The Ethics of Radiological Protection

Jacques LOCHARD
Vice-chair of ICRP
Director of CEPN – France

First Thomas S. Tenforde Topical Lecture
Fifty-First NCRP Annual Meeting,
Bethesda, Maryland, USA
17 March 2015

This presentation has neither been approved nor endorsed by ICRP
The three pillars of the ICRP system of radiological protection

- Science
- Ethical and social values
- Experience
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

Lauriston S. Taylor (1902 – 2004)
President of NCRP from 1929 to 1977
Chair of ICRP from 1937 to 1962
A basic definition of wisdom is the quality of having **experience, knowledge, and good judgement**. (Oxford dictionary)

As a **virtue**, wisdom is the disposition to behave and act with the **highest degree of adequacy under any given circumstances**.

In its popular sense, wisdom is attributed to a person who takes **reasonable** decisions and act accordingly.
Some references


The primary aim of the ICRP system of radiological protection

- “… to contribute to an appropriate level of protection of **people** and the **environment** against the **detrimental effects** of ionising radiation exposure without unduly limiting the **desirable human actions** that may be associated with such exposure.” ICRP 103, § 26

- This requires **scientific knowledge**, considerations about **societal and economic aspects**, and **value judgements** about different kind of risks and about **balancing risks and benefits** which is one of the most common **ethical dilemmas** of everyday life
The protection of human health

- The objective of the system of radiological protection is to manage exposures to ionizing radiation in order to:
  - Prevent deterministic effects
  - Reduce to the extend reasonably achievable **the risks of stochastic effects**
- In ethics the desire to prevent and to reduce risk, that is to say **to do good**, is called **beneficence**
- Beneficence together with **non-maleficence**, that is to say the desire **to do no harm**, are central to **medical ethics**
The scientific basis of the system of radiological protection

Pathology
Epidemiology
Radiobiology

Threshold doses
1
Radiation detriment
2

Uncertainties and value judgements

Anatomy
Physiology
Metrology

Effective dose

System of radiological protection

1 Deterministic effects  2 Stochastic effects
Uncertainties and prudence

“*It is prudent to take uncertainties in the current estimates of thresholds for deterministic effects* into account… 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… The Commission considers that the LNT model remains a prudent basis for radiological protection at low doses and low dose rate.” ICRP 103, § 36

“*There continues to be no direct evidence that exposure of parents to radiation leads to excess heritable disease* in offspring. However, the Commission judges that there is compelling evidence that radiation causes heritable effects in experimental animals. Therefore, the Commission prudently continues to include the risk of heritable effects in its system of radiological protection.” ICRP 103, § 74
About prudence

- Prudence is the **virtue of deliberation and judgment** in order to make choices without the full knowledge of the scope and consequences of our actions.

- In radiological protection, prudence allows to **act judiciously** taking into account the **uncertainties** of radiation risks.

- **Prevention** (when risks are known) and **precaution** (when risks are potential) are daughters of prudence.

- Prudence implies **a duty of vigilance** i.e. to relentlessly pursue research to try to reduce uncertainties particularly as far as stochastic effects are concerned.
The implications of prudence for stochastic effects

- As any exposure, whatever its level, presents a risk, exposing individuals must bring them directly or indirectly more advantages than drawbacks.

- If an exposure situation is considered advantageous, action must be taken to restrict exposures considering the assumed risk.

- In any cases, all individual exposures must be maintained below levels judged acceptable given the circumstances.

- “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. This leads to the Commission’s system of protection with its three fundamental principles of protection.” ICRP 103, § 38.
The basic components of the ICRP system of radiological protection for humans

- Exposure situations
  - Existing
  - Planned
  - Emergency

- Categories of exposure
  - Medical
  - Occupational
  - Public

- Principles of protection
  - Justification
  - Optimisation
  - Limitation

- Dose criteria
  - Reference levels
  - Dose constraints
  - Dose limits

- Requisites
  - Information
  - Assessment of exp.
  - Stakeholder involvement

- Stakeholder involvement
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INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION
The principles of radiological protection

- **The principle of justification**: any decision that alters a radiation exposure situation should do more good than harm.
  - This principle refers to the ethical values of prudence, and beneficence/non-maleficence.

- **The principle of optimisation** of protection: all exposures should be kept as low as reasonably achievable with restrictions on individual exposures to limit inequity between individuals.

