An Introduction to the Ethical Foundations of the Radiological Protection System

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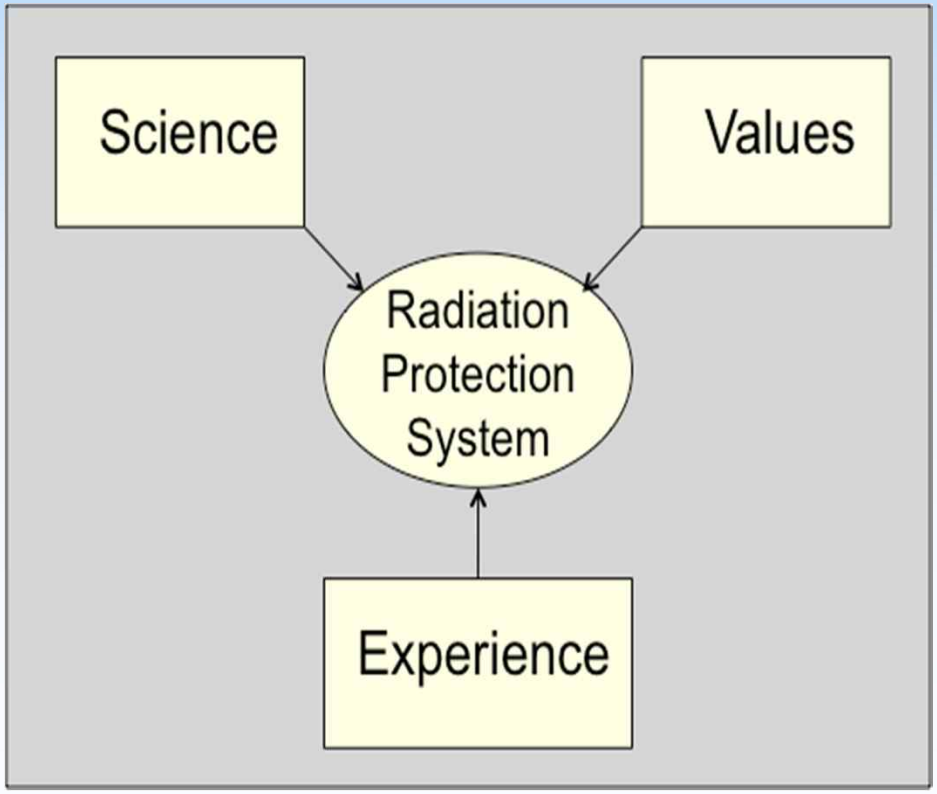
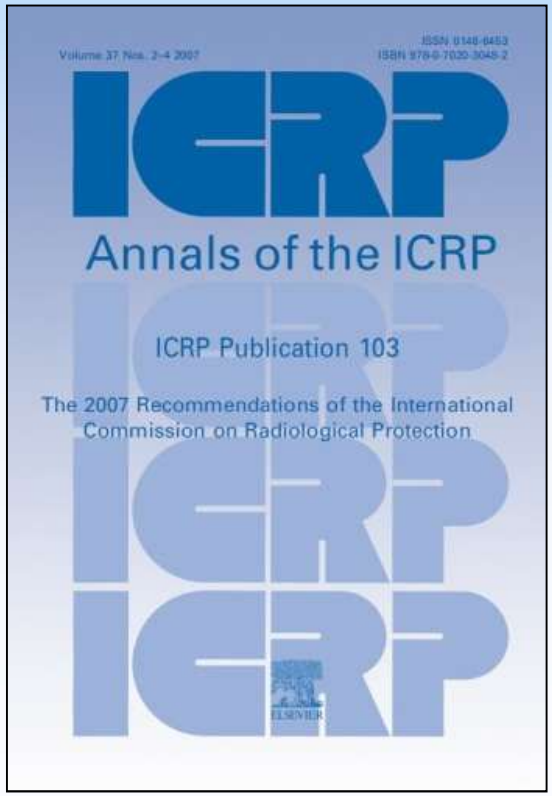
Preliminary remarks

