

# The Ethics of Radiological Protection

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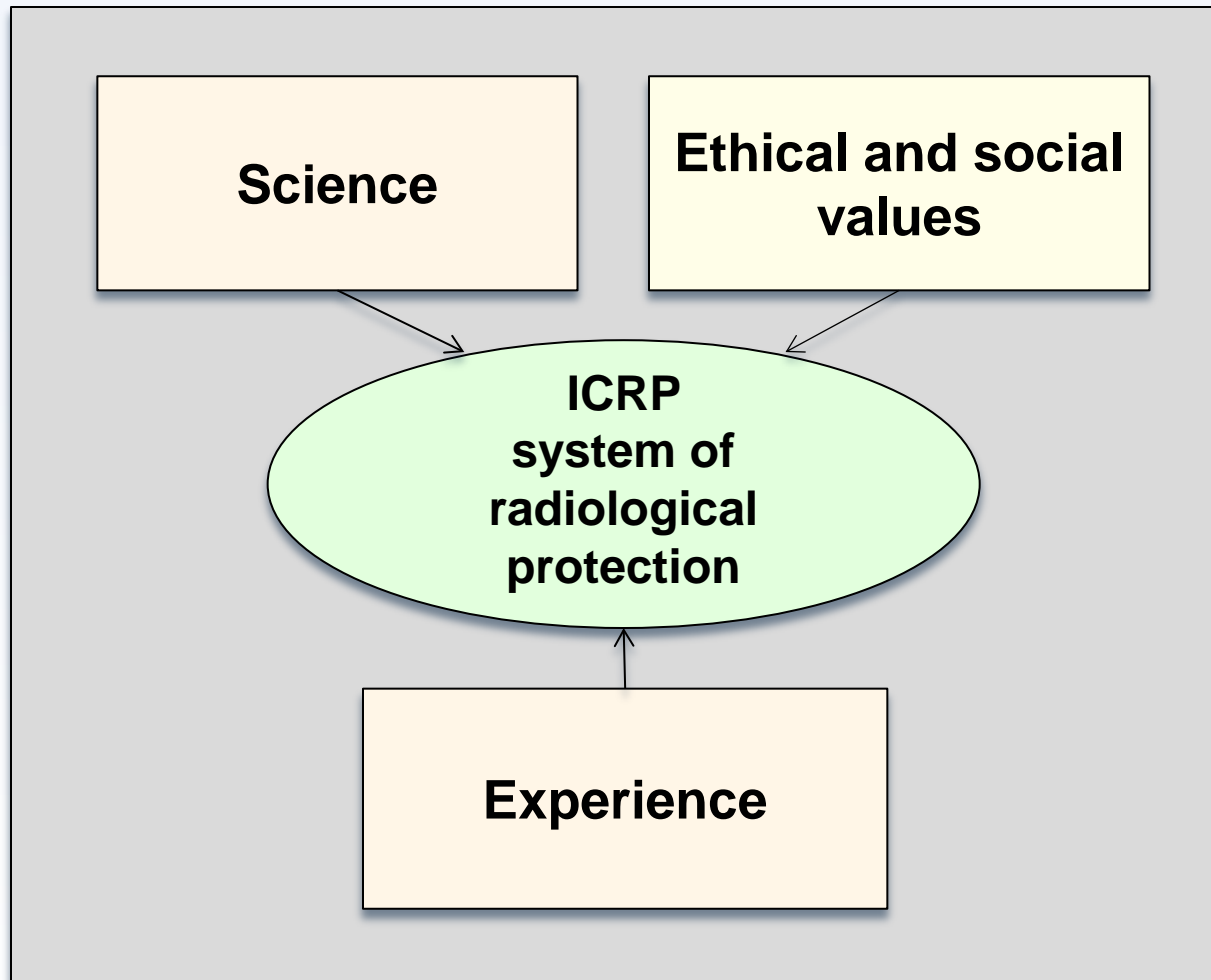
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**First Thomas S. Tenforde Topical Lecture**

