ICRP's recent efforts to revise its recommendations

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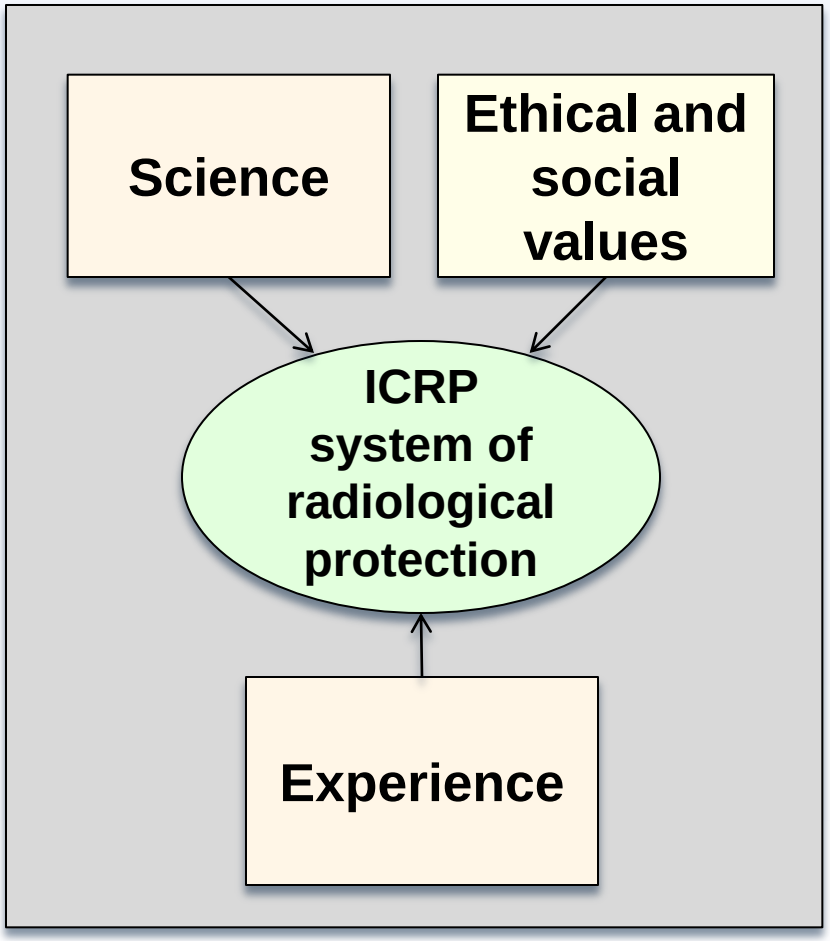
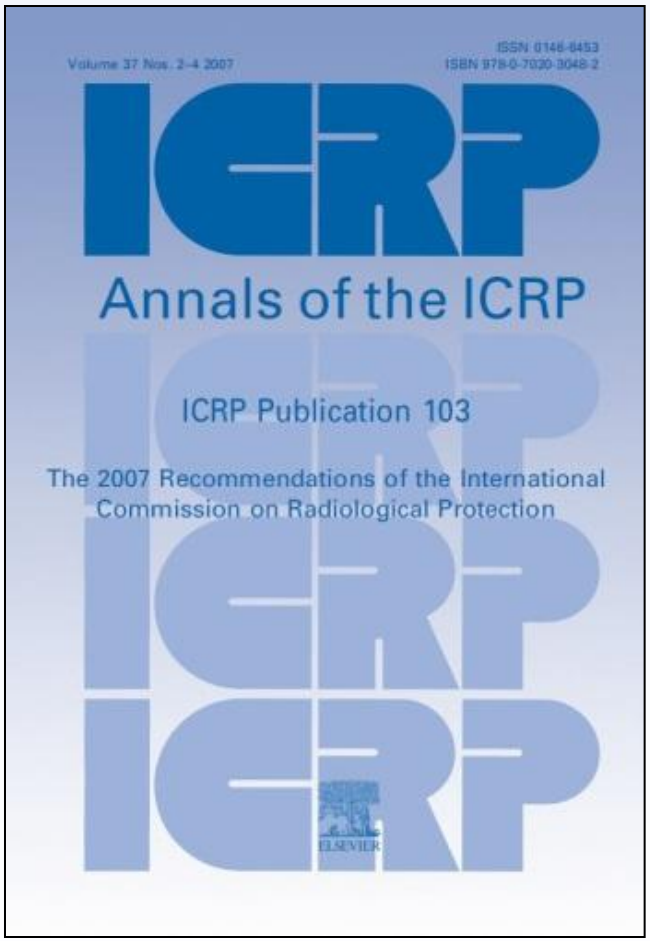
This presentation has neither been approved nor endorsed by ICRP