- ICRP C4 initiated a reflection on the ethics of radiological protection in fall 2009
- The first step was a review of ethical theories and principles which concluded that the system of radiological protection is rooted in the 3 major theories of ethics: **deontological, consequentialism/utilitarian and virtue ethics**
- The objective of this presentation is to identify the main ethical values that are explicitly or implicitly incorporated into the system of radiological protection. It does not pretend to be exhaustive but is intended to be a starting point for further reflections

The three pillars of the system of radiological protection

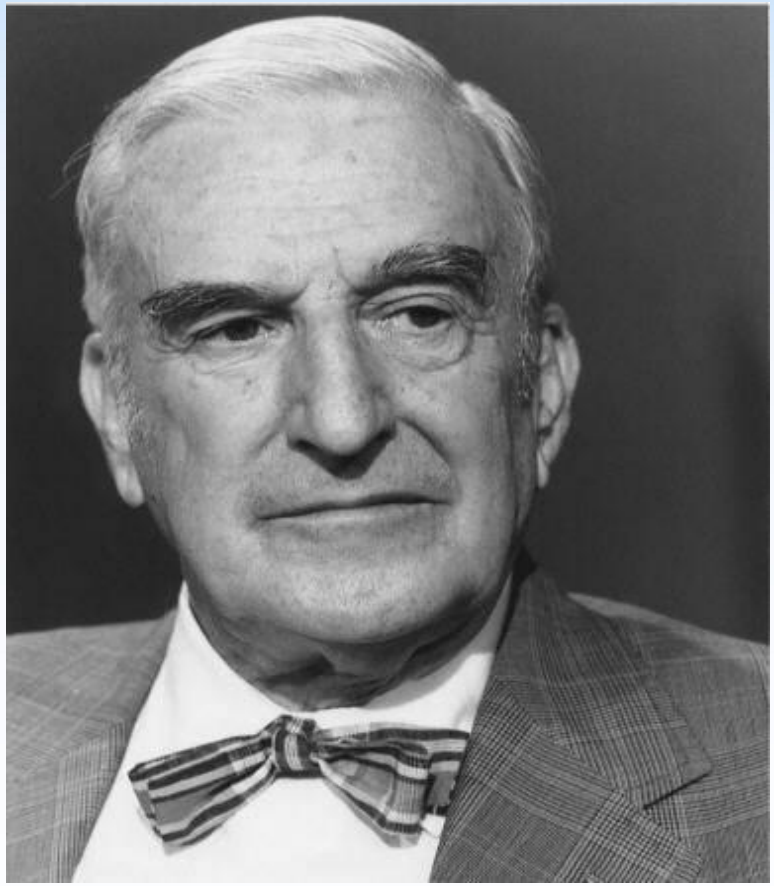




Publication 103

Fundamental Recommendations

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

Publication 103

- « The Recommendations are based on **scientific knowledge and on expert judgement.** Scientific data, such as those concerning health risks attributable to radiation exposure, are a necessary prerequisite, but **societal and economic aspects of protection have also to be considered**. All of those concerned with radiological protection have to make **value judgements** about the relative importance of different kinds of risk and about the **balancing of risks and benefits.** » (§ 27)

- The term 'Ethics' does not appear in ICRP 103. The expression 'ethical aspects' is used twice:
  - as possible aspect of the decision-making process related to radiological protection (§ 224)
  - as an aspect of the participation of volunteers in biomedical research involving radiation (§ 358)