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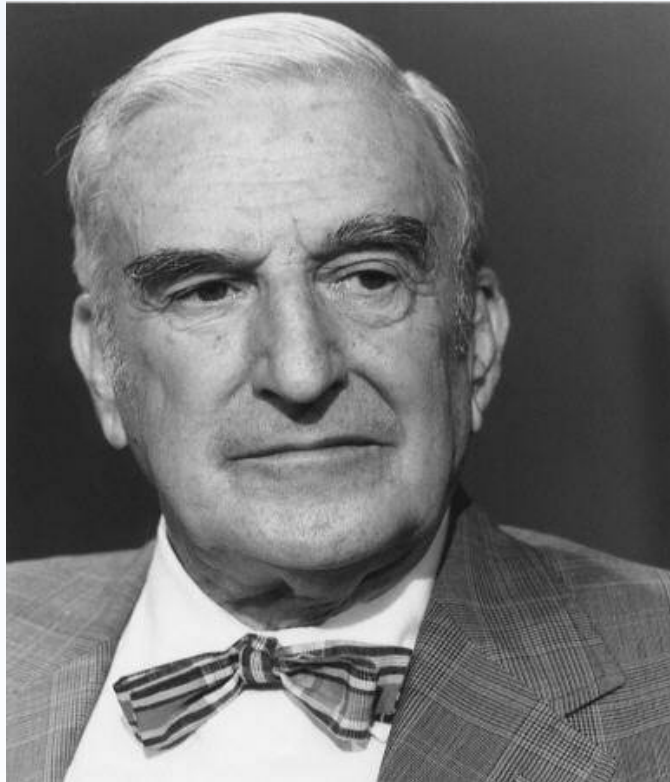
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# The three pillars of the ICRP system of radiological protection



# Science and ethics in radiological protection

## A long tradition



**Lauriston S. Taylor (1902 – 2004)**  
**President of NCRP from 1929 to 1977**  
**Chair of ICRP from 1937 to 1962**

“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

# Wisdom

- 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

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- **Deborah Oughton.** *Ethical Values in Radiological Protection.* Radiation Protection Dosimetry. Vol 28, N° 3/4, 203-208, 1996.
- **Lars Persson and Kristin Schrader-Frechette.** *An Evaluation of the Ethical Principles of the ICRP's Radiation Protection Standards for Workers.* Health Phys. 80(3): 225-234; 2001.
- **Bo Lindell.** *Logic and Ethics in Radiation Protection.* J. Radiol. Prot. (2001) 377- 380.
- **Sven Owe Hansson.** *Ethics and Radiation Protection.* J. Radiol. Prot. (2007) 147-156.

