



Safety culture maturity model

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1. Introduction

This report describes the development of a draft Safety Culture Maturity Model (SCMM) and the process involved in developing this model. The safety culture maturity concept is new and therefore it was important to explore the potential utility of a SCMM to safety improvement in the offshore oil and gas industry. The draft model produced has not been validated, as this was beyond the scope of this preliminary investigation. It is therefore important to note that the model is provided to illustrate the concept and it is not intended to be used as a diagnostic instrument.

The maturity model concept was initially developed by the Software Engineering Institute (SEI) as a mechanism to improve the way software is built and maintained¹. The model provides organisations with a five level process to assist them in developing their software engineering practices. The five levels are Initial, Repeatable, Defined, Managed and Optimising. The capability maturity model framework has been adapted to be used in other domains and to address issues, such as project management², human resources³, usability⁴ and quality⁵. The capability maturity model concept is useful because it enables organisations to establish their current level of maturity and the actions required to reach the next level.

The maturity model concept appears to be appropriate to safety culture development within the offshore oil and gas industry. The industry is currently trying to achieve an overall step change improvement in safety and it is perceived that behavioural and cultural issues need to be addressed to achieve this improvement. The offshore oil and gas industry are currently putting a considerable amount of effort into establishing best practice and identifying tools and techniques that are proven to be effective in improving safety. Whilst this approach is logical, its effectiveness may be limited by the heterogeneity in the safety culture across the industry. It is likely that companies or installations in the early stages of developing their safety culture will require different improvement techniques from those with strong safety cultures. Consequently a safety culture maturity model has been developed to assist organisations in (a) establishing their current level of safety culture maturity and (b) identifying the actions required to improve their culture.

2. Developing a draft Safety Culture Maturity Model (SCMM)

A review of publications describing capability maturity models used in other domains such as software engineering and usability was carried out in order to base the SCMM within an existing framework. HSE documents describing safety culture in general and specifically in the offshore oil and gas industry were reviewed to establish the principal components of an organisation's safety culture. A safety maturity model developed by DuPont⁶ was also examined. The information obtained from the above sources, was used to develop an initial draft of a SCMM.

The model was further developed and tested by interviewing and holding group discussions with safety experts, operational managers, safety representatives and frontline staff. Initially, two group discussions were held with senior managers and frontline staff from a petrochemical plant, recognised as best in class in terms of

safety performance. These sessions focused on describing the different levels of the SCMM. This organisation was selected because they appeared to have reached a high level of maturity and therefore could provide information about the different levels they had passed through and how they have achieved their current level of maturity. The results of these focus groups were used to produce descriptors for the five levels for each of the ten safety culture elements.

Interviews were held with senior managers, safety specialists and safety representatives from offshore oil and gas companies. The interviewer initially explained the SCMM concept and gave a brief outline of the terms and described the safety culture at each level. The interviewee was asked to describe their current level of safety culture maturity and to review the validity of the ten descriptors for a specific level of maturity, the terms used and the SCMM concept. The SCMM was revised in light of the results of these interviews.

3. Elements of an organisation's safety culture

The elements that form the safety culture maturity model have been adapted from the safety culture components listed by the HSE in HSG48⁷. It is unlikely that these elements will map exactly onto the factors that companies have previously measured in safety culture or climate surveys, because there is considerable variation in the proposed elements of an organisation's safety culture. Some researchers argue that safety culture is composed of the safety attitudes of an organisation's employees and others propose that it is much wider incorporating systems, attitudes, values, beliefs and organisational symbols. Safety climate tools tend to measure slightly different elements of safety culture. The elements used in the safety culture maturity model contain the most common components of both theoretical and measurement models.

The safety culture maturity of an organisation consists of ten elements, which are described below. An organisation's or installation's level of maturity is determined on the basis of their maturity on these elements. It is likely that an organisation will be at different levels on the ten components of the SCMM. Deciding which level is most appropriate will need to be based on the average level achieved by the organisation or installation being evaluated.

3.1. Ten elements of the safety culture maturity model

- Management commitment and visibility
- Communication
- Productivity versus safety
- Learning organisation
- Safety resources
- Participation
- Shared perceptions about safety
- Trust
- Industrial relations and job satisfaction
- Training

3.2. Assumptions of the safety cultural maturity model

Cultural or behavioural approaches to safety improvement are at their most effective when the technical and systems aspects of safety are performing adequately and the majority of accidents appear to be due to behavioural or cultural factors. The safety culture maturity model is therefore only of relevance to organisations that fulfil a number of specific criteria. These include:

- an adequate Safety Management System
- technical failures are not causing the majority of accidents
- the company is compliant with health and safety law
- safety is not driven by the avoidance of prosecution but by the desire to prevent accidents.