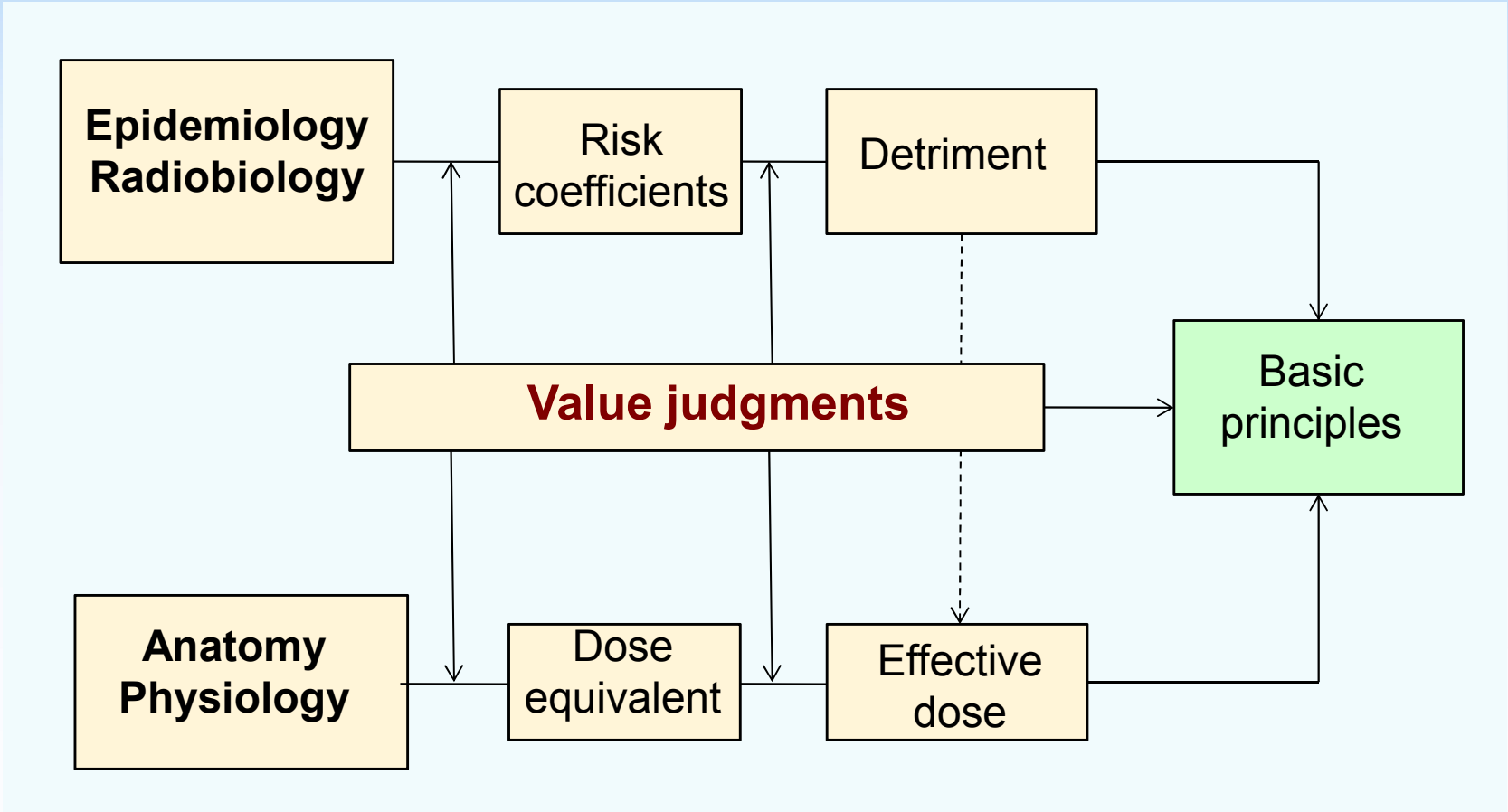
Experience

- Different meanings:
  - Testing to verify the relevance of an assumption or induce it from observation
  - Knowledge acquired through practice
  - Events giving rise to new knowledge (e.g. Chernobyl and Fukushima)