The three pillars of the ICRP system of radiological protection





Publication 103

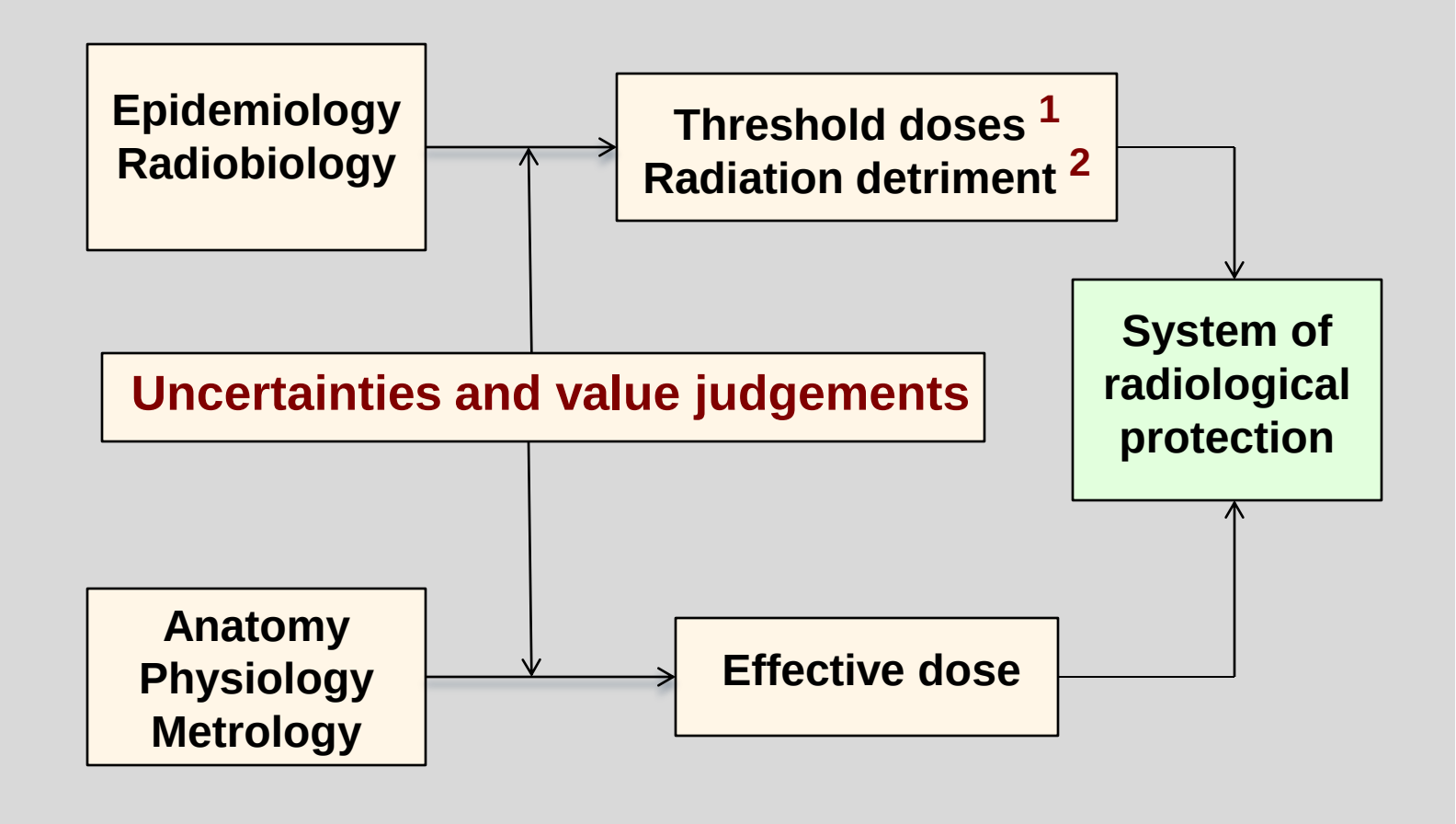
A brief historical perspective about the evolution of the ICRP system of radiological protection

- Until the Second World War the Commission was only dealing with the **protection of medical staffs**
- After the war the focus was on **nuclear energy** with the protection of workers **inside** nuclear installations and the public **outside**. This resulted in a coherent and effective regime of protection based on solid concepts, principles and norms (**Publication 60, 1991**)
- The **Chernobyl nuclear** accident followed by the raising concerns during the nineties on the exposure situations inherited from the **past** profoundly questioned the ICRP 60 Recommendations
- Although not explicit, this questioning has played an important role in the development of the most recent recommendations published in **2007 (Publication 103).**