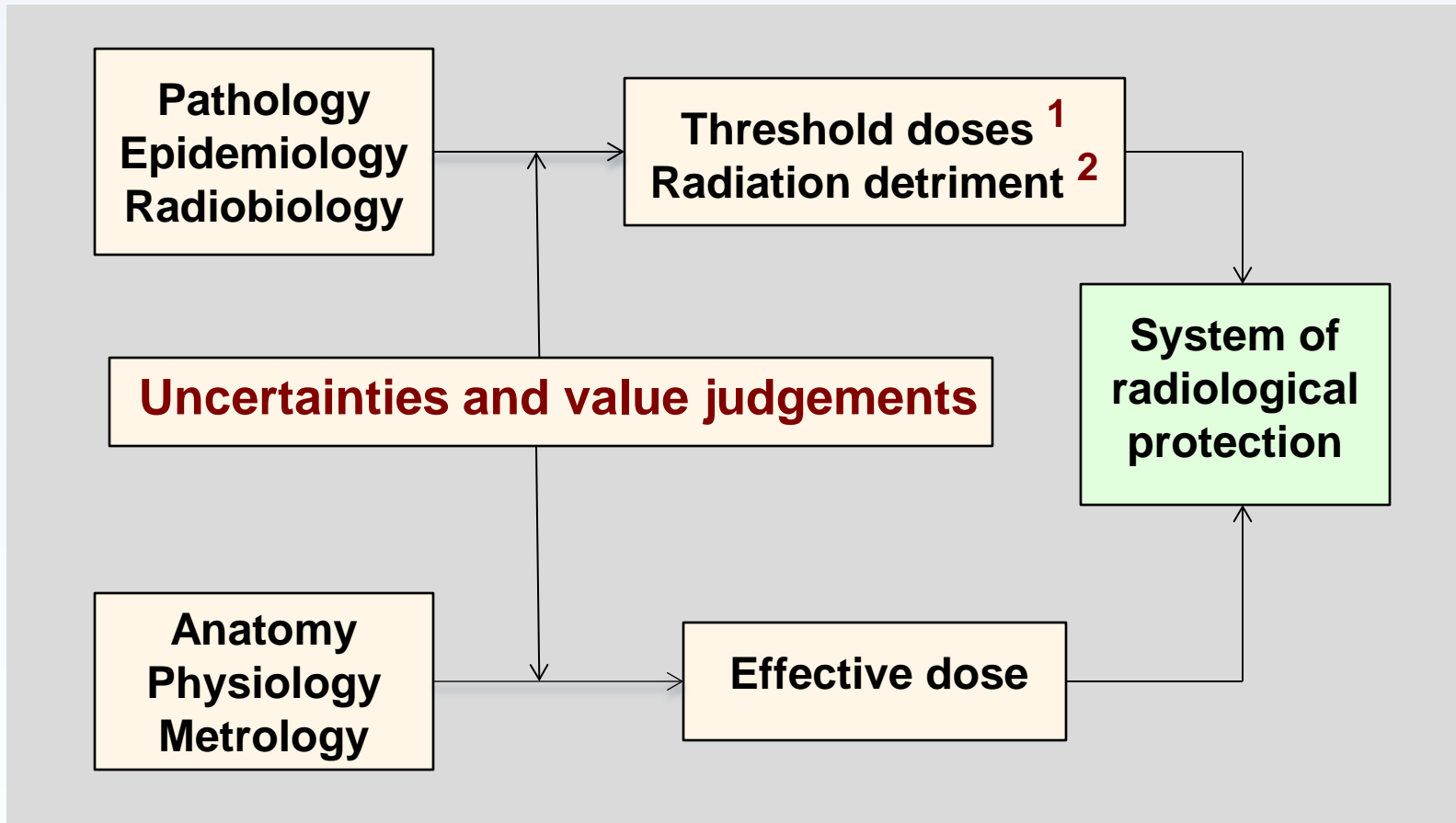
# The primary aim of the ICRP system of radiological protection

- “... 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 extent 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



<sup>1</sup> Deterministic effects    <sup>2</sup> 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

