

2015

The Identification of Assessment Criteria for a Safety Reporting Self-Assessment Tool

Maria Chiara Leva

Technological University Dublin, mariachiara.leva@tudublin.ie

Samuel Cromie

Trinity College Dublin

Ewan Douglas

Trinity College Dublin

Follow this and additional works at: <https://arrow.tudublin.ie/schfsehcon>



Part of the [Risk Analysis Commons](#)

Recommended Citation

Leva, M.C., S. Cromie, & Douglas, E. (2015). The Identification of Assessment Criteria for a Safety Reporting Self-Assessment Tool. *Irish Ergonomics Conference 2015*, At Trinity College Dublin - Centre for Innovative Human Systems, June 2015. doi:10.13140/RG.2.1.2649.7126

This Conference Paper is brought to you for free and open access by the School of Food Science and Environmental Health at ARROW@TU Dublin. It has been accepted for inclusion in Conference papers by an authorized administrator of ARROW@TU Dublin. For more information, please contact arrow.admin@tudublin.ie, aisling.coyne@tudublin.ie, gerard.connolly@tudublin.ie, vera.kilshaw@tudublin.ie.



This work is licensed under a [Creative Commons Attribution-NonCommercial-Share Alike 4.0 International License](#).

The Identification of Assessment Criteria for a Safety Reporting Self-Assessment Tool

E.Douglas, C.Leva, S.Cromie

*Center for Innovative Human Systems,
Department of Psychology,
Trinity College Dublin,
Éire*

Abstract

This paper describes the assessment criteria that have been identified for use within a self-assessment tool for risk reporting within an industrial context. An in-depth review of the available literature was carried out exposing the criteria discussed within this paper. The criteria target all areas of reporting from the design of the reporting interface to the cultural considerations and initiatives. These criteria will be refined and weighted using industrial case study experience and then developed into the full self-assessment tool.

Introduction

Why Reporting is Important within an Organisation?

Learning from near misses, previous mistakes and operational experience has historically been a cornerstone within safety management for as far back as the Heinrich, (1941) hierarchy of accident severity where it was shown that for every major incident there were many cases of smaller incidents and behind those smaller incidents there were many near misses that can occur within the organisation. This concept has remained a key consideration within safety management today with more recent models such as the Carter (2006) statistical model for accident prevention that suggests that an unidentified incident has both an unknown severity and an unknown likelihood and therefore an unknown level of risk to the organisation and the process and therefore will pose an unknown risk to the organisation which may in fact be critical to the operation

The commonly cited “Swiss Cheese” model by Reason (1998) suggests that an accident is the result of a combination of the weaknesses in defence barriers (i.e the holes in the cheese), therefore risk reporting can be seen as a methodology to identify the holes in these safety barriers. A famous example whereby risks were not adequately appreciated can be found within the Chernobyl disaster. In this accident a combination of a lack of operator experience, poor risk assessment, management pressure and poor plant design caused the disaster (Pidgeon & O’Leary, 2000). During the investigation into the accident, it was found that an almost identical situation had been mitigated at a similar power plant, the operators of the plant had reported the near miss to the atomic regulatory bodies but both regulators and plant operators did not act on their report undermining the whole safety management process (IAEA, 1991).

The lessons from incidents have driven organisations to develop and implement safety management systems (SMS). SMS systems take data that has been inputted from a variety of sources that can include reports submitted from staff within the organisation. These reports can pertain to concerns for safety, suggestions in addition to near misses and incidents. In order to improve the amount of “good” data leading into the system, SMS systems are frequently cited within accident reports as recommendations that should be implemented within the organisation (Leveson, 2011). However previous studies have found that reporting systems on site are underutilised and under used (Bhattacharya, 2012; Cromie et al., 2012; Leveson, 2011) organisations need to monitor the performance of reporting in order to ensure that a high level of reporting is maintained on site within the organisation. There is a considerable amount of literature that exists that looks into the influencing factors of reporting ranging from the design of the reporting system and procedure to the cultural elements that have to be considered within the process. This guidance does not currently provide a unified best practice and methodology which is one of the key inputs of the system.

Why should reporting be assessed with an organisation?

