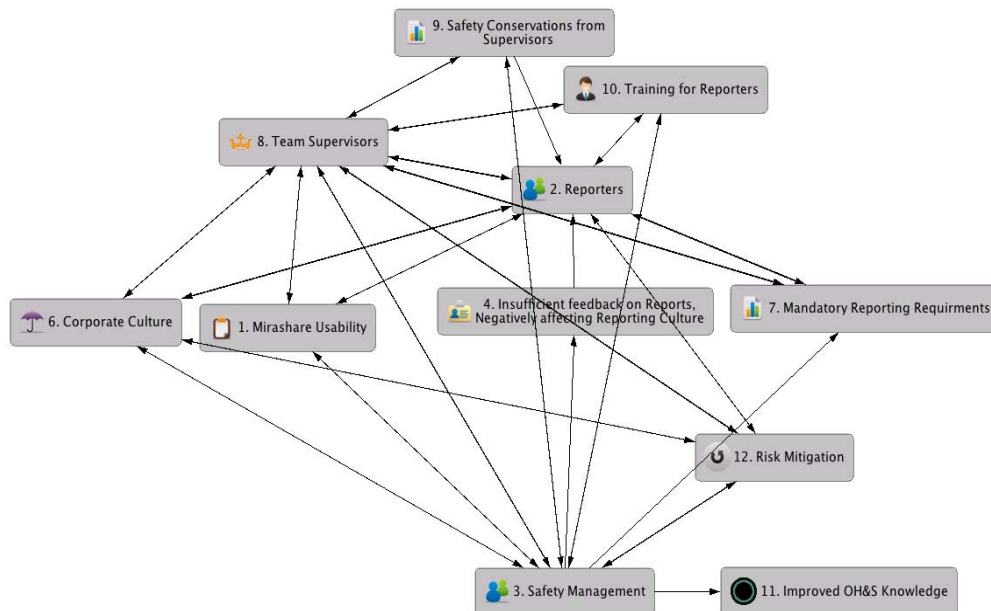


Figure 3 : SCOPE information map showing the areas of vulnerability within the process

3. Conclusion and Next Steps

Before an improved reporting system can be developed it is good practice to assess the current practice, to identify areas of improvement and assist in collecting feedback from stakeholders in the system. Modelling the process using a task modelling system such as SCOPE will assist with this process. The models will help establish the current industrial practice and will allow a comparison between industries and the ideal theoretical practice to be drawn.

The next steps will be to interview the people who will be making the reports into the system and to complete a series of workshops that will validate the modelling process, and allow improvements to be suggested. The above process will be repeated within different industries, and will provide an insight into how the reporting systems are implemented across different industries. Once data has been collected from different industries a theoretical best practice reporting system will be developed, the implementation of a real world reporting system implementing this best practice will be undertaken and the effectiveness of the new system will be analysed.

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