



TEACHING SAFETY CULTURE IN RADIATION PROTECTION COURSES – IS IT FEASIBLE OR MISSION IMPOSSIBLE?

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INTRODUCTION

- Use of the term “Safety culture” is common among people involved in nuclear technology.
- The term has been in use for almost three decades now and has deeply penetrated the minds and behaviour of people in the nuclear community.
- Due to the positive impact on radiation safety in nuclear facilities, one would expect that safety culture tools and approaches have also penetrated other (non-nuclear) radiation practices and facilities. However, this holds only partially.
 - Safety culture is not explicitly mentioned in the new Council Directive 2013/59/EURATOM.
 - IAEA BSS from year 2014 lists safety culture as one of the objectives of the management system in organisations.

BRIEF HISTORY OF SAFETY CULTURE...

- “Safety culture” was introduced in one of the IAEA documents related to an analysis of the Chernobyl accident (INSAG -1, 1986).
 - It was clear that safety culture is extremely important for nuclear safety, but the meaning of the term was still open to interpretation.
- In the year 1991, a special document focused on safety culture (INSAG-4) has been prepared to clarify the concept in relation to organisations and individuals engaged in nuclear power activities.
- Following INSAG documents were focused on further explanation of safety culture, and translation of concept into criteria that can serve as performance criteria.
- In the recent IAEA documents, safety culture has been addressed as a part of the leadership and management system.

WHAT IS SAFETY CULTURE

- **Culture** (Cambridge Advanced Learner's Dictionary & Thesaurus):
 - i. “The way of life, especially the general customs and beliefs, of a particular group of people at a particular time.”
 - ii. “The ideas and ways of working that are typical for an organization, and that affect how it does business and how its employees behave.”

- **Safety** (IAEA BSS):
 - The protection of people and environment against radiation risks, and the safety of facilities and activities that give rise to radiation risks.

WHAT IS SAFETY CULTURE (Cont.)

- **Safety culture (IAEA):**
 - The assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance.
- Safety culture **is not about** the physical background, infrastructure, equipment or papers; **it is about** people's behaviour, attitudes and relations.
- Safety culture is in fact "**culture for safety**" or "**culture that enhances safety**".

SAFETY CULTURE VS. RADIATION PROTECTION CULTURE

- **Professionals outside the nuclear sector** have problems with identification of radiation safety background in safety culture, which is common in nuclear and their organisations, and balancing of radiation safety requirements with their specific safety requirements and problems.
- To **avoid possible confusion** and to **support spreading of safety culture** also in the non-nuclear organisations, IRPA has prepared document IRPA Guiding Principles for Establishing a Radiation Protection Culture where the use of term "**radiation protection culture**" is recommended **instead of more general "safety culture"**.

SAFETY CULTURE VS. RADIATION PROTECTION CULTURE (Cont.)

- Some professionals now use **“safety culture”** and other **“radiation protection culture”**.
 - There is nothing wrong about this, as long as radiation protection culture is seen as an implementation of radiation protection principles inside the framework of safety culture and not some special or specific form of safety.

RADIATION PROTECTION CULTURE IMPLEMENTATION

- Embedding radiation protection at **a cultural level** within an organisation is by far the most effective way of achieving the desired performance
- In a certain organisation, the principal **contributions to culture come from three sources:**
 - 1) beliefs, values, and assumptions** of the founders of an organization,
 - 2) learning experiences** of group members as the organization evolves, and
 - 3) beliefs, values, and assumptions brought in by new members and leaders.**

RADIATION PROTECTION CULTURE IMPROVEMENT

- Basic ways to impact radiation protection culture are the following:
 - 1) **Strong leadership** focusing on operational radiation protection culture, and reinforcing and teaching safety behaviours,
 - 2) **Educating and training** the people involved in radiation protection applications,
 - 3) Creating positive and total **awareness** about radiation protection,
 - 4) Establishing **communication** processes among all the people involved in radiation protection applications,
 - 5) **Learning from events, incidents and near misses.**

RADIATION PROTECTION CULTURE IMPROVEMENT (Cont.)

- The matrix of individual and organisational **traits** of positive safety culture (and also radiation protection culture) has been identified:

Leadership Safety Values and Actions	Problem Identification and Resolution	Personal Accountability
Leaders demonstrate a commitment to safety in their decisions and behaviours.	Promptly and fully identify, evaluate, and correct safety issues commensurate with significance.	Take personal responsibility for safety.
Work Processes	Continuous Learning	Environment for Raising Concerns
Plan, implement, and control work activities so that safety is maintained.	Seek out opportunities to learn and implement ways to ensure safety.	Encourage raising safety concerns without fear of retaliation, intimidation, harassment, or discrimination.
Effective Safety Communications	Respectful Work Environment	Questioning Attitude
Maintain a focus on safety.	Permeate trust and respect through the organization.	Avoid complacency and continually challenge existing conditions to identify discrepancies that might result in inappropriate action.

