

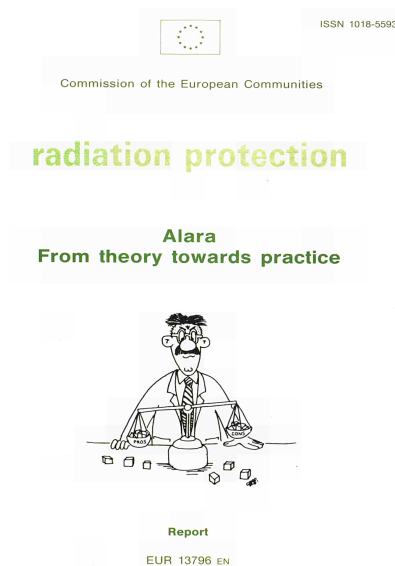
OPTIMISATION OF RADIATION PROTECTION (ALARA): A PRACTICAL GUIDEBOOK

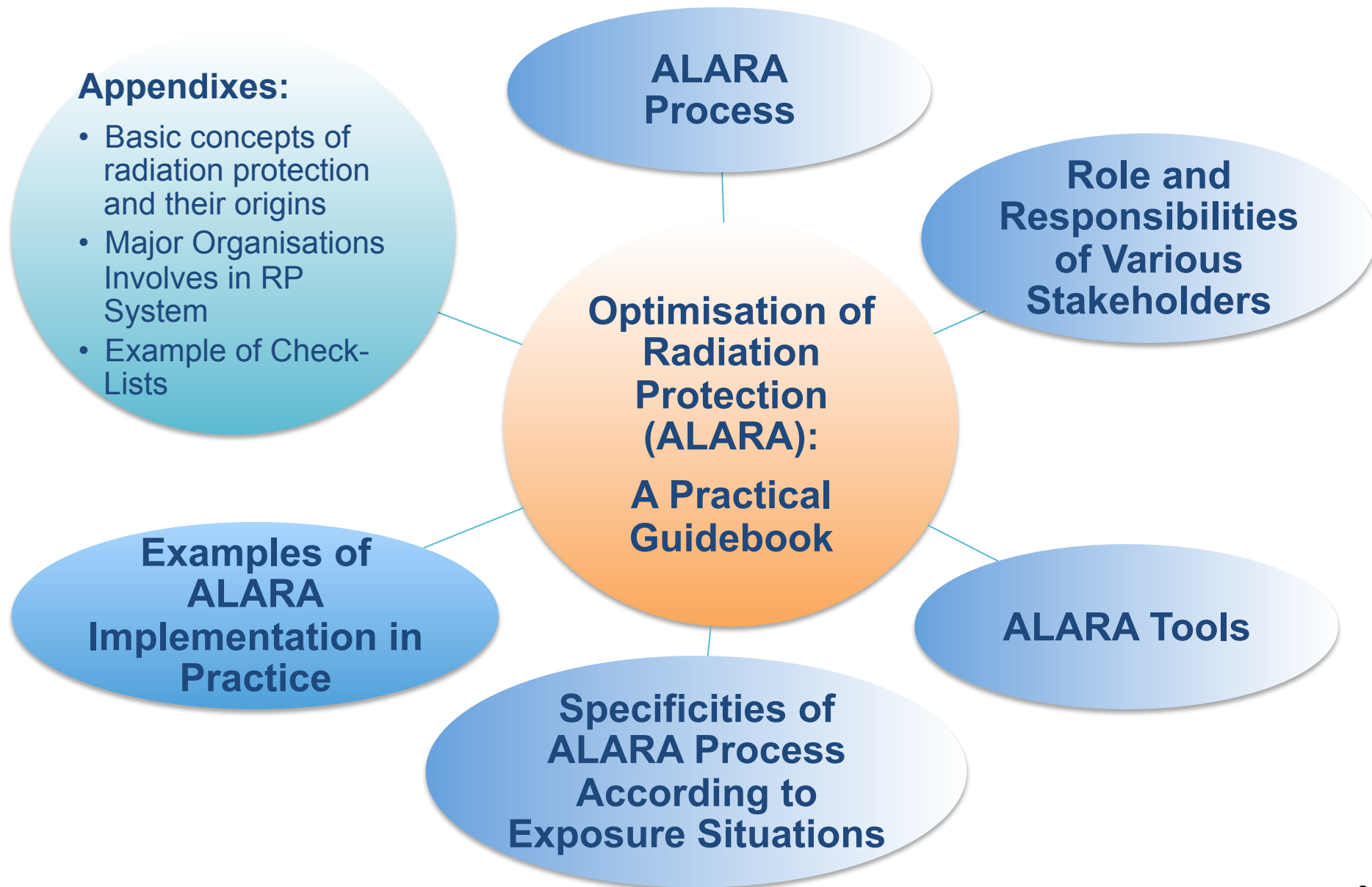
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EAN WG ON ALARA CULTURE