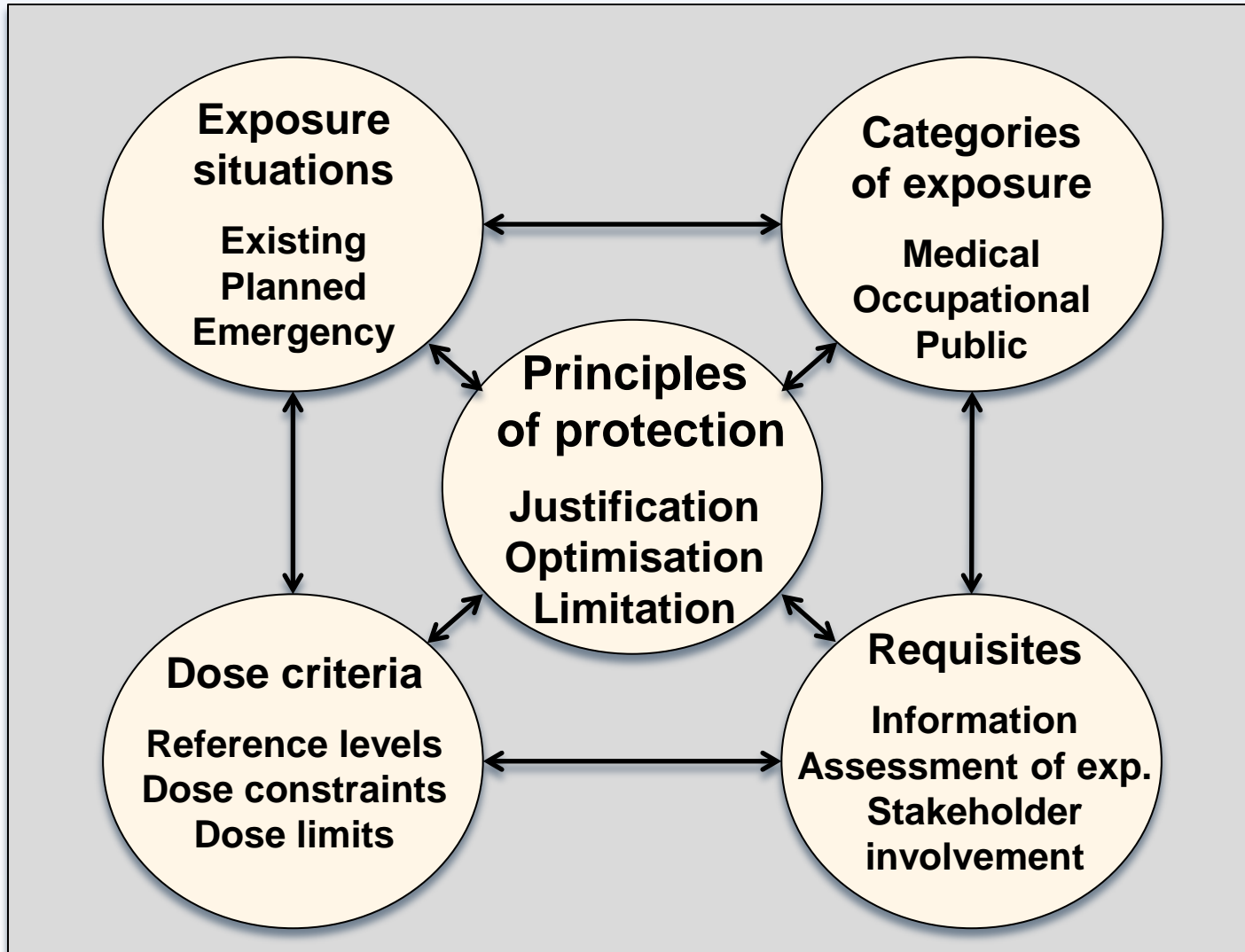
# About prudence

- 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

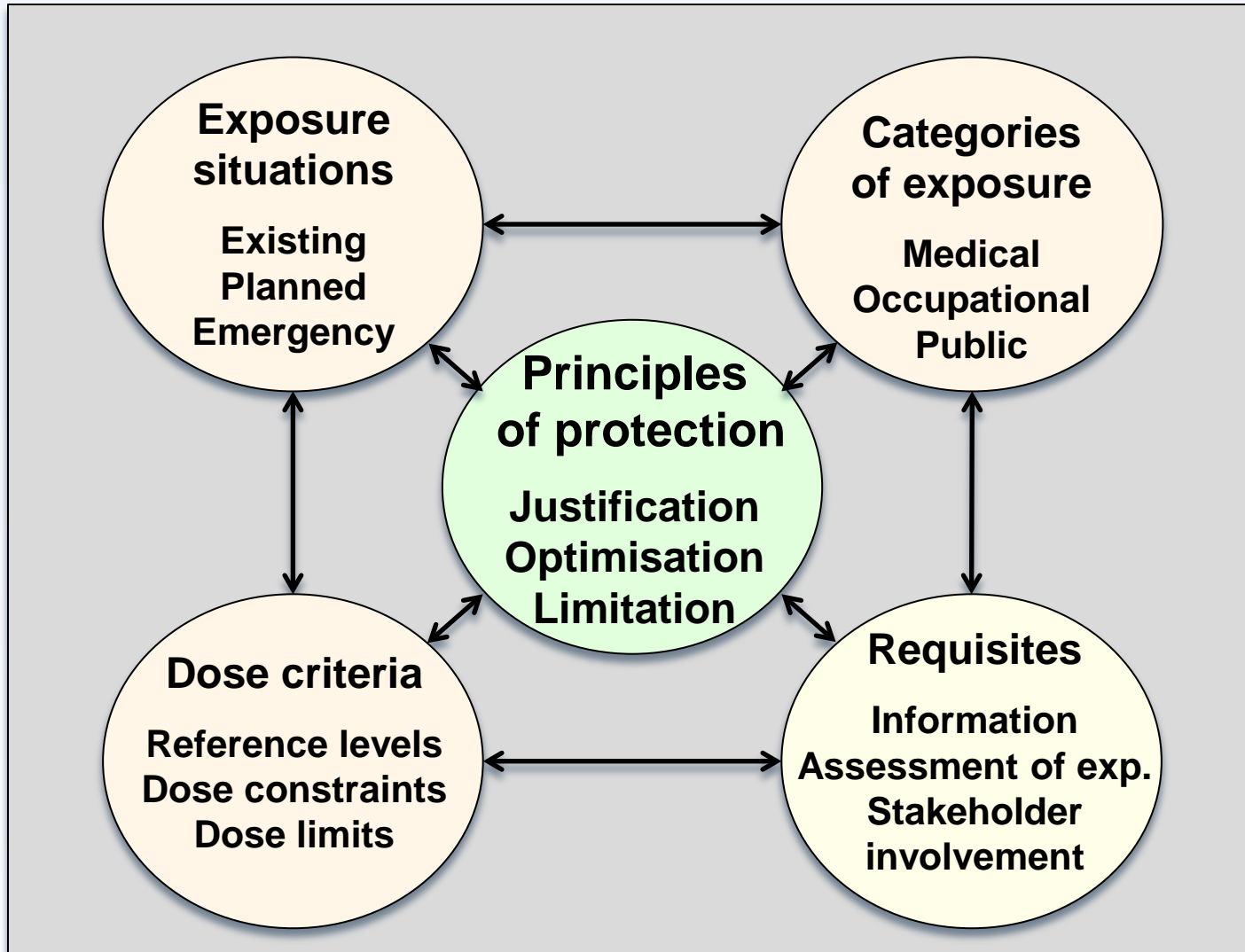
## The implications of prudence for stochastic effects

