

The Ethical Foundation of the System of Radiological Protection

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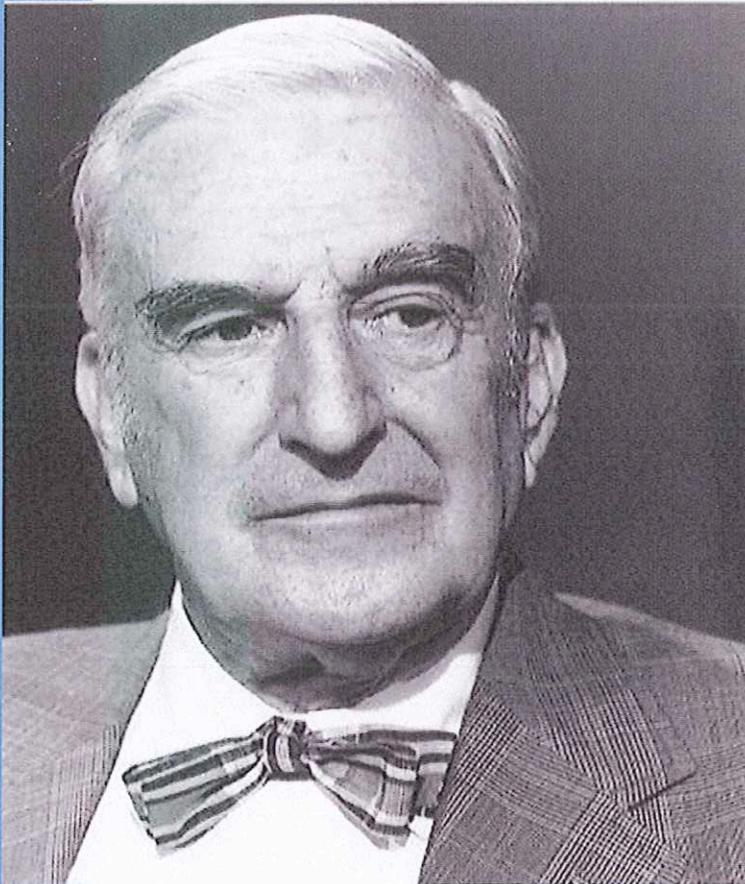
Chairman of ICRP Committee 4

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Lauriston S. Taylor (1902 – 2004)



"Radiation protection is not only a matter for science. It is a problem of philosophy, and morality, and the utmost wisdom."

The Philosophy Underlying
Radiation Protection

Am. J. Roent. Vol. 77, N° 5,
914-919, 1957

From address on 7 Nov. 1956

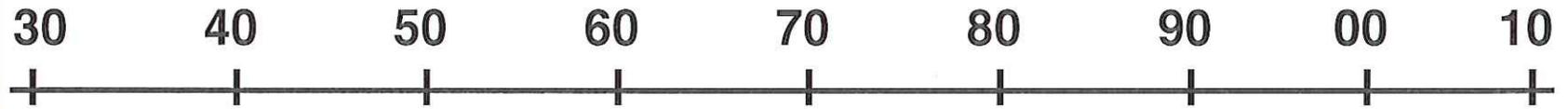
- Explicit considerations about ethical issues are almost absent from ICRP Publications, which are structuring the radiation protection system
(Short developments in Pub 77 on radioactive wastes in relation with the protection of future generations. The expression “ethical aspects” is quoted twice in Pub. 103 in relation to the optimisation protection process and the protection of volunteers in biomedical research)
- Interesting debate following the publication in 2001 in Health Physics of a critical paper by Persson and Shrader-Frechette on the ethical principles underlying the protection of workers (“ICRP principles ... clearly presuppose utilitarian rather than egalitarian ethical standards”. Clear impact on the preparation of Pub 103 with more emphasize on the protection of individuals)
- Recent developments in connection with the CRPPH Workshops on “Science and Values in Radiological Protection” (Helsinki, 2008, Vaulx de Cernay, 2009)

Aims of the radiation protection system

“The objective of the work of ICRP is to contribute to an appropriate level of protection against the **detrimental effects** of ionising radiation exposure without unduly limiting the **benefits** associated with the use of radiation.”