EVOLUTION OF RADIATION PROTECTION CULTURE

- **The main development stages**
 - **Stage 1: Basic compliance system** - Safety is dependent on compliance with regulations, equipment design and engineering (technique). This is passive compliance.
 - **Stage 2: Self-directed safety compliance system** – The integral approach where competence management and certification are important, control procedures are used, and assessment of safety on systems level are involved. This emphasizes active compliance with the regulations.
 - **Stage 3: Behavioural safety system** – teaching individuals to scan for hazards, to focus on potential injuries and safe behaviour(s) that can prevent them, and to act safely. In this stage, the key is the (organisational) culture which is based on personal leadership, responsibility, behaviour, norms, beliefs.

RADIATION PROTECTION CULTURE IN PRACTICE

- A common characteristic of all organisations outside the nuclear and medical sectors is that they **do not have “in house” expertise** about radiation protection and rely on hired help
- They can be divided into two broad groups:
 - a) a **general user sector**, and
 - b) a **higher education and research sector**.
- Regarding safety culture, each organisation in the general sector is **different** from others.
- There are huge **differences** regarding readiness to accept safety/radiation protection culture
 - Some organisations have well established and effective safety infrastructure culture, while others only comply with advice without really understanding, or even only complying in wording.

RADIATION PROTECTION CULTURE IN PRACTICE (Cont.)

- Factors **influencing radiation safety culture** in the general sector:
 - Good **regulatory infrastructure** is key to setting the proper context.
 - In some countries, supporting documents like Codes of Practice or Regulatory Guides are issued
 - **Presence of authorities** in the form of inspections, advice and ultimately prosecution.
 - **Radiation protection experts** (RPEs), who should normally support operational radiation protection.
 - **Radiation protection officers** (RPOs) and workers, who implement operational radiation protection.
 - **Interaction with other organizations** and their safety culture (users, clients, suppliers, maintenance personnel etc.)

HOW TO IMPROVE RADIATION SAFETY CULTURE IN GENERAL SECTOR

- Improving radiation safety culture could prove extremely **demanding if this effort is isolated** from general safety culture.
- The approach must be **general**, and must activate management and all workers.
- The basic ways to impact radiation protection culture are:
 - **Strong leadership,**
 - **Training and education** of people involved in radiation practice,
 - Creating positive and total **awareness** of radiation protection in workplaces, establishing adequate and effective **communication process** among all people involved and responsible for practice,
 - Building **capacity to learn** from accidents/incidents, near misses and use it for continual improvement, and
 - **Learning from other** sectors and industries.

HOW TO IMPROVE RADIATION SAFETY CULTURE IN GENERAL SECTOR (Cont.)

- It is clear that we cannot address all relevant values during a training event (or even process!) and that implementation and development of radiation protection culture strongly depend on organisational and cultural characteristics of the organisation.
- In the nuclear facilities, the values are communicated to all managers and workers **through numerous channels and occasions** in support of (general) safety culture.
- In general sector this is not the case and radiation protection culture **could be crippled and limited without the support of organisational leaders**, or other organisational characteristics (and habits) which are not favouring safety in general.
- The success of teaching safety culture in radiation protection training is highly dependent **on "external" factors** that cannot be directly influenced by the training process and could lead to an unsuccessful outcome.

WHAT CAN WE DO TO COMPENSATE

Options are:

1. Finding **way to approach management** and to communicate and educate them about radiation protection safety issues.
 - The first step in this direction should be supported by authorities.
2. Establish or extend the **training and education of RPEs and RPOs on radiation protection safety issues and communication approaches and skills** to enhance effectiveness of their work and involvement in radiation protection practice.
 - Professional societies and associations (with the support from authorities) should be initiators and organisers of these events.

CONCLUSIONS

- The term “safety culture” has been widely in use **since the Chernobyl accident** and has deeply penetrated the minds and behaviour of people in the nuclear community.
- In nuclear facilities, safety culture relates **to different types of safety.**
- IRPA has recommended the use of “**radiation protection culture**” for safety culture elements related to radiation safety. It should be **clearly stated** that the radiation protection culture is not different from safety culture.
- **Key elements for radiation protection culture improvement** are strong leadership, education and training, awareness about radiation protection, communication, and learning from the experience.
- The three **stages of evolution** of radiation protection culture are basic compliance, active compliance and culture.



CONCLUSIONS (Cont.)

- Organisations **outside the nuclear and medical sectors** are different in many aspects. They don't have "in house" expertise about radiation protection and have to rely on hired help.
- Radiation protection culture in the general sector **is influenced** by regulatory infrastructure and presence, the involvement of radiation protection experts, and radiation protection officers.
- Basic methods for improvement of radiation protection culture are **common to other sectors, but we can not address all aspects during the training.**
- Without the help of authorities and professional societies or associations, it is hard to believe that **stage 2 of evolution – active compliance with regulations** – will be completely achieved (we will stay at stage 1, more likely).