

SAFETY RADIATION CULTURE in RESEARCH & EDUCATION

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What is culture?

Etymologically, the word „culture“ has its roots in the latin *colere* (“cultivate“, “reclaim land“, “educate“).

Today’s definition of culture was strongly influenced by the American anthropologist Edward Tylor (1873:

"Culture or civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society."

BSS 2.0: no difference between safety culture and RP culture

- **2.47. The principal parties shall foster and maintain a safety culture by:**
- (a) Promoting individual and collective commitment to protection and safety at all levels of the organization;
- (b) Ensuring a common understanding of the key aspects of safety culture within the organization;
- (c) Providing the means by which the organization supports individuals and teams in carrying out their tasks safely and successfully, taking into account the interaction between individuals, technology and the organization;
- (d) Encouraging the participation of workers and their representatives and other relevant persons in the development and implementation of policies, rules and procedures dealing with protection and safety;
- Encouraging open communication within the organization and with other relevant parties, as appropriate;
- (g) Encouraging a questioning and learning attitude and discouraging complacency with regard to protection and safety;
- (h) Providing the means by which the organization continually seeks to develop and improve its safety culture.

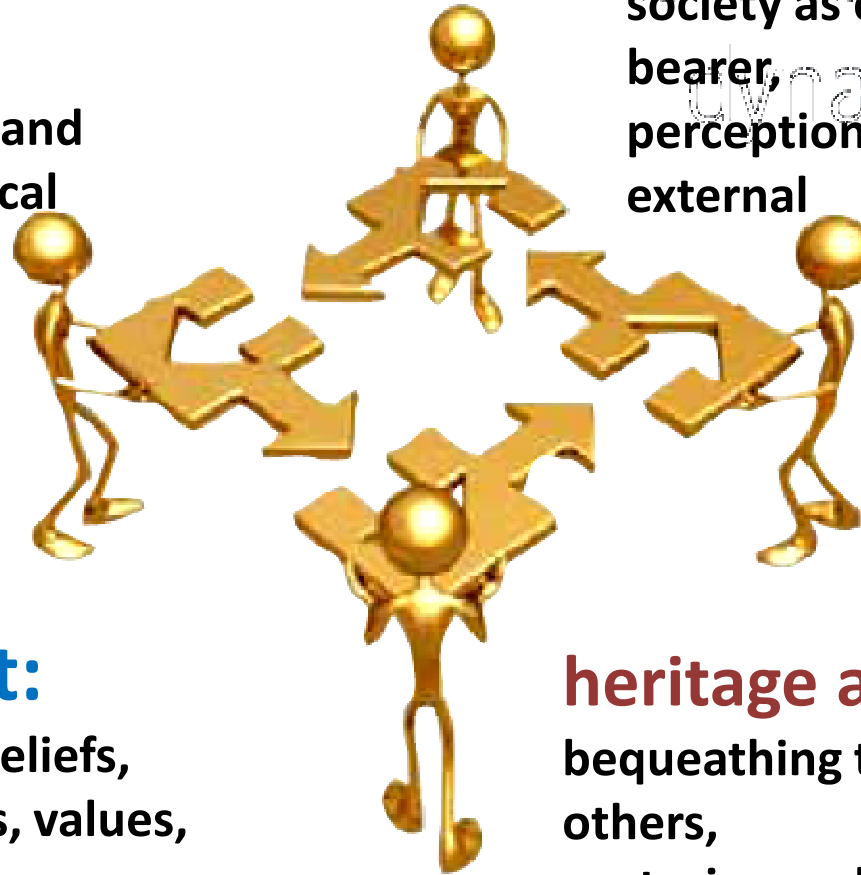
SR Culture: a process with 4 aspects

categorical and practical:

requirements and standards, systems and organization, practical embodiment and behavior.

societal:

society as culture-bearer,
perception: internal and external



content:

attitudes, beliefs, perceptions, values, goals.

heritage and future:

bequeathing the culture to others,
nurturing and fostering the culture,
conveying tradition and historical awareness

Why a culture of radiation safety?