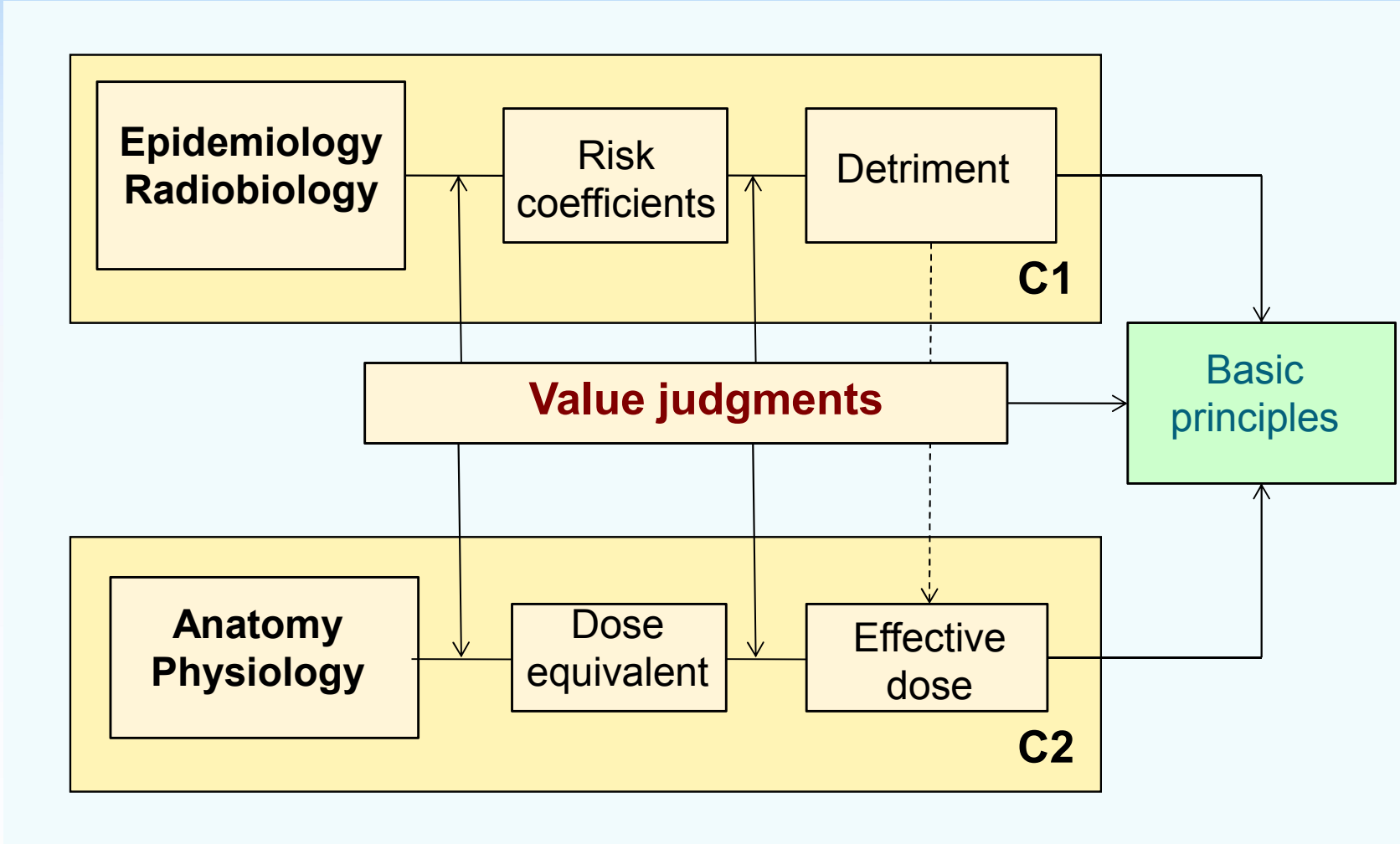
- Experience refers to **know how and empirical knowledge**, and also contributes to building universal. It is considered as the beginning of wisdom

- From an **ethical perspective**, experiences influences the societal perception of **which behaviours benefit to people and which acts are counterproductive to their welfare**