“The Commission’s system of radiological protection aims... to manage and control exposures to ionizing radiation so that deterministic effects are **prevented**, and the risks of stochastic effects are **reduced to the extent reasonably achievable.**”

Overview of the evolution of the radiation protection system



Deterministic effects
Threshold model

Skin, lens, hands and feet dose limits

Stochastic effects
Linear non threshold model

• *Justification*

• *ALAP*

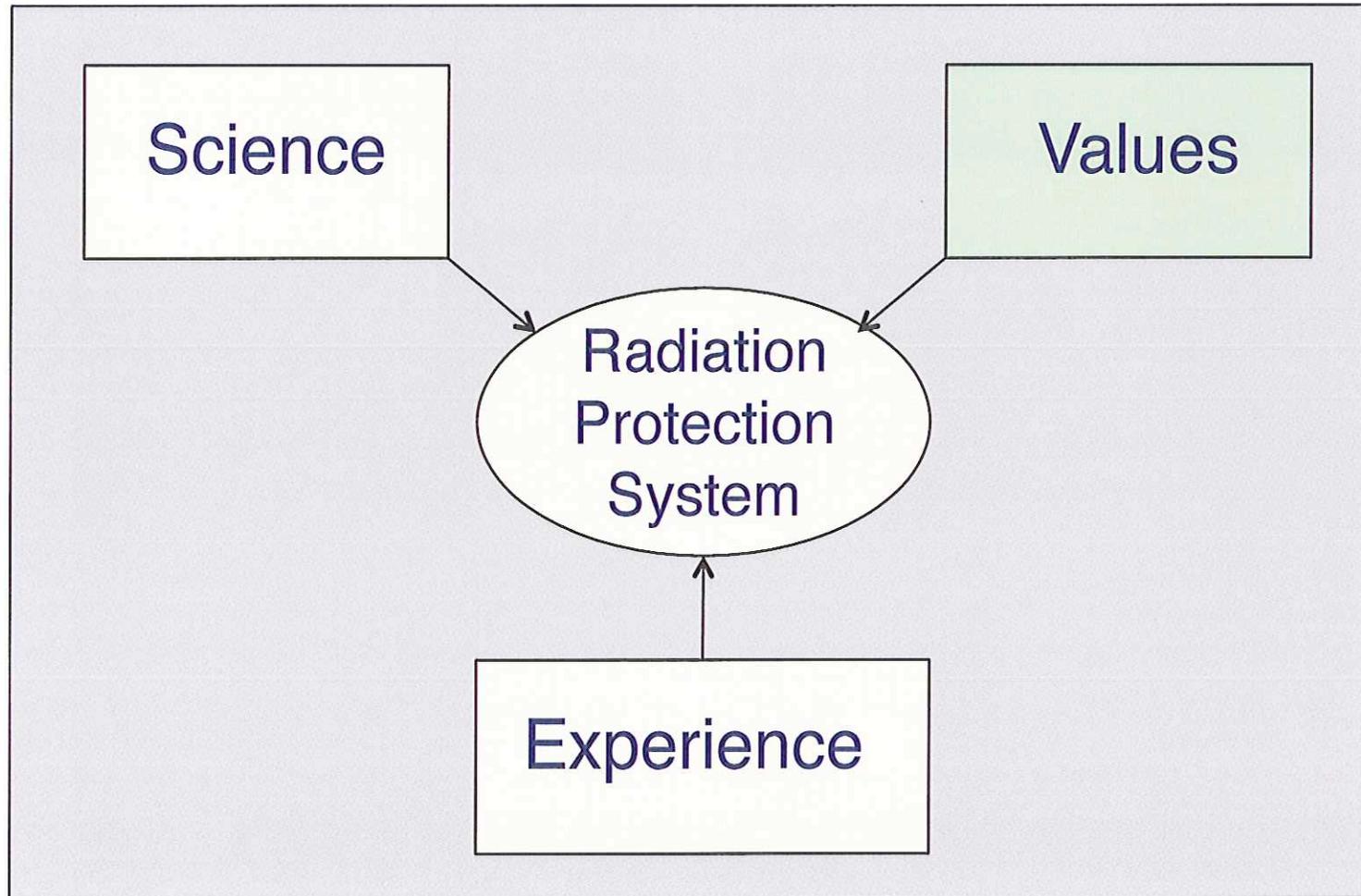
ALARA

Constraints

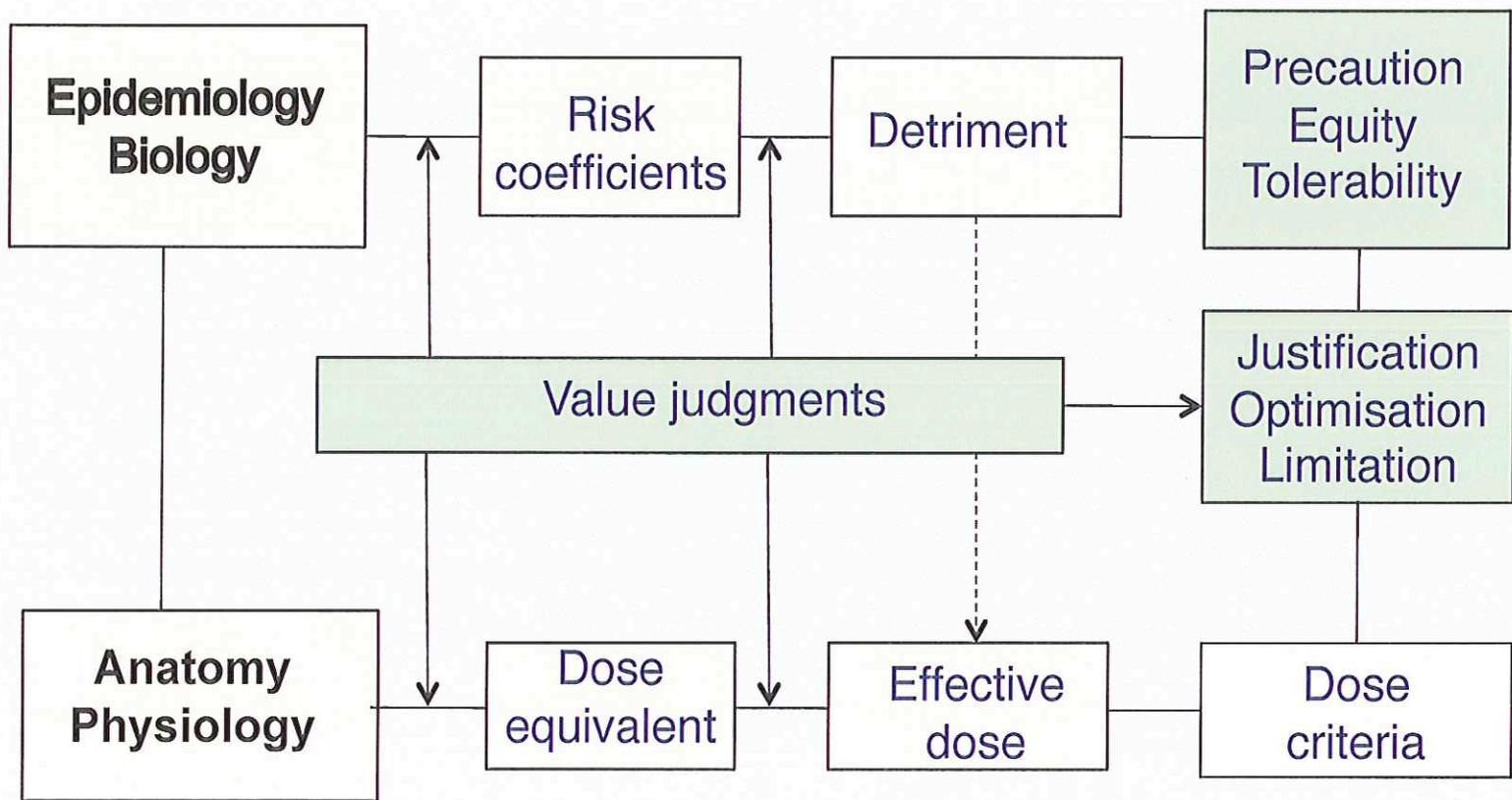
• *Limitation*

Occupational and public dose limits

The basis of the radiation protection system



The key elements of the radiation protection system



The three domains of ethics

- **Meta-ethics**

Study of the moral concepts, judgments and reasoning underlying ethics

- **Normative ethics**

Examination of moral standards about how humans ought to behave

- **Applied ethics**

Application of the normative ethical theories to practical problems (abortion, euthanasia...) or to particular domains (medical, business, military...)

Remarks:

1. Ethics (Greek) = Moral (Latin)
2. The objective of normative ethics is to promote values through norms and rules

Normative ethics

- **Consequentialism** (also called teleological ethics) : is moral what is promoting common good. What really matters are the consequences of human actions or action rules on the well being of people
(emphasize on the consequences of actions)
- **Utilitarianism** ethics is the most well known variant of consequentialism. Its generic principle states that is moral any action or rule which is leading to the largest increase of social welfare among several alternatives