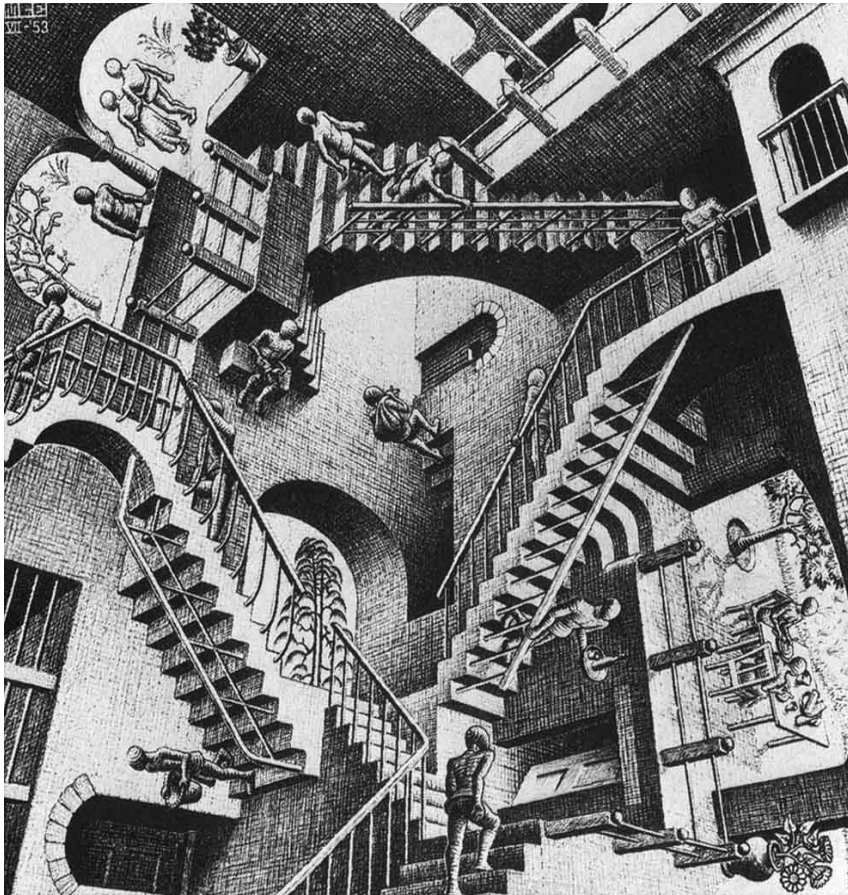
Since we need it for survival!

The need for radiation safety arises from the knowledge about the harmful actions of ionizing radiation. Radiation safety lives with the conflict that radioactivity and ionizing radiation have harmful effects, on the one hand, and can be used to the benefit of man and environment, on the other.

With respect to the applications, people think most frequently of nuclear energy industry and medicine. It has to be emphasized, however, that the applications of radioactivity and ionizing radiation extend by far beyond these – admittedly important – fields of application.

Further, it must be emphasized that radioactivity and ionizing radiation are omnipresent phenomena of our “hostile” environment; also here we need radiation protection/safety.

The construction of radiation safety/protection is a cultural achievement.



- Considerable progress was achieved in the past 60 years in all areas of radiation safety:
- in research,
- in education
- in medicine,
- in nuclear industry,
 - In conventional industries, radiation sources,
 - radioactive tracers,
 - NORM,
 - TENORM.

Motivation

- **Although there are is a need and a potential to improve radiation safety in various areas, it is necessary to maintain the achieved degree of protection.**
- **For this purpose, it is necessary to bequeath the cultural achievements of radiation safety to the next generation.**

Safety culture

- Historically, the trend around safety culture originated after Chernobyl brought attention to the importance of safety culture and the impact of managerial and human factors on the outcome of safety performance.
- The term 'safety culture' was first used in INSAG's 'Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident'. (**NOW – FUKUSHIMA ACCIDENT !**)
- This concept was introduced as a means of explaining how the lack of knowledge and understanding of risk and safety by the employees and organization contributed to the outcome of the disaster.

Safety culture

Advisory Committee on the Safety of Nuclear Installations (ACSNI) describes safety culture as :

“The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization’s health and safety management.”

The Culture of Radiation Safety can be regarded as part of the general industrial safety culture. But it extends far beyond that since radioactivity and radiation require radiation safety in medicine, research and in daily life. The Culture of Radiation Safety must offer a consistent system for all fields of application .

What is a culture of radiation safety?

A first attempt of a definition:

The term “safety radiation culture” describes the way in which radiation safety is regulated, managed, performed, preserved, and perceived in the laboratories, in education, and every day’s life and reflects “the attitudes, beliefs, perceptions, goals, and values that researchers, students, regulators, and society share in relation to radiation safety”.

The fundamental concept of radiation safety

From these results the fundamental concept of radiation safety:

- **to protect humans and the environment from the dangers of ionizing radiation,**
- **to minimize the consequences of their applications, and**
- **to provide a basis that human actions cause more good than harm.**

This concept has a normative character and, consequently, the ethics of radiation safety and the Culture of Radiation Safety become an inseparable unity.