The scientific basis of the radiological protection system



The scientific basis of the radiological system protection system



A key value judgment : prudence

- « It is **prudent** to take uncertainties in the current estimates of thresholds for deterministic effects into account, particularly in situations involving prolonged exposures. Consequently, annual doses rising towards 100 mSv will almost always justify the introduction of protective actions ». ICRP 103, § 35

- « At radiation doses below around 100 mSv in a year, the increase in the incidence of stochastic effects is assumed by the Commission to occur with a small probability and in proportion to the increase in radiation dose over the background dose. …The Commission considers that the LNT model remains a **prudent** basis for radiological protection at low doses and low dose rates. » ICRP 103, § 36

- « The major policy implication of the LNT model is that some finite risk, however small, must be assumed and a level of protection established based on what is deemed **acceptable**. » ICRP 103, § 38

Prudence

- **Long tradition in ethics**: Aristotle, Buddhist tradition, Confucianism, the ancient people of Oceania and America
- Prudence is a **virtue** : how to behave without the full knowledge of the consequences of our actions?
  = virtue ethics
- The object of prudence is the **contingent** i.e. what can happen or not happen, what is occasional, accidental, uncertain
- Prudence is the virtue of **deliberation:** the disposition to choose and act on what is in our power to do and not to do
  = relationship to the practice

The implications of prudence

- Risk taking is justified only if there is a benefit in return

  ➔ **Justification of decisions**

- Once an activity is justified:
  - How far to reduce the risk?
  - How not to jeopardize activity?
  - What criteria to use to base decisions on the right level of protection?

  ➔ **The quest for reasonableness**

- Maintaining exposures below a limit is not a guarantee of no risk

  ➔ **Restriction of individual exposure is an issue of tolerability of risk**

The basis and structure of the system of protection

« Because of the variety of radiation exposure situations and of the need to achieve a consistency across a wide range of applications, the Commission has established a formal system of radiological protection aimed at encouraging a feasible and structured approach to protection. **The system has to deal with a number of sources of exposure, some already being in place, and others that may be introduced deliberately as a matter of choice by society or as a result of emergencies.** These sources are linked by a variety of interconnected events and situations leading to exposure of individuals, groups, or entire populations, both in the present and in the future. The system of protection has been developed to allow this complex network to be treated by a logical structure. » ICRP 103, § 31

The system of radiological protection

- 3 types of exposure situations
- 3 categories of exposure
- 3 principles of protection

Exposure situations

- “The process causing human exposures from natural and man-made sources.”

- “Protection can be achieved by taking action at the source, or at points in the exposure pathways, and occasionally by modifying the location or characteristics of the exposed individuals.” ICRP103, § 169

The three types of exposure situations

- **Existing exposure situations :** when exposures result from **sources that already exist when decisions to control them are taken**. Characterization of exposures is a prerequisite to their control
- **Planned exposure situations :** when exposures result from the **deliberate introduction and operation of sources.** Exposures can be anticipated and fully controlled
- **Emergency exposure situations :** when exposures result from the **loss of control of a planned source**. These situations require urgent and timely actions in order to mitigate exposures

Remark: the Commission considers long term exposures resulting from a nuclear accident as an existing exposure situation and exposures resulting from malicious acts as an emergency exposure situation

The categories of exposure

- **Occupational exposure:** "… radiation exposures incurred at work as a result of *(exposure)* situations that can reasonably be regarded as being the responsibility of the operating management." ICRP 103, § 178

- **Medical exposure:** "Radiation exposures of patients occur in diagnostic, interventional, and therapeutic procedures." ICRP 103, § 181

- **Public exposure:** "Public exposures encompasses all exposures of the public other than occupational exposure and medical exposures of patients." ICRP 103, § 180

Remark: Individuals may fall into the 3 categories respectively as workers, patients or members of the public

The principles of radiological protection
ICRP 103, § 203

- **The principle of justification :** "Any decision that alters the radiation exposure situation should do **more good than harm**."

- **The principle of optimization:** "The likelihood of incurring exposures, the number of people exposed, and the magnitude of their individual doses should all be kept **as low as reasonably achievable, taking into account economic and societal factors**."

