the mindset of nuclear safety

by Giovanni Verlini

Nuclear safety depends on culture as well as good engineering practices, Anne Kerhoas and Marin Ignatov explain.

Question: What are the origins of the safety culture concept?

Anne Kerhoas: Engineering issues relating to safety have received close attention from the nuclear community over many years. However, it is only in the last two decades or so that organizational and cultural issues have been identified as vital in achieving safe operation. More specifically, the concept of safety culture originated after the 1986 Chernobyl accident in the International Nuclear Safety Group (INSAG).

INSAG maintained in their report that the establishment of a strong safety culture within a nuclear facility is one of the fundamental management principles necessary for the safe operation of the facility. The definition recognizes that "safety culture has two general components. The first is the necessary framework within an organization and is the responsibility of the management hierarchy. The second is the attitude of staff at all levels in responding to and benefiting from the framework."

This INSAG definition is still widely used.

Anne Kerhoas (left), a Senior Safety Specialist in the IAEA's Division of Nuclear Installation Safety, speaks with Marin Ignatov, a safety consultant.

(Photo: D.Calma/IAEA)

Q: But what is exactly safety culture?

Marin Ignatov: First of all, we should look at what we mean by the term 'culture'.

Culture is a deeply-rooted, rather than superficial, phenomenon and hence fairly stable over time. It is shared by people and relates primarily not to an individual but to a group, community or organization. Besides, it is a broad concept and covers all aspects of external and internal relationships in a group, community or organization.

Here, José Ramón Torralbo, Plant Manager, reviews materials with Anne Kerhoas and Marin Ignatov. In 2008, an IAEA team reviewed safety culture at the Santa María de Garoña nuclear power plant in Spain. (Photo: Nuclenor)

The main differences of nuclear safety culture compared with general corporate culture touch on the concept of core hazards and the potential large effects associated with the dispersion of radioactive substances. It is this fact that makes nuclear power different and that demands a set of organizational values that place nuclear safety as the top priority of an organization.

Q: How can we define a strong nuclear safety culture?

MI: A strong safety culture consists in the association of three major factors: a viable management system; a widely shared awareness of nuclear hazards; and widely shared behavioural norms and values.

A strong safety culture can be only expected in cases where the Management System is implemented into actual behaviour not because negative personal or group consequences (sanctions) are feared, but as a result of profound awareness about nuclear hazards and positive social norms, attitudes and values of management and staff.

Poor safety culture comes up in cases where the existing Management System is in itself underdeveloped, insufficient or inadequate. Negative attitudes or disruptive informal social norms become predominant. Such situations in today's nuclear industry are rare.

Q: The IAEA has launched a new service called SCART. What is it?

AK: SCART means Safety Culture Assessment Review Team and is one of the safety review service of the Agency. The difference with other services is that it focuses on human behaviour. In other words, SCART does not intend to assess the design or technical operation of a nuclear power plant.

The SCART assessment is based on five characteristics that are in the IAEA safety standards:

- Safety is a clearly recognized value;
- Leadership for safety is clear;
- Accountability for safety is clear;
- Safety is integrated into all activities; and
- Safety is learning-driven.

The service looks at a nuclear organization as a whole, which means that all major functional areas and all responsibility levels from the shop floor to the boardroom are included in the review.

Q: Assessing safety culture seems to be a difficult task. How can it be done?

AK: The safety culture review process follows a systematic approach, structured in several phases. The process seeks to integrate an initial independent assessment of the available empirical data by the international reviewers, followed by a discussion within the review team and a subsequent consensual decision.

The initial phase is data gathering – a review team usually consists of 5 reviewers, a team leader, and a deputy team leader. Each reviewer evaluates all characteristics of safety culture with their corresponding attributes (altogether 37 attributes) via interviews,

observations and documentation analysis. Usually, there are 4 interviews per day, per reviewer.

At the end of the data gathering phase, the reviewers analyse the data and come to conclusions concerning the attributes of all 5 safety culture characteristics. Their conclusions are individual and independent. This is the second step.

Afterwards, the reviewers share their individual opinion and develop a team opinion for each of the assessed safety culture attribute.

Finally, based on this evaluation, the team identifies strengths and areas for improvement. Strengths are areas where the safety culture is strong and safety performance highly satisfactory. In areas identified for improvement, the organizational performance or attitude at the nuclear facility does not correspond to what is expected according to IAEA Safety Standards. It leads to recommendations to the organisation assessed.

Q: What kind of expertise goes into a SCART team?

AK: When composing the team, the correct balance between behavioural scientists and technical specialists is essential for the implementation of the approach as well as for the outcomes. The strong synergy emerging from those two complementary skills allows a reliable expert opinion to emerge and provide credibility to the conclusions. This is one of the important differences of SCART with the other safety review services.

Q: What is the outcome of a SCART mission?

AK: SCART offers a reliable evaluation of the main characteristics of safety culture in a nuclear facility. Actually, the process of combining interviews, observations and documentation analysis, which is used in SCART, is a means to assess deeper values or shared assumptions while questionnaire surveys may only reflect the visible level of safety culture.

SCART assists a facility in the enhancement of safety culture by identifying ways in which to continuously improve the safety culture. Based on recommendations and suggestions issued at the end of the SCART process, the facility would then be able to build its corrective action plan.

SCART supports international information exchange between the management of nuclear facilities and reviewers on safety culture.

SCART is a sensitive tool that allows experts to reveal early signs of a deteriorating safety culture. It allows a reliable expert opinion to emerge, which is then used by the nuclear utility to develop an enhancement plan for the safety culture.

Q: What message on safety culture would you like to convey to countries operating or planning nuclear plants?

AK: Missions have allowed us to validate the main principles of the SCART methodology. The review approach of SCART is the result of several years of discussion and proactive work. We managed to win the support and assistance of experienced and well known international experts on safety culture.

The SCART instrument itself is a sensitive tool that allows experts to reveal early signs of a deteriorating safety culture.

It might be concluded that SCART as a safety review service for safety culture is a new level of support for Member States. Being a promotion tool for safety culture, it is also a motor of motivation for the Member States to enhance the safety culture in their nuclear facilities. On the other hand, SCART missions will increasingly become opportunities to facilitate the application of IAEA Safety Standards.

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