**The IRPA Code of Ethics
is one important building block of this ethics**

Basic attitudes in radiation safety

- Radiation safety should be based on **scientific knowledge**.
- Just a few fundamental principles are sufficient to construct the system of radiation protection/safety.
- The three fundamental pillars of radiation safety are “
 - **the principle of justification,**
 - **the principle of optimization, and**
 - **the principle of limitation.**

Two further principles have emerged recently as categorical principles of action and have received fundamental importance in radiation safety:

- **the principle of sustainability and**
- **the precautionary principle.**

Keywords:

multidisciplinary competence, sense of responsibility, honesty, transparency and openness, proactive actions, vigilance, risk awareness, fairness, self-criticism (inspections, audits and benchmarking), forgiving systems, no hard and fast systems, willingness to exchange information in order to avoid repetition mistakes at other places.

The goal is clear:

- **To safeguard man and environment against the harmful action of ionizing radiation and to provide a basis for safe applications of radioactivity and ionizing radiation to the benefit of man and environment.**
- **It should be an overarching goal of a Culture of Radiation Safety to integrate radiation safety in a comprehensive system of risk management and to improve and further develop this system continuously.**

The categorical and practical aspects of a Culture of Radiation Safety

How should a Culture of Radiation Safety be lived and how can subject matters be made practical?

That means, how radiation safety is

- regulated,
- managed, and
- put into practise.

➤ **One can refer to a well-established concept of safety culture.**

➤ **As a result of the FS/ÖVS/SFRP workshop (2009) a scheme of a temporal and qualitative development was established which already has been applied successfully by companies and professional societies.**

How is Radiation Safety
Culture implemented

in

Research & Education?

Who are involved?

- Management (all levels)
- Researchers/Postgraduate Students
- Undergraduate Students
- Staff (technical)
- Staff (non-technical)
- Public

**ALL OF THEM MUST BE MADE AWARE OF
RADIATION SAFETY/PROTECTION**

International Nuclear Safety Advisory Group (INSAG)

TWO general components of safety culture:

- a framework in the organisations that is created by management,
- and an attitude of everyone (researchers/students/staff) at all levels in responding to and benefiting from that framework

Example

University of Malaya

– an educational & research institution

Radiation Protection Services Unit

(established 1998)

Radiation Protection Services Unit

(initial objectives of establishment)

- to coordinate all matters pertaining to the management and safety of radioactive materials and irradiating apparatus in the University.
- to handle all matters pertaining to the application of the license for radioactive materials and irradiating apparatus for the University.
- responsible for monitoring the handling and disposal of radioactive materials and irradiating apparatus in the University

Functions of Radiation Protection Unit

- To manage the application, renewal and amendment of the Radiation Protection License under the Atomic Energy Licensing Act 1984 (Act 304)
- To implement efficiently and effectively a comprehensive programme of radiation protection in the University in accordance with the requirements of the Atomic Energy Licensing Act 1984 (Act 304) and its subsidiary regulations and conditions stipulated in the license
- To identify, plan and **conduct training** at the various levels required in radiation safety **to increase the knowledge of users** of radioactive materials and irradiating apparatus
- To manage and maintain records of radiation workers, purchasing of radioactive materials and irradiating apparatus and its maintenance in the University
- To identify new methods and requirements for the management of radioactive materials and irradiating apparatus

Radiation Protection Program (Research)

To ensure that administration and handling radiation source be managed systematically at workplace. List of contents of RPP as below:

- a) Structure of organization of the radiation protection programme
- b) Responsibilities
- c) Training Programme
- d) Operational Limits
- e) Maintenance, operation and keeping of records
- f) Normal operational procedure
- g) Abnormal operational procedure
- h) References

It should be able to prevent personnel and members of the public from unnecessary exposure to radiation.

Radiation Safety Manual

- Most universities have this manual
- Students/researchers/staff MUST read this manual & signed the declaration before they can start their experiments or do anything related to radiation
- Have to attend regular courses related to radiation safety & protection

SAFETY CULTURE IS INCULTATED

Continuous development

The aspect of continuous development of human knowledge and of conclusions to be drawn is a pre-requisite for any cultural achievement.

Culture is not a stationary state, it must be a process.

Self-satisfying, stagnating cultures die out.

We need radiation safety as a cultural achievement.

- **Radioactivity and ionizing radiation are omnipresent phenomena of nature.**
- **The applications of radioactivity and ionizing radiation exist and increase.**
- **Therefore, we need a Culture of Radiation Safety.**
- **We need it for survival and as a part of the efforts to make this world a world worth for humans to live in!**
- **Not to act is not a solution.**

THANK YOU
(TERIMA KASIH)

University of Malaya

