

Feedback on priorities.

Japan AS through Michiya Sasaki on 22.10.2022

The system for radiological protection is a system protecting people and the environment mainly at low doses and low dose rates, and it provides a concept for risk management.

For the purpose of radiological protection, although safer (conservative) assessment is important for risk assessment and dose estimation, a balance needs to be taken care of because too conservative risk and dose estimation can lead to loss of resources.

In particular, environmental protection is considered to require careful and in-depth discussion because of the large uncertainties involved.

To this end, it is necessary to reduce uncertainties in the underlying scientific knowledge.

Epidemiological studies alone are not sufficient, and it is most important to provide evidence by clarifying the mechanisms of biological effects due to radiation exposure.

Considering the impact on the system of radiological protection and the current state of scientific knowledge, dose rate effects, radiation detriment, setting the dose limit, uncertainty, and balance with environmental protection is considered to be a high priority.

Feedback from Nordic Society for Radiation Protection (NSFS)

We generally support the priority list, but would like to stress the following two things:

1. A discussion on the relation between optimization and reference levels is needed. In case of accidents with releases to the environment, and subsequent decontamination, the optimal balance between dose reduction (estimated averted number of cancer cases) and costs may be reached above the reference level. A further reduction of the dose may then be suboptimal, but nevertheless mandatory to perform.
2. We believe the topic on sources and impacts of uncertainty on the System of Radiological Protection should be assigned to a task group in the near future.

221020

Mats Isaksson & Håkan Pettersson

NVS - 4th Feedback: Review priorities ICRP

Introduction

Based on the email sent on September 19th, 2022 by the chair of the TG, the members of the focus group of the Dutch Society for Radiation Protection have been invited to provide comments on the list of issues identified by ICRP as priorities for review on the path to the next general recommendations.

General remark

The list of topics identified by ICRP is considered to be an already very complete but also very ambitious list. At the same time, as any further explanation of the topics is missing, it is hard to determine whether specific aspects are considered in the topics. We note that for e.g. the review of dose-response models (in particular the LNT-model) it is not straightforward to determine which topic deals with this issue. Of course, the topical list provides leads to determine where these issues could be dealt with. Also, the publication of Laurier et al.¹ gives indications of the content of some of the topics. Yet, it would have been helpful to have a slightly more elaborated list of topics.

Priorities

The NVS has in its previous contributions to this TG already addressed the in our opinion main issues in revising the system, as well as provided IRPA with examples of difficulties & challenges in practical situations. Research/review priorities can easily be deduced from these contributions.

From the perspective of operational radiation protection, we would expect that in identifying priorities, one could (or should) prioritize according to both the highest exposures (following a graded approach, which is or should be common sense in the implementation of the system of RP), and topics that underpin the revision process as a whole. This would imply a focus on issues relevant for e.g. medical exposures on one hand, and on issues relevant for e.g. the ethical foundation and communication of the system on the other.

We acknowledge that – when looking from different perspectives – one could end up with priorities different from ours. Therefore, we refrain from indicating topics that would deserve less attention than suggested by their inclusion in the topical list.

Possibly missing topics

We note that explicit attention to the following topics seems to be missing in the list:

- The use of artificial intelligence for radiation protection purposes, its beneficial use cases and its potential risks. The development of artificial intelligence (AI) can have huge benefits, but there are also risks involved. This is true in general, but also for radiation protection purposes: AI can play a positive role in e.g. (medical) justification, optimization measures, analyzing vast amounts of data, adjusting dose coefficients and predicting biological effects more accurate. It might be necessary to take into account the ethical use of AI in the process of reviewing the ethical foundation of the system of RP. In the end this might lead to recommendations concerning the beneficial use of AI and to prevent its detrimental use.
- The review of reasonableness in optimization in RP. It is rather unlikely that this topic will not be addressed. We assume that it will be considered in the work of TG114.

¹Areas of research to support the system of radiological protection, D. Laurier et al., Radiation and Environmental Biophysics (2021) 60:519–530.

- A holistic approach in (the revision of the system of) RP. From earlier comments of IRPA on the review of the system of radiation protection, one can derive a widely supported wish to use a holistic approach in radiation protection. From the list of priorities, it cannot be deducted if ICRP will address this topic (and specifically its challenges: what is exactly meant with a holistic approach, and how do you prevent the system of RP from becoming too complex).