If an organisation does not meet these criteria then it would be more appropriate for them to focus their resources on the technical and systems aspects of safety as opposed to the behavioural and cultural aspects.

4. Five levels of safety culture maturity

The safety culture maturity model presented in Figure 1 overleaf is set out in a number of iterative stages. It is proposed that organisations progress sequentially through the five levels, by building on the strengths and removing the weaknesses of the previous level. It is therefore not advisable for an organisation to attempt to jump or skip a level. For example, it is important for organisations to go through the managing level before the involving level as it is important that managers develop their commitment to safety and understand the need to involve frontline employees.

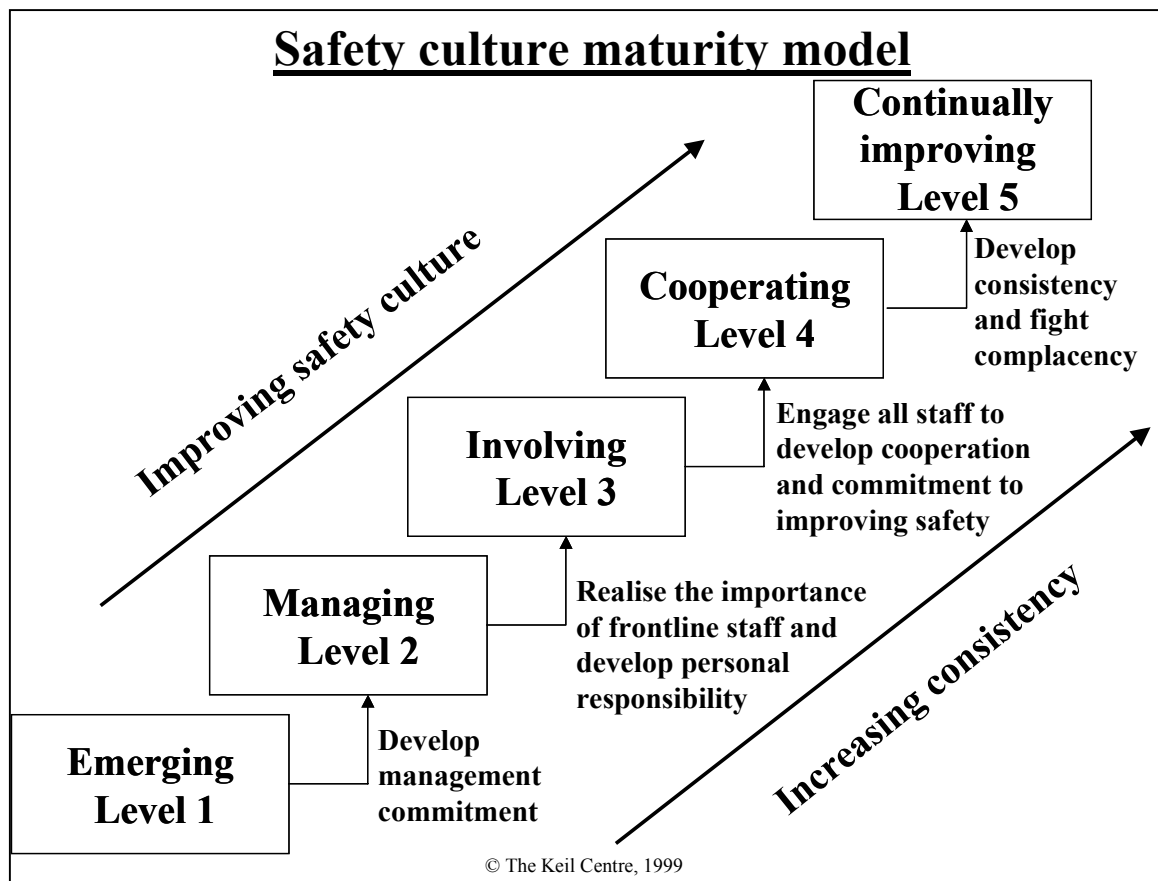


Figure 1: Draft safety culture maturity model

4.1.1. Level One: Emerging

Safety is defined in terms of technical and procedural solutions and compliance with regulations. Safety is not seen as a key business risk and the safety department is perceived to have primary responsibility for safety. Many accidents are seen as unavoidable and as part of the job. Most frontline staff are uninterested in safety and may only use safety as the basis for other arguments, such as changes in shift systems.