As discussed in the previous section, reporting systems are an important element of safety management/ Maintaining compliance is a key concern for all safety critical industries (Leveson, 2011) and this therefore causes simple compliance to be cited as the reason for the development of Safety management systems and in turn reporting systems. The use of regulations being the main motivational factor for reporting can introduce ramifications for a reporting system. There is a real risk that an organisation will set up a reporting system in order to “tick the box” and then just neglect to act on the data they are inputting which can result in a reporting system that isn’t used within the organisation as found within previous industrial studies (Cromie et al., 2012; Kongsvik, Fenstad, & Wendelborg, 2012) where the level of reporting declined soon after the reporting system was implemented and the opportunity to use reporting to reduce the level of risk within an organisation was missed.

In Reason (2004) a safe organisation is described as an organisation whereby there is a large amount of knowledge being inputted into Safety Management. A complete lack of reports demonstrates an organisation with a low level of risk awareness. In Reason (2004) a safe organisation is described as an organisation whereby there is a large amount of knowledge being inputted into the SMS. A complete lack of reports demonstrates an organisation with a low level of risk awareness. In the statistical model for accident causation developed by Carter and Smith (2006) a hazard that is not identified can have both a fully unknown level of severity and likelihood and therefore an unknown level of risk. Therefore it is crucial for organisations to ensure the reporting system is utilised as much as possible in order to maintain a high level of safety knowledge. Despite this there is a tendency for an organization to implement a reporting system and then fail to ensure that the system is actually identifying hazards etc. (Cromie et al., 2012; Leveson, 2011), Reason (2004) argues that a low number of hazard and near miss reports are not an indicator of a safe organization but an indicator or an organization that has poor risk management. Therefore there is an opportunity to develop a methodology that will allow organizations to assess their reporting system. It is proposed to have two areas of assessment, one focusing on the individual role within reporting and a second looking at the managerial oversight for reporting:

- Individual focus of reporting – A survey methodology
- Managerial focus of reporting – A Reporting Self Assessment Tool (R-SAT)

The R-SAT will be a software tool that will allow organizational management to assess the key influencing factors of reporting based on the assessment criteria that will be discussed within this paper.

Identification of Criteria

A high level overview of a reporting process was established. This was used to provide guidance to assist in investigating the existing literature and case studies to distil the main requirements and objectives of reporting systems and use them as the basis of the high level evaluation criteria. The criteria identified through this process are shown in Table 1 and a discussion on how and where they were identified in the literature is reported in the following chapter. Once these categories were established an in-depth literature review was carried out and the individual assessment criteria were developed:

Table 1 Assessment Criteria

Evaluation Criteria	Sub Criteria
Meeting the Requirements of the Regulatory Environment	Regulatory Requirements
	“Good Practice”
Usability of reporting forms and feasibility of reporting Procedure	Reporting Form Design
	Reporting Procedure
Provision and value of Feedback	Feedback loop To Reporters
	Value of Feedback for the organization
	Value of good catches to the organisation
Education and Promotion of the Reporting System	Training
	Reporting Awareness
Motivation	Safety Culture
	Stimulation of Reporting
External Influences from the Industrial sector	External factors

Identification of Assessment Criteria

Meeting the Requirements of the Regulatory Environment

The Regulatory Environment will vary depending on the industry that is being assessed. Typically safety critical industries such as Aerospace and the Process industry have fairly strict regulations governing the use of reporting systems within Safety Management. To develop and validate the R-SAT it is proposed to develop and validate two regulatory assessment criteria, one targeting the (Civil Aviation, 2013; European Aviation Safety Agency, 2013) and the other targeting the European Commission (1994) regulations of pharmaceutical good manufacturing practise regulations.

