



Development and Challengey to Improve Nuclear Knowledge Management and Safety Culture

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1. Background and Goal of the present work

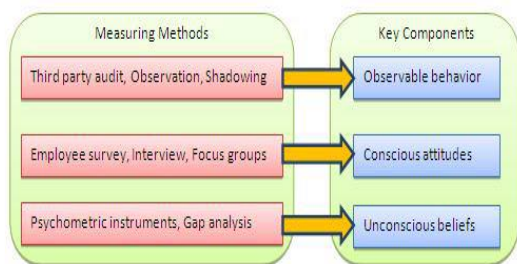
Today, there is universal acceptance of the significant impact that management and organisational factors have over the safety significance of complex industrial installations such as nuclear power plants.. The objective of this study is the development of new methods to increase and improve knowledge management for the safety of nuclear power plant operation focusing on commercial nuclear power plants that are intended for electrical power generation from a safety point of view, knowledge management , human performance and organisational factors perspective.

2. Safety Culture

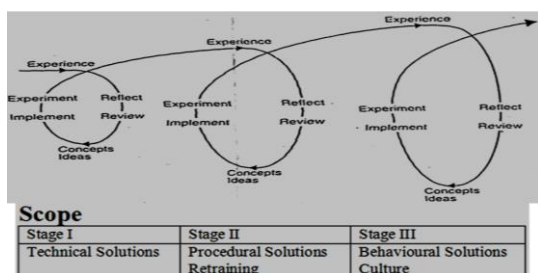
2.1. Safety Culture Assessments

The changing nature of safety culture makes it unlikely that such a measure will ever be found, So assessing progress in the development of safety culture should be based on identifying the range of indicators that reflect the individual sub-components. These component includes behavior, conscious attitudes and perceptions or beliefs. International Atomic Energy Authority series No.11 gave examples of methods that had been applied to measure these key components as shown in the following Figure. Ignoring the size of the organization, a prerequisite for the development of a good safety culture is the visible commitment of persons responsible for leading the organizations group. The process for the development of safety culture can be assisted by the use of a learning process within an organization.

A simple model based on the Kolb learning cycle is shown in the following figure . A person or organization learn by reflecting on what they have experienced, formulating concepts and ideas for change while continuing existing best practice. The implementation of such concepts and ideas is intended to improve performance and there by modify future experience. At an appropriate time this modified experience can itself be reviewed and lessons learned.



Measuring Methods for Safety Culture Components



2.2 - Knowledge management challenges

Today, increased attention is being given to phenomena such as learning organisations, human and organisational performance improvement, change management; knowledge management, and integrated management systems. As companies are increasingly recognising employees as being their most valuable assets, increased focus is being put on the critical roles that humans play in each of these phenomena. The increasing recognition of the invaluable nuclear power plant asset known as human or intellectual capital is having an enormous impact on the attention being paid to knowledge management (IAEA 2006).

Some of the knowledge management challenges that are faced by the nuclear industry include a complex technology base with a design basis as well as operation and management infrastructure. The nuclear power plant life cycle is very long, and there is a dependence on multidisciplinary technologies and extensive expertise. Stringent requirements for safety, nuclear quality assurance, and equipment and design configuration management must be maintained and achieved. A further question arises on how knowledge should be transferred to the younger generation. Knowledge transfer must be encouraged. National governments and also nuclear power companies should ensure that adequate education and training is made available in the nuclear industry (IAEA 2005).

2.3- Development of nuclear safety knowledge and management

As a field, knowledge management is relatively new. It is an amalgam of concepts borrowed from the artificial intelligence/knowledge based systems, software engineering, business process re-engineering, human resource management and organisational behaviour fields. Knowledge management has been the most visibly introduced to the nuclear industry as a response to the ageing nuclear industry workforce in IAEA member states, where the

generation that designed, commissioned and initially operated these plants has begun to reach retirement age. Knowledge management tools for capture and transfer of fundamental nuclear knowledge from the ageing workforce to its younger replacement have been emphasized.

