Practical Issues in Radiation Protection Decision Making: Can Scientific Input be Distinguished from Value Judgements?

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Declaring an interest….

I do work in return for money:

- Operators
- Regulators
- Interest groups
- Blood-sucking intermediaries

Being prepared to take money from anyone demonstrates a lack of prejudice!

But sometimes, I could be arguing in my spare time…

There is no such thing as an independent expert.

Benefits and dis-benefits from use of ionising radiation (1)

- Medical diagnosis, x-rays as well as internal intake of radiopharmaceuticals: Tc-99m, C-14 others
- Medical therapy
- Medical research
- Scientific investigation and research
- Industrial applications, instrumentation, radiography…

Benefits and dis-benefits from use of ionising radiation (2)

- Nuclear weapons
- Nuclear power
- Health effects on humans
- Radiological environmental impacts
- Legacies of nuclear development:
  - Areas affected by accidents and weapons testing
  - Historic nuclear technology sites
  - Inadequate radioactive waste management sites

Which is which…?

"Beauty is in the eye of the beholder"

3rd century Greek - Apparently…

Modern expression in Arrow's Impossibility Theorem …

> When voters have three or more distinct alternatives (options), no voting system can convert the ranked preferences of individuals into a community-wide (complete and transitive) ranking while also meeting a certain set of criteria.
>
> "A Difficulty in the Concept of Social Welfare" K Arrow, 1950

Does this mean consultation is a waste of time?

Multi-attribute utility analysis, with alternative viewpoint attribute weighting sets defined in a dialogue

The result does not objectively identify the best option. Arrow's Impossibility Theorem shows us mathematically that this would be a vain objective.

The value is in the transparent identification of the trade-offs inherent in adopting one option rather than another, and hence the issues of difference

The person responsible for choosing from among the options, by making her choice, explicitly admits who the winners and losers would be and why

There is no perfect answer, but thinking is better than not… it helps provide a credible narrative of a decision

Separating science and value judgements

- Distinguish assumptions that are claimed as objectively verifiable from those which are intended to be taken as value judgements
- Include uncertainty estimates for the objective stuff; and allow for alternative viewpoints in the value judgements
- Sometimes, the uncertainty linked to putatively objective information (and, not unusually, information critical to a decision) is so large that value judgements creep into the interpretation of the data available
- Support such value judgement with a credible narrative – explain yourself!

- *The source of the assumption is less relevant than the information which supports it. Traceability and transparency allow others to test your veracity.*

Basis for consideration of ethics in radiation protection

- International Commission on Radiation Protection recommendations
  - Claims to address collective and individual interests…
  - Explicitly acknowledges the values issue in the expression of optimisation: As Low As Reasonably Achievable, economic and social factors being taken into account
- International Atomic Energy Agency
  - Safety Fundamentals document

European Council Directive 2011/70

"Although each Member State is responsible for its own policy on spent fuel and radioactive waste management, that policy should respect the relevant fundamental safety principles set by the IAEA.

It is ***an ethical obligation*** of each Member State to avoid any undue burden on future generations in respect of the existing spent fuel and radioactive waste, as well as those expected from decommissioning of existing nuclear installations"

Norwegian Plan of Action to improve nuclear and radiation safety in NW Russia

- Cooperation with different regulatory authorities
  - Nuclear safety (Rostechnadzor)
  - Radiation protection (FMBA)
  - DSS NRS of Russian Ministry of Defence
- Holistic consideration of issues
  - short and long term doses and risks, linked with other pollution hazards
  - workers, public and environment
  - off-site and on site
  - planned and unplanned situations, with emergency preparedness and response
  - waste treatment, storage and final disposal

Creating the dialogue, developing the narrative

IAEA International Working Forum for Regulatory Supervision of Legacy Sites (RSLS)

- Overall objective to promote effective and efficient regulatory supervision for the management of legacy sites, consistent with the IAEA Fundamental Principles, Safety Standards and good international practices.
- To be achieved through the collection, collation and exchange of information on nuclear legacy sites; and the generation of mutual support through presentation and discussion of how regulatory supervision can be implemented and maintained.