- 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



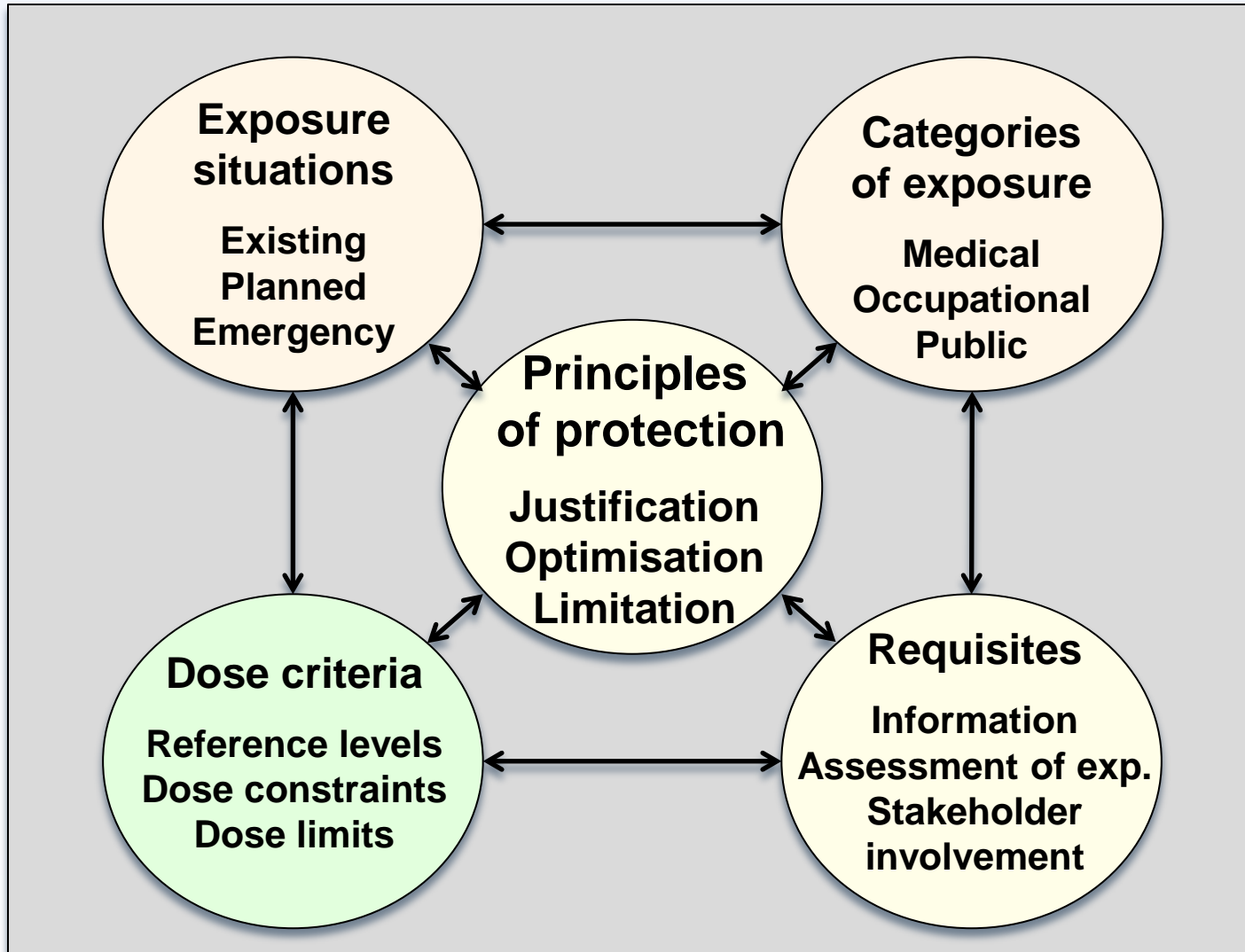
# The basic components of the ICRP system of radiological protection for humans