A threat to sustaining nuclear competence, recognized for quite some time, has been the declining number of appropriately qualified young professionals entering the field. This trend has an adverse impact on preserving and further developing the accumulated nuclear knowledge and expertise. In nuclear power plant organizations the loss of institutional memory of nuclear knowledge could become the precursor of problems in nuclear safety. Therefore, the decline in

the number of students of nuclear sciences and a growing number of universities giving up their nuclear education programmes have given rise to understandable concerns (IAEA 2005). Over the last 60 years or so, industry first reduced accident rates by improving: hardware (effective guards, safer equipment); then improved employee performance (selection and training, incentives and reward schemes) and, then changed the way they manage and organise – especially, by introducing safety management systems. The table below lists the main factors; indicates what would show that you had a good safety culture, and what would support the safety culture. This can be used as

a very rough guide to assessing your safety culture or as a way of developing ideas for improving it.

A healthy safety culture is one where there is	This is shown when management	And is helped when management
Visible Commitment to Safety by Management	<ul style="list-style-type: none"> <input type="checkbox"/> Make regular <i>useful</i> visits to site <input type="checkbox"/> Discuss safety matters with frontline personnel <input type="checkbox"/> Will stop production for safety reasons regardless of cost <input type="checkbox"/> Spend time and money on safety e.g. to provide protective equipment, safety training, and conduct safety culture workshops or audits <input type="checkbox"/> Will not tolerate violations of procedures and actively try to improve systems so as to discourage violations e.g. plan work so that short cuts aren't necessary to do the work in time. 	<ul style="list-style-type: none"> <input type="checkbox"/> Makes time to visit site (not just following an accident or incident) <input type="checkbox"/> All show commitment <input type="checkbox"/> Has good non-technical skills (e.g. communication skills;) <input type="checkbox"/> Are also interested in workforce safety when they are not at work, e.g. provide information on domestic safety <input type="checkbox"/> Shows concern for wider issues e.g. workforce stress and general health <input type="checkbox"/> Actively sets an example (e.g. always conform to all safety procedures)
Workforce Participation and Ownership of Safety Problems and Solutions	<ul style="list-style-type: none"> <input type="checkbox"/> Consults widely about health and safety matters <input type="checkbox"/> Does more than the minimum to comply with the law on consultation <input type="checkbox"/> Seeks workforce participation in: <ul style="list-style-type: none"> • setting policies and objectives • accident/near miss investigations 	<ul style="list-style-type: none"> <input type="checkbox"/> Supports an active safety committee <input type="checkbox"/> Have a positive attitude to safety representatives <input type="checkbox"/> Provides tools or methods that encourage participation e.g. behavioural observation programmes & incentive schemes that promote safety
Trust Between Shop floor and Management	<ul style="list-style-type: none"> <input type="checkbox"/> Encourages all employees and contractors to challenge anyone working on site about safety without fear of reprisals <input type="checkbox"/> Keeps their promises <input type="checkbox"/> Treats the workforce with respect 	<ul style="list-style-type: none"> <input type="checkbox"/> Promotes job satisfaction/good industrial relations and high morale <input type="checkbox"/> Promotes a 'just' culture (assigning blame only where someone was clearly reckless or took a significant risk) <input type="checkbox"/> Encourages trust between all employees
Good Communications	<ul style="list-style-type: none"> <input type="checkbox"/> Provides good (clear, concise, relevant) written materials (safety bulletins, posters, guidance) <input type="checkbox"/> Provides good briefings on current issues day to day and in formal safety meetings; listening and feedback 	<ul style="list-style-type: none"> <input type="checkbox"/> Encourages employee participation in suggesting safety topics to be communicated <input type="checkbox"/> Provides specific training in communication skills <input type="checkbox"/> Has more than one means of communicating
Acompetent Workforce	<ul style="list-style-type: none"> <input type="checkbox"/> Ensures that everyone working on their sites is competent in their job and in safety matters 	<ul style="list-style-type: none"> <input type="checkbox"/> Is supportive Has a good competence assurance system

The four discernible elements of external knowledge management activities, which have been identified by the member states, are (IAEA 2005):

- Enhancing nuclear education and training
- Preserving and maintaining nuclear knowledge
- Pooling and analysing nuclear knowledge
- Promoting policy and guidance for nuclear knowledge management

3- Conclusion

We can conclude that as technology develops, the analysis, methods, and procedures to ensure safety must also be developed accordingly. The general starting point has been that safety culture is a part of organisation culture. The concept-analytical part of the study discusses the background of the safety culture concept in order to understand how safety culture can be deduced from the basic principles of organisation culture. Safety depends not only on the technical systems, but also on the people and the organisation. The best safety and health programs involve every level of the organization, instilling a safety culture that reduces accidents for workers and improves the bottom line for managers. When safety and health are part of the organization's way of life, everyone wins.