- Created in 2009 (first meeting in October)
- Elaboration of a paper on
« The Development and Dissemination of
ALARA Culture »
 - Presented at IRPA 13- Glasgow in May 2012
- Decision to elaborate an update version of the book « ALARA from Theory towards Practice » (published by EC in 1991)





The ALARA PROCESS

Description of Exposure Situation



Review of Input Data Needed for Dose Assessment



Initial Dose Assessment



ALARA Analysis



ALARA Synthesis

- *Operational follow-up*
- *Check Procedure*



Follow-up & Feedback Experience

- *Performance Analysis*
- *Gap & Mishaps Analysis*
- *Proposal for corrective actions*

Analysis of Doses

- *Where ? When? Who? How?*



Identification of Protective Actions which Can (or Cannot) be Implemented



Evaluation of Protective Actions Efficiency

- *Impact on Doses*
- *Other Impacts*



Selection of Protective Actions

- *Identification of Decision Criteria*
- *Ranking of Actions*



Sensitivity Analysis



Role and Responsibilities of Stakeholders

**Positive attitudes towards radiological risk
at the individual and/or organisational level**

A questioning attitude

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

Open to changing habits, reporting mishaps, explaining radiation protection options,...

Commitment to dose reduction

Appropriate individual behaviour in the presence of radiation sources, willingness to invest in protection measures,...

Role and Responsibilities of Stakeholders



ALARA Tools



Dose Constraints and Reference Levels

virtual load	No Workers	Average (mSv)
	3 mech.	2
	3 mech.	0.6
	3 mech. 2 HP	0.07 0.03
5)	3 mech.	0.9
	2 mech.	1
	1 mech.	0.2
	2 mech.	1
	3 mech.	0.2

Dose Tables



Softwares



Decision Aiding Techniques



Organisational Structures



ALARA Review, Audits



Education and Training

Specificities of ALARA Process According to Exposure Situation

Planned Exposure Situations

Occupational exposures in nuclear and industrial field

- Long experience
- Specific RP/ALARA organisations
- Structured approach

Public exposure from planned activities

- Usually less formal approach
- Search for “minimisation”
- Use of dose constraint

Specificities of ALARA Process According to Exposure Situation

Existing Exposure Situations

- Natural background of radiation (radon, ...)
 - Residual radioactive material from a nuclear or radiological emergency
-
- Potential for optimisation varies a lot according to the situations
 - National, regional and sites specific reference levels
 - Pro-active identification of stakeholders
 - Self-help protective actions

Specificities of ALARA Process According to Exposure Situation

Emergency Situations

- **Public Exposure**
 - **Emergency workers / responders**
-
- Integration into the planning stage of protection strategies and during emergency
 - Active involvement of stakeholders (authorities, police, fire fighters, etc.) in the planning stage
 - Lessons learned from past accidents

Specificities of ALARA Process According to Exposure Situation

The Medical Field

Education and training

Occupational exposures

- Dose reduction techniques according to the type of procedure and technique applied
- Radiology, nuclear medicine, radiotherapy

Patients

- Justification of exposure
- Dose reduction techniques

Comforters and carers

- Usually very low doses
- Information, appropriate instructions

Examples

- Illustration of all exposure situations
- All examples come from presentations / publications during various Congresses / Workshop
- Try to adopt a similar structure
 - What is the example illustrating
 - Context
 - Methodology
 - Results
 - Lessons learned

APPENDIXES

Basic Concepts of Radiation Protection and their Origins

- Health effects
- Justification
- Optimisation
- Limitation
- Exposure situations

Major Organisations Involved in the RP System

- Elaboration of scientific basis
 - UNSCEAR, BEIR
- Elaboration of system of protection
 - ICRP, ICRU
- Other organisations involved in standard, regulation, recommendations
 - EURATOM, IAEA, WHO,..
 - Networks, Professional Associations,...

Example of Check-Lists

- Identification of protective actions
- Pre/post job ALARA review
- Audits,
- ...

Monetary Value of the Man-Sievert

- Reference value based on the "human capital approach"
- Proposal of a system based on increasing value with individual dose level
- Example of values in nuclear field

Next Steps

- Finalisation of the book: Main chapters missing
 - Softwares (2.3.3)
 - Organisational structures (2.3.5)
 - Education & Training (2.3.7)
 - ALARA process for public exposure from planned activities (2.4.2)
 - Elements of ALARA process for Emergency Situations (2.6)
 - Examples
 - Any other to be provided?

- Objective to have a "pdf file" to be downloaded on EAN website
 - Need for ISBN (International Standard Book Number) or ISSN (International Standard Serial Number) ?
 - Need to work on the layout and presentation of the book



THANK YOU