"In order **to avoid severely inequitable outcomes** of this optimisation procedure, there should be **restrictions on the doses or risks to individuals** from a particular source."

- **The principle of limitation:** "The total dose to any individual from regulated sources in planned exposure situations other than medical exposure of patients should not exceed the appropriate limits recommended by the Commission."

Justification: « More good than harm »

- « This means that, by introducing a new radiation source, by reducing existing exposure, or by reducing the risk of potential exposure, one should achieve **sufficient individual or societal benefit to offset the detriment** it causes. » ICRP 103, § 203

- « … the responsibility for judging the justification usually falls on governments or national authorities **to ensure an overall benefit in the broadest sense to society and thus not necessarily to each individual.** » ICRP 103, § 208

- The duty to do more good than harm through public actions because, in practice, no action will have exclusively beneficial effects, is called in ethics **beneficence or principle of utility**

Beneficence

- Beneficence means «the doing of good » i.e. **to act for the benefit of others**
- Beneficence as an ethical requirement means: **do no harm, maximize benefits and minimize harms**
- Beneficence is strongly tied to the **utilitarian theory of ethics**.
- Beneficence concerns **human welfare** with the objective to reduce the harms and optimise the benefit of social practices

Remark: Beneficence is one of the 4 basic ethical principles used in health care decision-making

Restriction and limitation of individual exposures: « to avoid severely inequitable outcomes »

- « The concept of dose constraints was introduced in Publication 60 as a means of ensuring that the optimisation process did not create **inequity,** i.e., the possibility that some individuals in an optimised protection scheme may be subject to much more exposure than the average. » ICRP 103, § 232

- **«** Most of the methods used in the optimisation of protection tend to emphasise the benefits and detriments to society and the whole exposed population. The benefits and detriments are unlikely to be distributed through society in the same way. Optimisation of protection may thus introduce a substantial **inequity** between one individual and another. This inequity can be limited by incorporating source-related restrictions on individual dose into the process of optimization. » ICRP 103, § 232

Equity and justice

- The word 'equity' means to do something fairly
- Inequity = injustice, unfairness, lack of equity
- Equity is about **social fairness and justice**
- Equity refers to the **fair distribution of advantages and disadvantages within a society** i.e. how burdens and benefits, goods, services, jobs and salaries, but also risks are distributed
- Equity is related to the **ethical concept of distributive justice**

Stakeholder engagement

- In Publication 103 « the Commission mentions, for the first time, **the need to account for the views and concerns of stakeholders** when optimising protection » (Editorial).

- « … while this report should be seen as providing decision-aiding recommendations mainly based on scientific considerations on radiological protection, the Commission's advice will be expected to serve as an input to a final (usually wider) decision-making process, which may include other societal concerns and ethical aspects, as well as considerations of transparency (ICRP, 2006a). This decision making process may often include **the participation of relevant stakeholders** rather than radiological protection specialists alone ».

Medical exposure of patients

- « The patient, or legal guardian, agrees or consents to a medical procedure using radiation. This decision is made with varying degrees of **informed consent** that includes not only the expected benefit but also the potential risks (including radiation). » ICRP 103, § 327

- « The pregnant patient has a **right to know** the magnitude and type of potential radiation effects that might result from in-utero exposure. » ICRP 103, § 344

Protection of people living in long term contaminated areas

- « The decision to allow people who wish to live in contaminated areas to do so is taken by the authorities, and this indicates the beginning of the post-accident rehabilitation phase. Implicit with this decision is the ability to provide people with protection against the potential health consequences of the radiation, and **sustainable living conditions, including respectable lifestyles and livelihoods**. » Pub 111, § 8
- « The protection strategy defined by the authorities should take into account both categories of protective actions, and should enable affected individuals to take **self-help initiatives**. However, as self-help protective actions are implemented – and thus largely decided – by the inhabitants themselves, they must be properly **informed** and, if relevant, **trained** (to use the means and equipment provided by the authorities) in order **to take informed decisions** concerning their own protection, with a net benefit. » Pub 111, § 30