# The principles of radiological protection

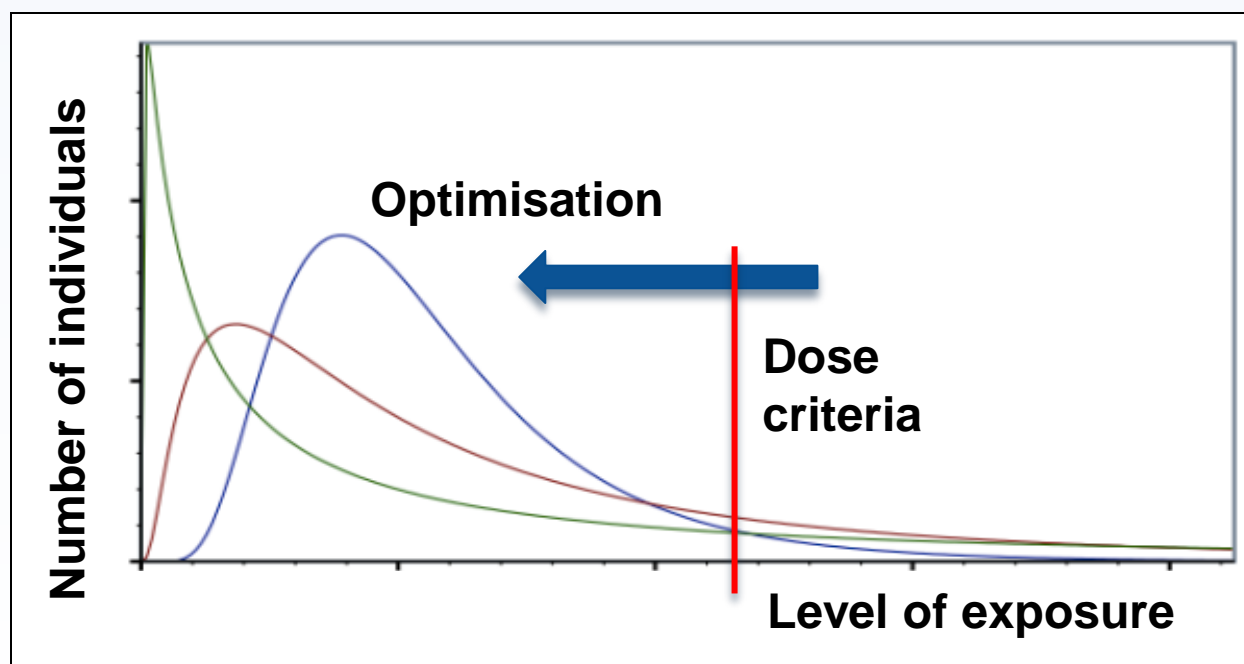
- **The principle of justification:** any decision that alters a radiation exposure situation should do **more good than harm**
  - ➔ This principle refers to the ethical values of **prudence**, and **beneficence/non-maleficence**
- **The principle of optimisation** of protection: all exposures should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