4.1.2. Level Two: Managing

The organisation's accident rate is average for its industrial sector but they tend to have more serious accidents than average. Safety is seen as a business risk and management time and effort is put into accident prevention. Safety is solely defined in terms of adherence to rules and procedures and engineering controls. Accidents are seen as preventable. Managers perceive that the majority of accidents are solely caused by the unsafe behaviour of front-line staff. Safety performance is measured in terms of lagging indicators such as LTI and safety incentives are based on reduced LTI rates. Senior managers are reactive in their involvement in health and safety (i.e. they use punishment when accident rates increase).

4.1.3. Level Three: Involving

Accident rates are relatively low, but they have reached a plateau. The organisation is convinced that the involvement of the frontline employee in health and safety is critical, if future improvements are going to be achieved. Managers recognise that a wide range of factors cause accidents and the root causes often originate from management decisions. A significant proportion of frontline employees are willing to work with management to improve health and safety. The majority of staff accept personal responsibility for their own health and safety. Safety performance is actively monitored and the data is used effectively.

4.1.4. Level Four: Cooperating

The majority of staff in the organisation are convinced that health and safety is important from both a moral and economic point of view. Managers and frontline staff recognise that a wide range of factors cause accidents and the root causes are likely to come back to management decisions. Frontline staff accept personal responsibility for their own and others health and safety. The importance of all employees feeling valued and treated fairly is recognised. The organisation puts significant effort into proactive measures to prevent accidents. Safety performance is actively monitored using all data available. Non-work accidents are also monitored and a healthy lifestyle is promoted.

4.1.5. Level Five Continuous improvement

The prevention of all injuries or harm to employees (both at work and at home) is a core company value. The organisation has had a sustained period (years) without a recordable accident or high potential incident, but there is no feeling of complacency. They live with the paranoia that their next accident is just around the corner. The organisation uses a range of indicators to monitor performance but it is not performance-driven, as it has confidence in its safety processes. The organisation is constantly striving to be better and find better ways of improving hazard control mechanisms. All employees share the belief that health and safety is a critical aspect of their job and accept that the prevention of non-work injuries is important. The company invests considerable effort in promoting health and safety at home.

5. Conclusions

All of the participants in this project indicated that the SCMM concept was useful and they could see how they could use it to develop their organisation's safety culture. The interviewees agreed with the assertion that the level of safety culture maturity influenced the appropriateness and effectiveness of different safety improvement techniques. They provided examples of incidents where certain behavioural safety interventions they had used would not work in an organisation that had not reached a specific level of safety culture maturity.

The interviews produced some interesting anomalies with large differences between frontline employees' evaluations of their organisation's level of cultural maturity and the evaluations of senior management. The frontline staff tended to indicate that their organisation was at a lower level than the level described by their managers. This

raises the question of which group's perception is the most accurate reflection of the true SCMM level.

It is important to note that while it is assumed that safety performance improves with increasing levels of maturity, there is no hard evidence to support this assumption. The assumption is based on research that compared high and low accident organisations, which revealed that lower accident organisations tended to display the features associated with higher levels of maturity. It is possible that these organisations had lower accident rates for reasons that were not measured in these studies.

While it is intended to develop the SCMM concept into a diagnostic tool, a significant amount of research is required before it can be used in this way. In its current format it is more appropriate to use the SCMM as a framework to facilitate further discussion of safety culture issues.

¹ Paulk, M.C., Curtis, B., Chrissis, M.B. & Weber, C.V. (1993) Capability Maturity Model, Version 1.1. *IEEE Software* 10 (4) 18-27.

² Fincher, A. & Levin, G. (1997) Project Management Maturity Model. Project management institute 28th annual seminars & symposium, pp 1028-1035 Chicago, Illinois.

³ Hefley, W.E., Curtis, B. Miller, S. & Konrad, M. (1995) People Capability Maturity Model incorporating human resources into process improvement programs. Proceedings of the annual international symposium- National council on systems engineering No 5 pp 559-566

⁴ Earthy, J. (1998) *Usability Maturity Model*: Lloyd's Register and the European Commission: London

⁵ Mohamed W. E. A. & Siakas, K.V. (1995) Assessing software quality management maturity: A new model incorporating technical as well as cultural factors. *Software Quality Management International conference* 1 (1) pp 325-336.

⁶ Thomson, P. (1997) Developing a safety culture in practice – interdependency and involvement. Paper presented at the safety culture in the energy industries conference: Aberdeen, University of Aberdeen, 22-24 September.

⁷ HSE (1999) *HSG48 Reducing error and influencing behaviour*, Norwich HMSO.



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