Table 2 Aerospace Reporting Requirements

Reference	Criteria
4.5.3	The Organisation has a SMS Manual which communicates the SMS policy to the whole organisation and provides the following: <ul style="list-style-type: none"> • Scope of the SMS • Objectives of the SMS

	<ul style="list-style-type: none"> • Hazard Identification and Risk Management schemes • Incident Investigation and Reporting plans • Just Culture policy and Culpability Definitions are propagated to staff • The SMS is promoted on site
5.1	The organisation has a process of on-going hazard identification
5.1	The organisation has a process of hazard identification and reporting using a mixture of reactive and proactive approaches including safety surveys, near miss reporting, hazard reporting systems etc.
6.1.1	Safety audits are implemented to ensure that the SMS is sound in terms of: <ul style="list-style-type: none"> • Adequate staff levels • Levels of competency • Achievement of Safety Policy and Objectives • Effectiveness of interventions and risk mitigations
6.1.2	Safety and Cultural surveys are used to examine the effectiveness of a specific operation and can use: <ul style="list-style-type: none"> • Checklists • Questionnaires • Interviews
6.3	The Organisation seeks to improve SMS performance, continuous improvement could be achieved through: <ul style="list-style-type: none"> • Proactive and reactive evaluation of day-to-day operations through safety audits or surveys • Evaluation of an individual's performance to verify the fulfilment of their safety responsibility • Change Management
7.2	Safety Communication, the SMS is propagated by : <ul style="list-style-type: none"> • Policies and Procedures • Newsletters, safety bulletins etc. • Websites and e-mail • Informal workplace meetings etc.
7.2.1	Staff should be familiar with the SMS and the Organisational Safety Culture: <ul style="list-style-type: none"> • Disseminate safety critical information • Feedback explains why actions are taken

Table 3 GMP Regulation

Reference	Criteria
1.8 (vii)	Any significant deviations are fully recorded, investigated with the objective of determining the root cause and appropriate correction and preventative action implemented
1.10 (iv)	A review of all significant deviation or non-conformances, their related investigations and the effectiveness of resultant corrective and preventative actions taken
1.12	Quality risk management is a systematic process for the assessment, control, communication and review of risks to the quality of the medicinal produce. It can be applied both proactively and reactively.

Usability of reporting forms and feasibility of reporting Procedure

This concerns the design of the reporting form and the procedures surrounding reporting. There

has been previous research into design considerations for the reporting form. Shown below in Table 4 Reporting System Design the assessment criteria for the form design, considering the ethos of reporting, design considerations based on the referenced literature

Table 4 Reporting System Design

Reference	Criteria
Kongsvik, Fenstad, & Wendelborg, (2012) Leva et al. (2010) Evans et al., (2006).	The reporting system is implemented with a view to reduce additional paperwork and ideally should aim to reduce the paperwork reporting staff
Boeing Airplane (2000), Leveson (2011)	The reporting form allows reporters to share information that focuses outside of the act of the error including influencing factors such as environmental, workload etc.
Williamsen (2013)	The form is constantly reviewed for its suitability for purpose
Lappalainen et al., (2011)	Efforts are made to ensure that the reporting form is clear concise and to the point
(Johnson, 2002; Leva, Cahill, et al., 2010)	Any electronic reporting forms that are developed are intended to be easily accessible
Leva et al. (2010) (Lappalainen et al., 2011) (DePasquale & Geller, 2013; Short & Keasey, 1997)	The reporting system is designed in such a way to require a minimum amount of time to submit a report. The Organisation monitors the time impact report submission has on reporting staff.
Cohen (2000) Dekker (2012)	Reports are encouraged to report not through mandatory approaches but out of interest for safety. Management actively reinforces this through the reporting procedure.
Dekker (2012)	The organisation is moving to a voluntarily reporting system if they are already not at the point.

Provision and value of Feedback

Feedback is commonly cited as one of the key motivational factors towards reporting (S. M. Evans et al., 2006; Sue M. Evans et al., 2007; McAfee & Winn, 1989; Reason, 1998; Sanne, 2008) therefore these criteria will be looking at the provision of feedback within the organization

Reference	Criteria
(S. M. Evans et al., 2006; Sue M. Evans et al., 2007; McAfee & Winn, 1989; Reason, 1998; Sanne, 2008).	The Organisation laid out procedures for the delivery and objectives of feedback within the organisation
Williamsen, (2013)	The quality of feedback within the organisation is monitored by management
(Dekker & Stoop, 2012)	If a mitigation isn't available or feasible, then steps are taken to explain to the reporter why
(Douglas, Cromie, Leva, & Balfe, 2014)	There is a feedback loop for reporting within the organisation

Education and Promotion of the Reporting System

These criteria concerns the efforts implemented towards educating reporters and promotion initiatives of the reporting system within the organization. These criteria will focus on the operational