- **Deontological ethics**: is moral what is accomplished according duties and rules whatever the consequences
(emphasize on duties and rules)
- **Virtue ethics**: is moral what is perfecting human beings as virtuous agents
(emphasize on the personality traits driving behaviour)

Value judgments to address uncertainty and variability

- **Models** (empirical, deterministic, stochastic)
- Use of **default options**: a way to cope with uncertainty about the choice of appropriate models or theory
 - **Inference**: process of deriving logical conclusions from premises known or assumed to be true
 - **Extrapolation**: estimate by extending or projecting known information
- **Quantitative uncertainty analysis**
- **Expert judgments/elicitation**

What are the links between these judgements and ethical values and issues?

Ref: US National Research Council, 1983, 1904, 1996, 2009

Two key values underlying the radiation protection system

- **Prudence (Precautionary principle)** : to respond to the uncertainties concerning stochastic effects at low doses.

Adoption of the LNT model

Long ethical tradition (*Phronesis by Aristotle*). How to behave without the full knowledge of the consequences of our actions? – **Virtue ethics**

- **Equity/Fairness**: to ensure social justice, within the present generation and with respect to future generations (intergenerational equity)

Implementation of restrictions on individual exposures

Equity is a state of mind inspired by the willingness to promote justice. Equity does not mean equality but the search for an “equilibrium” between inequalities acceptable by those concerned - **Deontological ethics**

The basic principles of radiation protection