- **The principle of limitation of individual exposure**: all individual exposures should not exceed the dose criteria recommended by the Commission.
  - These two principles refer to the ethical values of prudence and justice.
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  - Emergency

- **Categories of exposure**
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  - Occupational
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- **Principles of protection**
  - Justification
  - Optimisation
  - Limitation

- **Dose criteria**
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- **Stakeholder involvement**
The role of dose criteria

- To **reduce inequity** in the distribution of individual exposures in case some individuals are subject to much more exposure than the average (dose constraints and reference levels)

- To **avoid unacceptable** exposures (dose limits). These represent the point at which exposures can reasonably be regarded as only just **tolerable**
About justice

- Dose criteria are tools to ensure **justice** in the distribution of risks across exposed groups of individuals.

- Justice is a complex ethical value, with meanings ranging from the **fair treatment of individuals** to the **equitable distribution of benefits and burdens** to individuals by social organisations, but also how the **rights of individuals** are guaranteed.

- The principle of **fairness** or **equity** requires that to the extent reasonable, cases that are alike, should be treated in the same way.

- In radiological protection this often means in practice accepting to allocate **more resources** to protect individuals whose exposures are significantly **above the average** exposure for a given situation.
The basic components of the ICRP system of radiological protection for humans

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**Categories of exposure**
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**Principles of protection**
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**Requisites**
- Information
- Assessment of exp.
- Stakeholder involvement
The basic requisites that apply to all exposure situations and categories of exposure

- **Information** of exposed individuals
- **Assessment** of exposure (estimates and/or measurement)
- **Involvement** of stakeholders introduced first in the ICRP general recommendations in Publication 103, 2007

These basic requisites are declined differently depending of the exposure situation and the category of exposure e.g.:

- **Informed consent** in the medical field
- **Training** and **monitoring** for occupationally exposed workers
- **Practical radiological protection culture** for people living in long term affected areas after a nuclear accident
“Aside from our experienced scientists, trained in radiation protection, 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 developing our total radiation protection philosophy.”

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

- Concretely engaging stakeholders in radiological protection emerged in the late 80s and early 90s in the context of the management of exposures in contaminated areas by the Chernobyl accident and contaminated sites by past activities.

- Why to engage stakeholders?
  - To take into account their concerns and expectations as well as the prevailing circumstances of the exposure situation.
  - To adopt more effective and fairer protection actions.
  - To favour their empowerment and autonomy i.e. to promote their dignity.
About dignity

- **Dignity is an attribute of the 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.

- **Personal autonomy** is the corollary of human dignity: idea that individuals have the capacity to act freely and morally.

- Dignity is **cultural**. It is a conquest over the inhuman, an agreement between a culture and those who share it.

- Dignity is enshrined in the Universal Declaration of Human Rights (1948): “All human beings are born free and equal in **dignity** and rights” (Art. 1).
The quest for reasonableness and tolerableness

- Attempts to find in the 70s and 80s *rational and objective bases* for what is reasonable (*cost-benefit analysis*) and tolerable (*risk comparison*) in the radiological protection field have failed.

- Reasonableness and tolerableness qualify on the ethical level the complex relationship between *radiation science* and *actions to protect* exposed people by *combining* beneficence/non-maleficence, prudence, justice and dignity.

- In practice, searching for reasonableness and tolerableness is a *permanent questioning*, which depends on the prevailing circumstances, in order to *act wisely* based on *accumulated knowledge and experience*. 
Concluding remarks (1)

- The ICRP system of radiological protection is founded on the ethical values of **beneficence/non maleficence, prudence, justice and dignity**

- These core values are the constituents of **reasonableness** and **tolerableness**, which allow radiation protection professionals to act **wisely** i.e. with the desire to:
  - do more good than arm
  - avoid unnecessary risk
  - seek for fair distribution of exposures
  - treat people with respect
Concluding remarks (2)

- Studies of **oral and written traditions** that guided population of different cultures through ages show that these core values are also **largely shared worldwide**
Apart from scientists, experts and professionals, citizens are rarely informed about radiation and even less about the radiological protection system.

Experience on stakeholder engagement during the last 2 decades teaches us that we, as professionals, must develop a narrative about the ethical and social values of the radiological protection system if we want to be better understood and gain confidence.

ICRP Committee 4 is currently developing a reflection on the ethics of radiological protection with the objective to produce an ICRP Publication that will hopefully bring to professionals and the public a clearer view on what the system is designed to achieve and why.