Final remark

We end with a remark that is slightly outside the scope of TG's request. We note that a lot has been done in the past years to make the ICRP recommendations available to a wider audience (providing e.g. electronic annexes to publications, but also making most of the ICRP publications available for free). That certainly improves the implementation of the recommendations. We greatly appreciate this development and would like to urge ICRP to continue e.g. providing future data in the recommendations not only in printed but also in electronic form, preferably in a way facilitating further use by researchers and radiation protection professionals.

Hielke Freerk Boersma, October 13, 2022

IRPA Task Group on the Revision of the System of Radiological Protection

Fourth feedback – Review on the list of priorities defined by ICRP

Date: 19 October 2022
Authors, on behalf of SFRP. Sylvain Andresz, Nuclear Protection Evaluation Centre (CEPN)
 Anne Cordelle, Radiation Protection and Nuclear Safety Institute (IRSN)
 And Contributors from SFRP

Approach. From 14 to 19 October, SFRP members were invited to express their views whether the topics identified by the ICRP at the Main Commission meeting in April 2022 are deemed a 'priority' or 'not a priority'. An online survey collected the views of 23 Members – making the results not "representative" (under a statistical definition) but interesting to separate the topics considered important vs. those less important.

1. Results of the survey

Topics	Priority	Not a priority
Effects and risks for biota and ecosystems	50%	50%
Exposure situations and exposure categories	76%	24%
Implication of taking into account the individualisation of effect, dose and risk in the radiation protection system (1) (2) (3)	70%	30%
Revision of the radiation detriment	67%	33%
Radiation protection in space	11%	89%
Application of the justification principle in medicine (4)	79%	21%
Application of the principle of justification and optimisation for the foetus, the premature baby and the new-born	80%	20%
Optimisation, including constraints and reference level	90%	10%
Application of the (new) radiation detriment	56%	44%
Non-cancer effects of radiation (in addition to cardiovascular effects) (5)	58%	42%
Consolidation of dosimetry recommendations	75%	25%
New weighting factors (tissue, ...) for cancer and other effects	68%	32%
New dose coefficients	53%	47%
Alignment of voxelised and mesh approaches	12%	88%
Exposure level and risk coefficients for molecular radiotherapy	56%	44%
Protection of animals other than those already included in the protection system	18%	82%
Reconciling human and environmental objectives	82%	18%
Dose limit and protection of individuals - the concept of limit	90%	10%
Practical implications of ethics in radiation protection	56%	44%
New publication on radiation protection in medicine (Publication 105) including individualisation of effect	75%	25%
New compendium of dose coefficients	28%	72%
Sources of uncertainty in the protection system and sensitivity analysis	63%	37%
Education and training	80%	20%
Communication	80%	20%

Translation of the comments.

(1) The concept of the individualisation of the exposure should undergo a ethical review first given its potential implications at work such as a workers denied of working, another allowed to be more exposed than others because of their genetic background.

(2) Individual sensitivity/susceptibility are core subjects that need more research.

(3) Elaborating more on the individualisation also depends on the objective and the situation of exposure especially if this should apply in planned or in emergency).

(4) Justification is particularly at stake for remote operated radiology.

(5) Not forgetting cardiovascular effects at low dose!

2. Synthesis

The method and the data collected allows to identify which topics are regarded a 'priority' (N=14) and those who are considered of 'lower priority' (N=10) from the point of view of the SFRP Members who answered the survey.

Notwithstanding with the quantitative results (and also the feedbacks from the other IRPA AS), it is clear (and logical) that ICRP will give priority to several topics not necessarily because they are more important than others, but because the elements (principles, science, ...) to address them are available and because their outputs are needed for other topics. Consider for example TG122 on new detriment (considered as a priority) which needs the results of TGs 118, 119, 121 and 122 (not all regarded as a priority) to move forward.

Globally and from these results obtained here, the revealed 'priorities' (which are maybe a surrogate of the preoccupations of the professionals?) lie more in the application of the system than in its foundations considering that

- 'Applications of the justification', the 'dose constraints and reference level' and the 'dose limit' have obtained the higher scores, followed by 'education, training' and 'communication' and all being at the very end of the RP process.
- The other priorities are linked with the environment (partly) and research topics, mainly on the effect of ionizing radiation (detriment, individualisation, uncertainties).
- Non-priorities are associated with very specific topic: space, molecular radiology etc.

This survey supports the idea that the transparency and the clarity/explicability of the next ICRP system are more important for the RP professionals than the inclusion of the scientific evolutions and research discoveries. Finally, the topic of the implication of the individualisation of the effect has received most of the written comments, who insisted not so much on the science but rather on the (ethical) consequences .