- **Justification** : political decision for introducing a new activity (planned exposure situations) or a protection strategy to control existing or emergency exposure situations. The decision should do more **good** than **arm** - best consequences for the greatest number of people
- **Optimisation of radiation protection** : process applied to all types of exposure situations to keep all exposure ALARA taking into account economic and societal factors - **maximising the margin of benefit over harm**

Optimisation is applied with restrictions on individual doses “to **limit the inequity** that is likely to result from inherent economic and societal judgements”
- **Limitation of individual exposures**: total dose for workers and the public in planned exposure situations should not exceed limits (*regulatory instruments*) established in reference to the social "**tolerability**" of the risk associated to radiation

Evolution of the optimisation principle

- Uncertainties, **prudent attitude**, assumption of no-threshold, As Low As Possible - ALAP (1950)
(The limit is not anymore a guarantee of the absence of risk)
- If an activity is justified, how far to reduce the risk without endanger the activity, As Low as **Reasonably Achievable** - ALARA (1958)
("As Low as" is the echo of the no-threshold assumption and "Reasonably Achievable" of the idea of avoiding carelessness and paralysis in front of the risk suspicion)
- Attempt to found the "Reasonably" on science: the **cost-benefit model** (1973)
- Combining **collective and individual** protection : the "beta value" (1988), pragmatism : the ALARA procedure (1999) and **democratic rights**: stakeholder involvement (2007)