# The basic components of the ICRP system of radiological protection for humans



## 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**

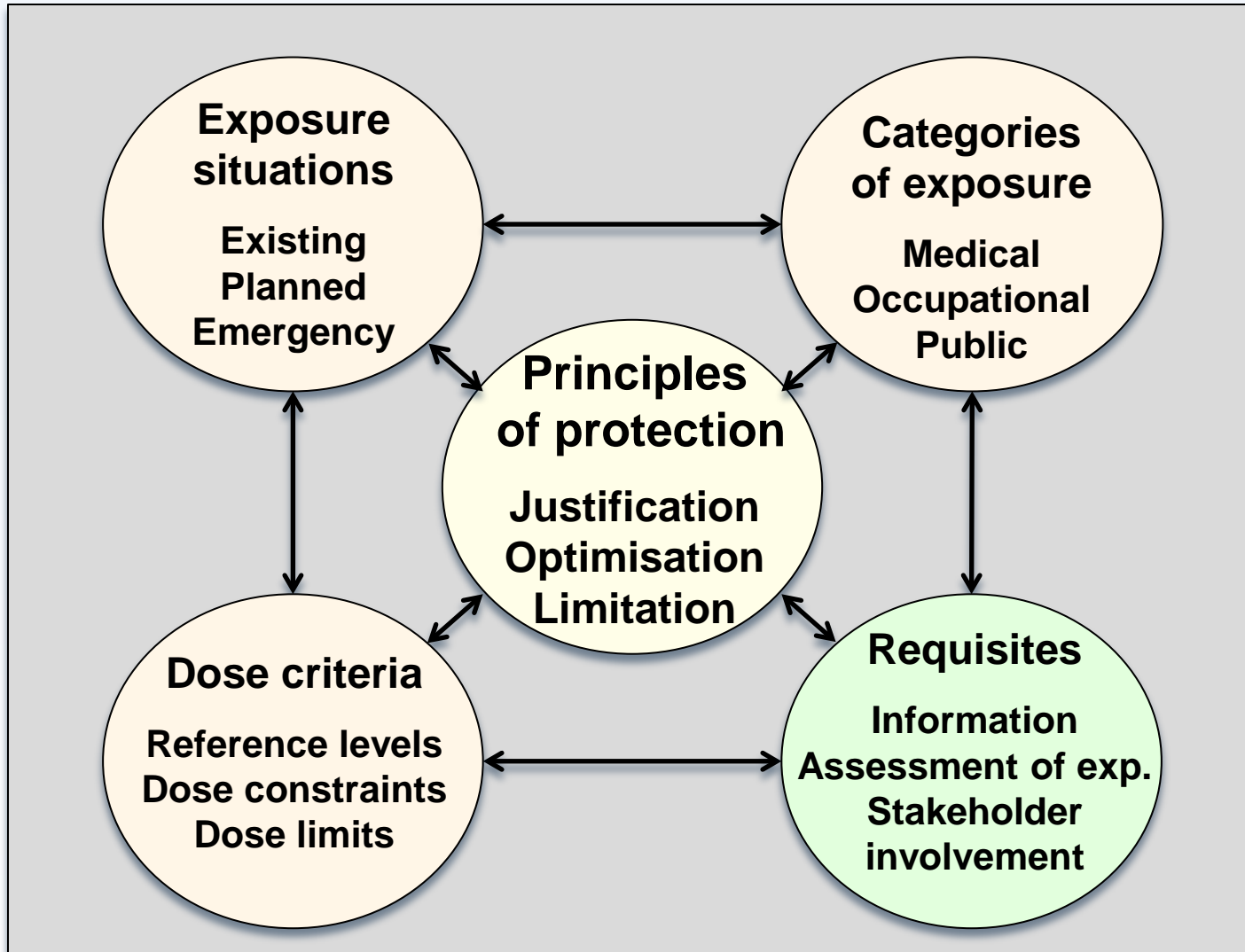




# About justice

- 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



# The requisites

- 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

# Stakeholder involvement

## The vision of a pioneer

“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 harm**
  - **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**



## Concluding remarks (3)

- 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**

**ICRP**

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