Sig Magnusson
IRPA

Dear Sig,

SRP response to the IRPA request for comment on ICRP's Priority Topics

On behalf of the SRP President Jim Thurston and John Harrison, the SRP TG leader for this issue, I attach below SRP's perspective on the ICRP proposals on priority topics for review.

SRP very much welcomes this opportunity to work with IRPA on this important interface with ICRP.

With best wishes,

Roger Coates

Roger Coates

Copied to:

Jim Thurston, SRP President
John Harrison, SRP TG Leader

SRP response to IRPA on ICRP's 'Topics for Priority Review'

As a general comment the recent ICRP requests for input have been very generalised, a little overlapping and often difficult to interpret. The current listing of priority review topics is not particularly helpful without an explanation of the intended workplan and thinking behind it, with some of the descriptions having somewhat cryptic wording. We look forward to the opportunity to comment on more substantive issues within the review of the system of protection.

We note that about half the proposed topics are science-based, with many other related to application. There is also a strong medical flavour, which is generally supported since the use of radiation in medicine is a very dominant and growing exposure pathway, with many new technological developments.

Some specific comments are given below.

Detriment and Dose

There are two relevant topics in the ICRP listing as follows:

Revised detriment. The remit of TG 122 is to explore the methodology of the calculation of detriment rather than, as might initially be assumed, to update current calculations. TGs 119 and 121 address disease of the circulatory system and hereditary / in utero effects, respectively. It is certainly important to consider the extent to which these effects should be included in low dose detriment (or some alternative). A further bullet "non-cancer beyond cardiovascular disease is also relevant, to gauge whether other diseases (eg. dementia, respiratory diseases) might be included. Any revision of the Recommendations must consider whether there would be significant changes to the numerical values of total detriment (or alternative), and the proportions contributed by irradiation of individual organs/tissues, from the 2007 values.

Application of detriment and a related w_r etc for cancer and possibly non-cancer effects: Currently, the only applications of detriment is in the choice of w_r values and more generally (and loosely) in relating effective dose to risk. If new values of detriment are not substantially different from 2007 values, it is arguable that there will be no need to change w_r values, requiring the wholesale recalculation of dose coefficients. However, ICRP will wish to follow-up on ideas already raised of age- and sex- specific effective dose, not mentioned in the current list. In that context, consideration will need to be given to the balance between scientific accuracy and increased complexity, and the promotion of a single system applicable to people exposed as workers, members of the public or patients. The need for *New dose coefficients* will need careful consideration. It is not clear what is meant by *Reconciliation of voxel dose coefficients and mesh phantoms* when ICRP has already set out its intentions with regard to the use of phantoms.

Tolerability and Reasonableness

It is important that the work of TG114 and further ongoing work in C4 take account of the need for a wider input to decision-making at low exposures around the 'few mSv' level. Current thoughts revolve quite closely around the LNT-assumed risk and do not seem to take account of how life decisions are made in radiation environments – especially taking account of natural background. There are fears that the current approaches are driving towards minimisation of exposure, leading to great expense for society.

Previous comments have raised the issue of comparison of risks, with other carcinogens and more generally with risks in industry and everyday life – including for example for patients, also considering the risks of not having procedures involving radiation exposures. This is sometimes termed developing an holistic 'all hazards' approach. However, we recognise that ICRP's area of competency is limited to radiation, and that any expansion of the means to achieve this may be

beyond its scope. But a clear top-tier statement of the importance of considering all hazards could encourage others with the relevant expertise to address this issue. In particular it is essential that regulators have the competency, capacity and willingness to take account of the non-radiation factors in achieving optimization.

Non-Human biota

ICRP might look again at DCRLs, their derivation and practical application. Many of these values look low in the context of protection of populations and there needs to be a defined methodology for the calculation of doses to exposed populations. It is likely that there will be very few situations in which protection of non-human biota will be of importance. It would be good for ICRP to be clear about this (if correct) so that resources are directed most appropriately.

Communication

Communication of radiation and risk is widely recognised as one of the key challenges within our profession. However, it is not clear what ICRP's role could be in this context, other than ensuring that the system of protection, as it evolves, is able to be presented in terms that are understandable and relatable to members of the public, and ensuring that those parts of the current system which seem to imply that low doses may carry significant risk are appropriately moderated. Part of the current concern could be addressed within the proposed review of the exposure situations and categories of exposure, together with a simplified approach to limitation of exposure (considering limits, constraints and reference levels)

SRP October 2022