The limitation principle

$$\begin{array}{r}
 \text{Annual dose limit} = \\
 \text{[mSv/year]}
 \end{array}
 = \frac{
 \begin{array}{r}
 \text{[%/year]} \\
 \text{Tolerable annual risk level}
 \end{array}
 }{
 \begin{array}{r}
 \text{Dose risk coefficient} \\
 \text{[%/mSv]}
 \end{array}
 }$$

Correspondence between ethical theories and radiation protection principles

- **Justification** : authors do not share the same view concerning the ethical foundation of justification
 - « Acting with the right reasons and motives” i.e. **Virtue ethics** - Hansson (2007)
 - “Decision are assessed by the state of affairs they bring about” i.e. **Teleological ethics** (Consequentialism) - *Gonzalez (2011)*
 - An interesting position: “In proposing that RP be based on the principle to do more good than harm, ICRP appears to reject the egalitarian and contractarian notion that sometimes basic human rights” - Persson & Shrader-Frechette (2001)
 - Egalitarian ethics: claim that it is a bad thing for some people to be worse off than others through no fault of their own
 - Contractarian ethics : claim that ethical obligations originate in mutual agreements or contracts between people
- All authors agree to consider the **optimisation** principle as related to the **utilitarian ethics** and the **limitation** of individual exposures to the **deontological** one

Procedural issues and ethics (1)

What information the affected persons should receive?

Some developments in ICRP Publications 105 on protection in medicine

- **Informed consent:** an informed consent can be said to have been given based upon a clear appreciation and understanding of the facts, implications, and future consequences of an action. In order to give informed consent, the individual concerned must have adequate reasoning faculties and be in possession of all relevant facts at the time consent is given
- **Right to know:** about the hazards an individual is exposed to, the harm they might cause, and the precautions that could prevent these harmful effects

Procedural issues and ethics (2)

How and by whom decisions that influence exposures should be made?

From the prerogative of experts to stakeholder involvement

“Aside from our experienced scientists, trained in RP, where do we look further for our supply of wisdom? Personally, I feel strongly that we must turn to the much larger group of citizens generally, most of whom have to be regarded as well-meaning and sincere, but rarely well-informed about the radiation problems that they have to deal with. Nevertheless, collectively or as individuals, they can be of great value in our RP domain if they can be properly guided in the technical matters without implantation of illogical and unacceptable biases and emotions and self-promotion. I will insist that we will have to utilize these people in developing our total radiation protection philosophy.”

Lauriston Taylor, Sievert Lecture, IRPA 5 Congress, Jerusalem, 1980

Some issues to be explored

- What are the links between the judgments on **uncertainty and variability** and the ethical theories?
- What is the ethics sustaining the **precautionary principle**?
- What are the ethical values behind the reference to natural exposure and the comparison with risks associated to human activities in deciding about the **tolerability of radiation risk** for the public and for workers?
- What is the right ethical attitude towards **future generations**?
- What are the ethical foundation of the **procedural issues** related to the implementation of the radiation protection system?
- ...

Conclusion

- The RP system is a construction attempting to combine the respect of **individual rights** (deontological ethics), the furthering of **collective interest** (utilitarian ethics) and the promotion of **wisdom and discernment** (virtue ethics)
- *“The **ethics of radiation protection** is a new field of **applied ethics**. It is a highly promising one, both from a theoretical and a practical perspective”*. Hansson, 2007
- The **IRPA Code Of Ethics** adopted in 2007 to aid members of IRPA Associate Societies in maintaining a professional level of ethical conduct in relation to radiation protection is an important step to promote the ethics of radiation protection

Ethics, values and radiation protection principles

