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Dialogue Session Contributing Paper: Knowledge Management Methodologies for Improving Safety Culture

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Synopsis

Epistemic uncertainties could affect operator's capability to prevent rare but potentially catastrophic accident sequences. Safety analysis methodologies are powerful but fragile tools if basic assumptions are not sound and exhaustive.

In particular, expert judgments and technical data could be invalidated by organizational context change (e.g. maintenance planning, supply systems etc.) or by unexpected events.

In 1986 accidents like Chernobyl, the explosion of Shuttle Challenger and -two years before- the toxic release at Bhopal chemical plant represented the point of no return with respect to the previous vision of safety and highlighted the not delayable need to change paradigm and face safety issues in complex systems not only from a technical point of view but adopting a systemic vision able to include and integrate human and organizational aspects.

In a well-known article about his experience in the Presidential Commission on the Space Shuttle Challenger Accident (Feynman, Richard P. (1987) "Mr. Feynman Goes to Washington". Engineering and Science, 51 (1). pp. 6-22) Feynman stated: "So my theory is that the loss of common interest - between the engineers and scientists on the one hand and management on the other - is the cause of the deterioration in cooperation, which, as you've seen, produced a calamity".

Taking the cue from Feynman's observation, we could say that one fundamental condition to set a common interest and then establish a systemic vision is the creation of a common code and a shared and widespread knowledge inside the organization.

This effort is still going on but there are some areas where it collides with current trends in organizations operating on edge technologies and high level risks (nuclear, chemical, aerospace etc.). Infact, the over-specialization required for decision-making in such fields could represent a barrier with respect to a global vision of potential criticalities affecting safety of systems and plants. This trend could lead to a state of "knowledge fragmentation" where it could be very difficult to find the common interest.

According to metaphor approach, we could say that there is the risk to have stuck "pools" of knowledge rather than a "stream" of knowledge which all areas of organization can draw from.

The activation of this stream requires a process of connecting different disciplines and expertise in order to create a common background and an information network. Several software applications make possible to deliver information in a widespread way within the organization, anyway this availability does not result automatically in knowledge creation.

According to complexity theory, culture is an emerging property of organizations and it is the result of a continuous interaction between individual and group viewpoints and of a continuous competition between current and new tools to understand a variable context.

Education and Training (E&T) actions can be very powerful and effective drivers of these processes, because

they represent a tool for changing individual and group visions and spreading best practices and updated concepts.

Anyway, E&T actions could be not so effective if they don't aim at shaping the stream of knowledge inside the organization. To reach this goal, it is necessary to adopt an inductive approach that allows each student to access and share individual experience and knowledge using the "keywords" provided by the trainer. This one leads the process of "knowledge finding" through safety-related case studies, role-playing and simulation based on the technique of brainstorming where specialists and experts of different disciplines work together with people coming from all areas of the organization.

In this way, workgroups are "organizations in micro-scale" where different know-how and expertise combine in order to yield best solutions. After, this process is re-played among the workgroups through collaborative and competitive strategies, according to complex systems dynamics and logics as it happens, for example, in growth processes.

A relevant output of knowledge sharing is represented by the role awareness that participants to E&T sessions learn in so far as they acquire a higher view of organizational model and dynamics and recognize their potential contribute to safety culture improvement. This upgrade requires the realization of a meta-knowledge inside the organization, that is possible through the implementation of a knowledge management system based on interactive processes of Education and Training.

Country or International Agency

Italy

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Primary author: RUSCONI, Carlo (Italy)

Presenter: RUSCONI, Carlo (Italy)

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