Reference	Criteria
(Erdoğan, 2011; Leveson, 2011)	The Organisation has clear concise guidelines for the use of safety reporting within industry
(Baram & Schoebel, 2007; Krugh & Sommers, 2010; Storgård, Erdogan, Lappalainen, & Tapaninen, 2012)	The Organisation makes efforts to make staff aware of the importance of reporting on site, and avoids target based approaches
(Cohen, 2000)	The organisation has a voluntarily approach to reporting or plans to move to a voluntary approach
(McAfee & Winn, 1989)	Positive mitigations are used as an example to encourage more reports
Douglas et al. (2015)	There are efforts to remind staff about the existence of and benefits to the reporting system

Motivation

These criteria look into the motivational techniques management can implement to stimulate reporting on site focusing on the cultural considerations

Reference	Criteria
(Reason, 1998; Waring, 2005; Williamsen, 2013)	The organisation has a clear culpability agreement that makes staff aware of what types of behaviour and reports are acceptable or not
Reason, 1998; Waring, 2005; Clarke (1998b)	Reports are seen as simply a way to improve safety and not a way to catch people out for unsafe behaviour
Reason, 1998;	The Organisation implements an approach to advertise positive mitigations as a result of the SMS system
Waring, 2005;(Clarke, 1998a; Sue M. Evans et al., 2007; Walton, 2006)	Efforts are made to break the seniority gradient within the organisation so that junior staff have the confidence to report safety concerns and near misses involving more senior staff.
(Smith, 1999)	The organisation is avoiding Behavioural Based Safety approaches and is instead trying to help instil the attitude that reports improve the safety of someone's working environment and can provide a net benefit to their own safety

External Influences on the Organization

These final criteria look at the role of external factors on the organization. These factors can range from recent incidents within the industrial sector, litigation problems such as Freedom of

Information requests. These factors will not be under influence of the management but they can have an effect on the reporting system performance

Reference	Criteria
Waring, 2005; (Sue M. Evans et al., 2007)	Efforts are made to protect reports from litigation such as freedom of information effects
(Leveson, 2011)	Accidents within the industry are discussed within the organisation and report recommendations can be used as a driver for reporting
(Reason, 1998)	The reporting system is developed with cooperation by unions and other interest lobbies

Further Work and Conclusions

The assessment criteria discussed in this paper will be further refined using case study experience in the Biopharma and Aerospace industries where surveys and semi structured interviews have been carried out to help expose additional areas of assessment. In addition the case studies will allow the weighting of the assessment criteria to be determined to help assist in the development of a quantitative assessment of the organizational reporting culture which combined with techniques such as dashboards etc. will allow a safety manager to drill down and determine the areas that will need attention and improvement. .

References

- Baram, M., & Schoebel, M. (2007). Safety culture and behavioral change at the workplace. *Safety Science*, 45(6), 631-636. doi: 10.1016/j.ssci.2007.04.001
- Bhattacharya, S. (2012). Sociological factors influencing the practice of incident reporting: the case of the shipping industry. *Employee Relations*, 34(1), 4-21. doi: 10.1108/01425451211183237
- Boeing Airplane, C. (2000). Maintenance Error Decision Aid (MEDA) - Users Guide. Seattle WA.
- Carter, G., & Smith, S. D. (2006). Safety Hazard Identification on Construction Projects. *Journal of Construction Engineering and Management*, 132(2), 197-205. doi: 10.1061/(ASCE)0733-9364(2006)132:2(197)
- Civil Aviation, A. (2013). CAP 716 Aviation Maintenance Human Factors (EASA / JAR145 Approved Organisations).
- Clarke, S. (1998a). Organizational factors affecting the incident reporting of train drivers. *Work & Stress*, 12(1), 6-16. doi: 10.1080/02678379808256845
- Clarke, S. (1998b). Safety culture on the UK railway network. *Work & Stress*, 12(3), 285-292. doi: 10.1080/02678379808256867
- Cohen, M. R. (2000). Why error reporting systems should be voluntary. *BMJ*, 320(7237), 728-729. doi: 10.1136/bmj.320.7237.728
- Cromie, S., Liston, P., Ross, D., Corrigan, S., Vani, L., Lynch, D., & Demosthenous, S. (2012). Evaluation report on Phase 1 of the (The Company's) Human Factors and Safety Management Programme 2011-2012: Trinity College Dublin. Dublin: Trinity College.
- Dekker, S., & Stoop, J. (2012). Are safety investigations pro-active? *Safety Science*, 50, 1422-1430.
- DePasquale, J. P., & Geller, E. S. (2013). Reprint of "Critical Success Factors for Behavior-Based Safety: A Study of Twenty Industry-wide Applications". *Journal of Safety Research*, null(null). doi: 10.1016/j.jsr.2013.07.007
- Douglas, E., Cromie, S., Leva, M. C., & Balfe, N. (2014). Modelling the Reporting Culture within a Modern Organisation. *Chemical Engineering Transactions*, 36, 589-594. doi: 10.3303/CET1436099
- Erdoğan, I. (2011). *Best Practices in near-miss reporting*.
- European Aviation Safety Agency. (2013). EASA Part 145 2013-01 (Vol. 0251).
- European Commission. (1994). Directive 94/9/EU of the European Parliament and Council. *Official Journal of the European Union*(100), 1-7.

