

Developing ALARA culture

This article, elaborated by a working group from the European ALARA Network (EAN) discusses the elements that constitute ALARA culture and its current status in relation to the various exposure situations. By Sotirios Economides, Frank Hardeman, Cristina Nuccetelli, Serena Risica, Caroline Schieber, Annemarie Schmitt-Hannig and Fernand Vermeersch

ALARA culture is at the heart of radiation protection culture. It is based on the hypothesis of a linear dose-effect relationship without a threshold for stochastic effects. It should result in attitudes and behaviours of individuals and organisations that are always committed to searching for an acceptable level of risk taking into account societal and economic factors.

Justification of radiation exposures, optimisation of radiation protection and application of individual dose limits are the three radiation protection principles as adopted for the first time in International Commission on Radiological Protection publication 26 [1] and incorporated in the subsequent recommendations [2, 3]. Publication 103 states that optimisation of protection is the process by which "the likelihood of incurring exposures, the number of people exposed, as well as the magnitude of their individual doses should be kept As Low As Reasonably Achievable taking into account economic and societal factors" [3].

The objective of implementing ALARA is to reach an 'acceptable' level of risk, below

the dose limit which is the upper bound of the 'tolerable' level of risk. ALARA is an obligation of means, and not an obligation of results, in the sense that the result of ALARA depends on processes, procedures, and judgments and is not a given value of exposure. The acceptable level of exposure depends on the exposure situation as well as the societal and economic considerations.

According to ICRP 101 [4], optimisation is a frame of mind, always questioning whether the best has been done in the prevailing circumstances. It requires a forward-looking iterative process aimed at preventing exposures before they occur. It is continuous, taking into account feedback experience as well as technical and socio-economic developments. It requires both qualitative and quantitative judgements.

There are many elements in good ALARA culture. Some examples are presented below.

Attitudes and behaviour

Positive attitudes towards radiological risk should include at the individual and/or organisational level:

- A questioning attitude (for example: did I do what I could to save doses? Is the management committed to the introduction of new technologies to save doses or prevent accidents?...);
- Openness and transparency (for example: open to changing habits, reporting mishaps, explaining radiation protection options,...);
- Commitment to dose reduction (for example appropriate individual behaviour in the presence of radiation sources, willingness to invest in protection measures,...).

Radiation risk awareness

Risk awareness is the basis of ALARA culture. There is thus a need to reach a common understanding of radiation risk among all the stakeholders involved in the exposure situations. The degree or level of knowledge has to be adapted to the situation, the level of responsibility, the required competences in radiation protection, and so on. Therefore, various methods of raising risk awareness may be appropriate: education, training, continuous professional development, communication and information.

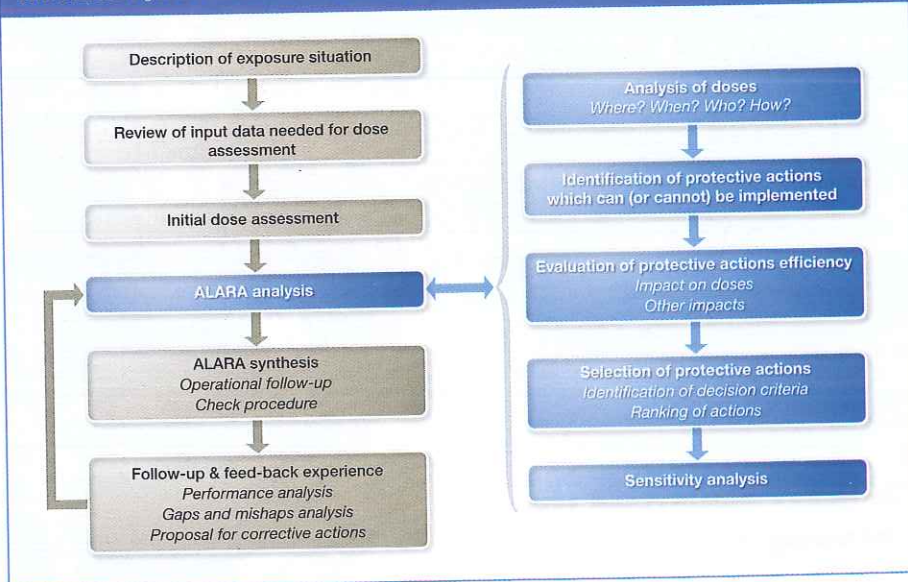
Stakeholder engagement

The efficiency of an ALARA-oriented radiation protection system strongly depends on the engagement and the participation of the stakeholders involved. Different categories of stakeholders can be identified whose main roles and responsibilities in the ALARA process are the following.

Competent authorities are responsible for introducing special optimisation provisions in national legislation according to international safety standards (such as IAEA, EC). Moreover, they should establish and apply appropriate methodologies for the verification of ALARA implementation, issue recommendations and take enforcement actions if required. They set the regulatory objectives for ALARA. Regarding their relationship with the public, they should not only provide transparent information, but also facilitate public involvement in the decision making processes.

Licenses have to show their commitment to ALARA through an adequate organisation, facilitating implementation of the ALARA process, allocating necessary resources, providing training at all levels of the organisation (from senior management to shop floor). They should establish and implement an effective radiation protection management system. Clear management support must exist to translate the regulatory objectives into reality. Therefore, distribution of responsibilities is fundamental for the effective implementation of ALARA. People

The ALARA procedure as a flow chart



involved should be well aware of their role and duties and act accordingly.

Manufacturers, suppliers and designers need to ensure that the design and construction of facilities, equipment or sources are based not only on requirements and limitations introduced by national legislations, but also on considerations about optimisation of radiation protection for their full life cycle (installation, operation, dismantling).

Radiation protection professionals are responsible for the design, establishment, implementation and surveillance of radiation protection systems which are ALARA-oriented. They have a major role in stimulating and supporting ALARA attitudes and initiatives. Moreover, they should register possible non-compliances, propose corrective actions or improvements and evaluate related results. These non-compliances should be appropriately turned into lessons learnt.

Professional associations have a role in the dissemination of ALARA culture among their members, for example by providing a forum for exchange of experiences, elaborating radiation protection guidance or protocols specific to their field of activities, and so on.

Exposed workers are responsible for properly applying the established ALARA procedures after having received the appropriate training. They should have an attitude towards dose reductions for themselves as well as their colleagues. They should not only follow given guidelines and protocols but also

identify and report possible problems, as well as applying the required corrective measures. They should participate in the continuous improvement of radiation protection providing practical feedback.

The **public** should be allowed to take a proactive role in decision making regarding their protection against ionising radiation. While consultation processes are already implemented in several countries, this approach needs to be applied more often. This will lead to clearer decisions agreed by the public. Therefore, initiatives should be further developed to facilitate an improvement of the public's risk awareness and radiation protection knowledge. ■

This article is based on a paper presented at the IRPA 13 international congress, 13-18 May 2012, Glasgow, Scotland. The elements presented in this article will be further elaborated by the EAN working group on ALARA culture in a publication under preparation, "Optimisation of radiation protection (ALARA): a practical guidebook".

References

References have been deleted for space but are available on www.neimagazine.com/aculture

About the authors

The European ALARA Network (EAN) is a non-profit organisation that furthers research on topics dealing with optimization of radiation protection for all types of occupational exposure, as well as to facilitate the dissemination of good ALARA practices within the European industry, research and medical sectors (<http://www.eu-alara.net/>)

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