The right to know principle

- **Right to know** is related to the hazards an individual is exposed to, the harm they might cause, and the precautions that could prevent these harmful effects in order to allow her/him to act based upon a clear appreciation and understanding of the facts, implications, and future consequences of her/his action

- In other words, right to know refers to the type of information that affected persons should receive to make **informed and effective decisions**

- The right to know principle in the field of radiation protection is closely related to the access to **radiation protection culture**

Self-help

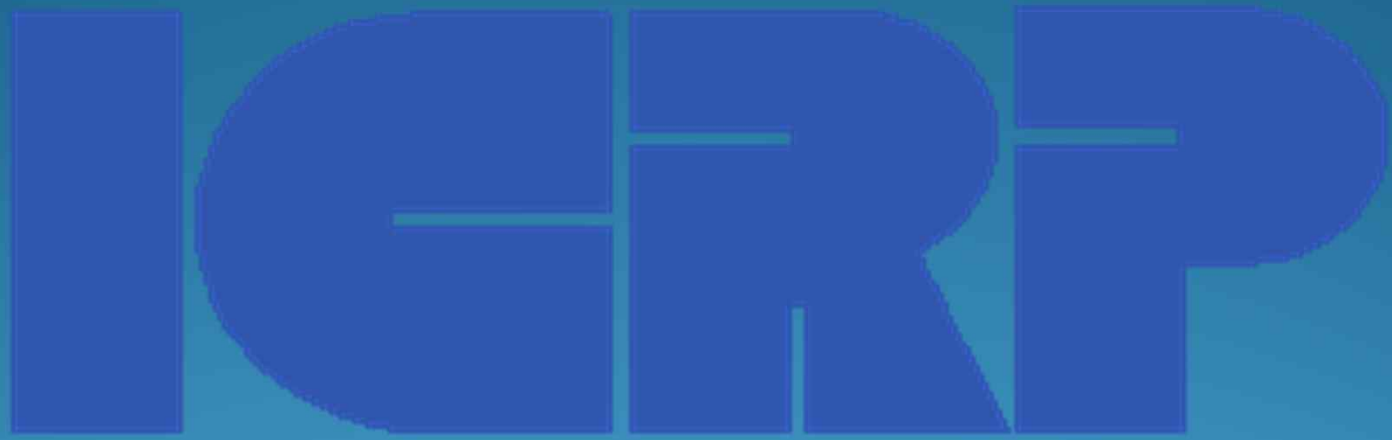
- The act of improving or helping yourself without relying on anyone else
- Include activities that improve **awareness**, develop **competence** and **interpersonal relationships**, and enhance **quality of life**
- Stakeholder engagement promotes **autonomy and accountability** of individuals
- Voluntary actions carried out by affected individuals themselves are deemed positive as they respect the fundamental values of **autonomy** and **dignity**

Dignity

- **Dignity** has two dimensions :
  - **Attribute of human condition** : idea that something is due to the human being because she/he is human. This means that every individual deserves unconditional respect, whatever her/his age, sex, health, social condition, ethnic origin and religion
  - **Autonomy of the individual**: idea that individuals have the capacity to act freely and morally i.e. to reign over themselves and to be able to make decisions that apply to their lives
- The ethics of dignity is **to treat individuals as subjects (persons) and not as objects**
- Stakeholder engagement, right to know, self-help are **procedural aspects** that enable to implement autonomy and dignity in practice
- Dignity is with responsibility an argument against the traditional paternalistic viewpoint

In summary

- The radiation protection system is a construct that combines the state of **knowledge** on the effects of radiation, **ethical values** and the feedback **experience** from the field
- On first reading, the basic principles of radiological protection are promoting:
  - **Prudence**
  - **Beneficence**
  - **Equity (Justice)**
- The system of protection is also promoting **human dignity and autonomy**
- There would be a merit to explore more fully in an ethical perspective the two concepts/values of **reasonableness** and **tolerability** which are at the core of the radiological protection system



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