- Evans, S. M., Berry, J. G., Smith, B. J., Esterman, A., Selim, P., O'Shaughnessy, J., & DeWit, M. (2006). Attitudes and barriers to incident reporting: a collaborative hospital study. *Quality & safety in health care*, *15*(1), 39-43. doi: 10.1136/qshc.2004.012559
- Evans, S. M., Smith, B. J., Esterman, A., Runciman, W. B., Maddern, G., Stead, K., . . . Jones, S. (2007). Evaluation of an intervention aimed at improving voluntary incident reporting in hospitals. *Quality & safety in health care*, *16*(3), 169-175. doi: 10.1136/qshc.2006.019349
- Krugh, K. a., & Sommers, J. R. (2010). Safety Observation System and Near Miss Reporting Programs: Methods to maintain employee engagement in behavioral based safety practices. *2010 IEEE-IAS/PCA 52nd Cement Industry Technical Conference*, 1-10. doi: 10.1109/CITCON.2010.5470071
- Leveson, N. G. (2011). *Engineering a Safer World*. Cambridge ,MA: Massachusetts Institute of Technology.
- McAfee, R. B., & Winn, A. R. (1989). The use of incentives/feedback to enhance work place safety: A critique of the literature. *Journal of Safety Research*, *20*(1), 7-19. doi: 10.1016/0022-4375(89)90003-0
- Reason, J. (1998). Achieving a safe culture: Theory and practice. *Work & Stress*, *12*(3), 293-306. doi: 10.1080/02678379808256868
- Reason, J. (2004). Beyond the organisational accident: the need for "error wisdom" on the frontline. *Quality and Safety in Health Care*, *13*(suppl_2), ii28-ii33. doi: 10.1136/qshc.2003.009548
- Sanne, J. M. (2008). Incident reporting or storytelling? Competing schemes in a safety-critical and hazardous work setting. *Safety Science*, *46*(8), 1205-1222.
- Short, H., & Keasey, K. (1997). Institutional Voting in the UK: Is Mandatory Voting the Answer? *Corporate Governance: An International Review*, *5*(1), 37-44. doi: 10.1111/1467-8683.00038
- Smith, T. A. (1999). What's wrong with behavior based safety ? *Professional Safety*(September), 1-8.
- Storgård, J., Erdogan, I., Lappalainen, J., & Tapaninen, U. (2012). Developing Incident and Near Miss Reporting in the Maritime Industry—A Case Study on the Baltic Sea. *Procedia - Social and Behavioral Sciences*, *48*, 1010-1021. doi: 10.1016/j.sbspro.2012.06.1078
- Walton, M. M. (2006). Hierarchies: the Berlin Wall of patient safety. *Quality & safety in health care*, *15*(4), 229-230. doi: 10.1136/qshc.2006.019240
- Waring, J. J. (2005). Beyond blame: cultural barriers to medical incident reporting. *Social science & medicine* (1982), *60*(9), 1927-1935. doi: 10.1016/j.socscimed.2004.08.055
- Williamsen, M. (2013). Near-Miss Reporting - A Missing Link in Safety Culture. *Professional Safety*(May).