The aims of the ICRP system of radiological protection

- "… 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." ICRP 103, § 26
- "… 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**." ICRP 103, § 29
- Estimating and comparing benefits and risk of different options for actions is one of the most common **ethical dilemmas** of everyday life

The scientific basis of the system of radiological protection (1)



[1] Deterministic effects

[2] Stochastic effects

The scientific basis of the system of radiological protection (2)

- Remarkable **stability** of the thresholds for **deterministic effects** since the early recommendations (except for the lens of the eyes revised recently)
- **Reduction of uncertainty** related to **stochastic effects** since their recognition after the second world war with **adjustments of the radiation detriment:**
  - The risk for somatic effects has been re-evaluated in the eighties (about a factor 5)
  - The risk for genetic effects has been reduced in Publication 103 (about a factor 8)
- **Re-evaluation of the risk of radon** in 2009 of approximately a factor 2
- Emergence in the 2000s of **non-cancer effects** (under scrutiny)

The three main evolutions of the ICRP system of protection in Publication 103

- The introduction of **3 types of exposure situations** with the **generalization of the optimisation principle** in connection with **individual dose restrictions** to all controllable exposure situations
- The introduction for the first time in the general recommendations of the Commission of the "**the need to account for the views and concerns of stakeholders when optimising protection**"
- The **protection of the environment** (fauna and flora)

Exposure situations

- **Existing exposure situations**: exposures resulting from natural and man-made **sources that already exist when decisions to control them are taken**. Characterization of exposures is a prerequisite to their control
- **Planned exposure situations**: exposures resulting from the **deliberate introduction and operation of sources used for their radioactive and radiation properties**. Exposures can be anticipated and fully controlled.
- **Emergency exposure situations**: when exposures result from the **loss of control of a source** or from any **unexpected situation**. These situations require urgent and timely actions in order to mitigate exposures

Exposure situations

- **Existing**
  - **Natural sources**: radon (Publication 126, 2014), NORM (TG76) and cosmic radiation (TG83)
  - **Man-made sources**: contaminated areas (Publication 111, 2009. Being updated, TG93) and contaminated sites (TG98)
- **Planned**
  - Medical facilities (Publication 105, 2007)
  - Research, industrial and nuclear installations (Publications 122 and 125, TG95)
- **Emergency**
  - Loss of control of planned sources (Publication 109, 2009. Being updated, TG93)
  - Malicious acts *(Publication 96, 2005)*

The principles of radiological protection

- **The principle of justification:** any decision that alters the radiation exposure situation **should do more good than harm**
- **The principle of optimisation of protection:** all exposures should be **kept as low as reasonably achievable**
- **The principle of limitation of individual exposure:** all individual exposures should **not exceed the dose criteria** recommended by the Commission

The setting of dose criteria in the ICRP system of radiological protection

$$\underset{[\text{mSv/year}]}{\textbf{Annual dose criteria}} = \frac{\underset{[\%/\text{year}]}{\textbf{Annual level of tolerable risk}}}{\underset{[\%/\text{mSv}]}{\textbf{Dose-risk coefficient}}}$$

When selecting dose criteria "*the relevant exposure situation in terms of the nature of the exposure, the benefits from the exposure situation to individuals and society, as well as other societal criteria, and the practicability of reducing or preventing the exposures*" should be considered

Stakeholder engagement (1)
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 engagement (2)

- Concretely stakeholder engagement 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**

The protection of the environment

- **Publication 91, 2003**. A **framework** for assessing the impact of ionizing radiation on non-human species.
  - The objective is to prevent or reduce the frequency of deleterious effects on biota (Fauna and flora) to a level where they would have a negligible impact on the maintenance of **biological diversity**; the **conservation of species**; the **health and status of natural habitats, communities, and ecosystems**.
- **Publication 103, 2007**. Explicit **extension** of the system of radiological protection to address the protection of the environment.
- **Publication 124, 2014**: Protection of the environment under different exposure situations.
  - Description of how the framework for protecting the environment should be applied in any specified exposure situation with the use of **reference animals and plants** and **reference values**

Concluding remarks

- The ICRP system of radiological protection is based on well established scientific evidences and well structured with the principle of **optimisation being the cornerstone** of the system and **reasonableness** and **tolerability** the core elements
- Apart from scientists, experts and professionals, citizens are rarely informed about radiation and even less about the radiological protection system
- Lessons from engaging with stakeholders during the last 2 decades tell us that we, as professionals, must develop **a narrative about the ethical and social values** embodied into the radiological protection system

Thank you

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