

NEA Workshop on Optimisation: *Rethinking the Art of Reasonable*

Introduction

The optimisation of protection has, over the past 15 to 20 years, moved from being just one aspect of international recommendations, to being a major focus. This is true of recommendations from the ICRP, of requirements from the IAEA, and of Directives from the European Commission. As a result of this evolution, optimisation has become a more significant part of national regulation in many countries around the world. Doses should be kept As Low As Reasonably Achievable, social and economic aspects being taken into account. But in practice, the optimum protection solution can be difficult to identify.

A factor in this difficulty may be that societal interest in decisions addressing public health issues has greatly increased, and the notion of stakeholder involvement has become a significant aspect of decision-making. Yet practically it is not always obvious what stakeholders should be involved, in some fashion, in decision processes to identify and implement optimal protection. It is not always obvious who decides what protection option to implement. In some circumstances, stakeholder involvement has resulted in the implementation of the optimisation concept such that it has become closer to dose minimisation rather than optimisation of protection.

While it is generally well understood in the radiological protection community that in concept, optimisation is *not* minimisation (and this is stated clearly in international recommendations such as ICRP 103), conservative choices tend to be the norm in practice. This is partly driven by the uncertainty in the effects of low-levels of radiation exposure. While epidemiological science and data suggest that the Linear Non-Threshold (LNT) assumption is a good fit to existing human and animal exposure effects data, the exposures that could lead statistically significant adverse health effects are above the doses typically received by most radiation workers, and well above the doses experienced by the public. Biological studies of the effects of radiation provide some evidence that low doses may not lead to adverse effects, but at the same time have not yet fully explained the complex cellular repair and damage mechanisms and cannot yet resolve the issue of what level of exposure can cause damage.

This uncertainty invokes the consideration of the precautionary principle, which often leads to conservative protection decisions—in which, as suggested by the LNT assumption, any exposure, no matter how small, carries a proportionate risk.

LNT Issues

The LNT assumption is used by regulatory agencies around the world as the bases for the practical management of radiological exposures. Some experts feel that because the system of radiological protection assumes LNT, and does not establish an exposure level below which it is “Safe” (e.g. there is no risk), the reaction of the general stakeholder is fear because any exposure is in fact dangerous. Some experts feel that a Threshold model, rather than LNT, would directly address such stakeholder fearful and overly prudent views.

The science behind radiological risk assessment continues to evolve, and the practical approach to addressing the scientific uncertainty in risk assessment has been debated for many years. There has been no movement towards resolution of the conflicting views, and no emergence of a clear regulatory model that would serve as an alternative to LNT. A 2018 meeting organised by the American Nuclear Society and the American Health Physics Society brought together radiological protection officials, epidemiologists, biological researchers, and other experts from around the world to discuss the current scientific understanding of radiation effects and practical approaches to the implementation of optimisation.

As discussed in this meeting, assuming that any dose carries risk has in many circumstances, such as in waste management, clean-up end-state selection, or the consideration of operational effluents, resulted in the selection of optimisation of protection solutions that can be viewed as extremely conservative in absolute terms. Whether resources are being used optimally has become a significant question, further demonstrating the need to develop a broadly accepted practical approach to how exposure to low-levels of radiation should be managed and regulated.

Prevailing Circumstances

In the context of making radiological protection decisions, the prevailing circumstances refer to any aspects that could or should be taken into account by the decider as part of the decision process. In fact, prevailing circumstances provoke the need for radiological protection decisions, and form the situational framework that will drive decision makers to make choices.

As decisions are made by governments and regulators, engagement with stakeholders is an essential aspect of understanding how prevailing circumstances should be balanced with the desire to minimise exposure. In addition to radiological aspects (e.g. exposure scenarios, protection options, residual doses, dose distributions, etc.), decisions must reflect other public health risk factors, economic aspects, and social aspects (e.g. community disruption and/or stress, social structure disruption, etc.).

The broad community will have views not necessarily based on scientific analyses and governmental choices regarding where it is authorised to live, what is authorised to eat, and where it is authorised to work. These societal views cannot be ignored as decisions are made. In addition to providing input into regulatory or governmental decisions, stakeholders will, as a practical matter, take actions based on their understanding of the situation—for example, members of the public affected by an accident situation may evacuate during an accident and later decide to return home when allowed or choose to move away. Societal views and realities should be understood as the decision process proceeds.

Decision Making

Radiological protection decisions are informed by science, but are based on judgement as to what level of protection is “reasonably achievable”. The science of radiological protection continues to evolve and advance, but seems not likely to quickly and definitively resolve the issue of what level of exposure can cause harm. However, the need to take radiological protection decisions remains, and input is needed to help to assure that protection choices are reasonable. Taking a broad view of assessing and balancing responses to the risks associated with any particular prevailing circumstance in practice can be very difficult to achieve. To help to better and more objectively address such situations, the CRPPH is organising an “NEA Workshop on Optimisation: Rethinking the Art of Reasonable.”

Objective

The objective of this workshop is to identify a regulatory and practical approach for assessing radiological protection circumstances, and for developing, with appropriate stakeholder participation, the best radiological protection choices under the prevailing circumstances.

Young-Professional Participation

Sessions 4, 5 and 6 will be specially planned to highlight the participation and views of young professionals, who will be tomorrow’s RP leaders. To appropriately prepare for these sessions, students and young professionals will be identified in advance, through the IRPA young professionals’ group, and brought together via webinar. These pre-workshop discussions will present workshop expectations, proposed topic areas and approaches, possible future directions for framework evolution. Presented materials will be refined to better represent modern approaches, and will be used, particularly in Session 6, to develop results.

The Path Forward

The intention of this workshop is to identify areas where further, broad vision of the implications of decisions could facilitate a more widely accepted and sustainable path forward in circumstances needing radiological protection decisions. It is hoped that these discussions will help to lead to evolution in the implementational interpretation of the current radiological protection framework, and will help to provide direction to the steady evolution of international recommendations and standards. This may include:

- Begin broad and institutional discussions of how “reasonableness” is understood, and of processes to identify “reasonable” protection decisions
- Study of the situation-specific consequences of radiological protection decisions
- Approaches to agreeing on numeric and other decisional criteria
- Radiological and non-radiological situational and decisional aspects to consider in regulation and application
- What evolution of optimisation implementation can be easily achieved in practice, and what longer-term framework evolution would then be needed

Poster Session

A poster session, particularly addressed at students and young professionals, will be held in between sessions and during breaks. Students and young professionals will be encouraged to submit posters addressing aspects presented above.

Venue

The workshop will take place in Lisbon, Portugal, hosted by the Service de Radiologie, Institut Portugais. The workshop will be held at the Portuguese Institute of Oncology.

Timeframe

The workshop is scheduled from 13 to 15 January 2020.

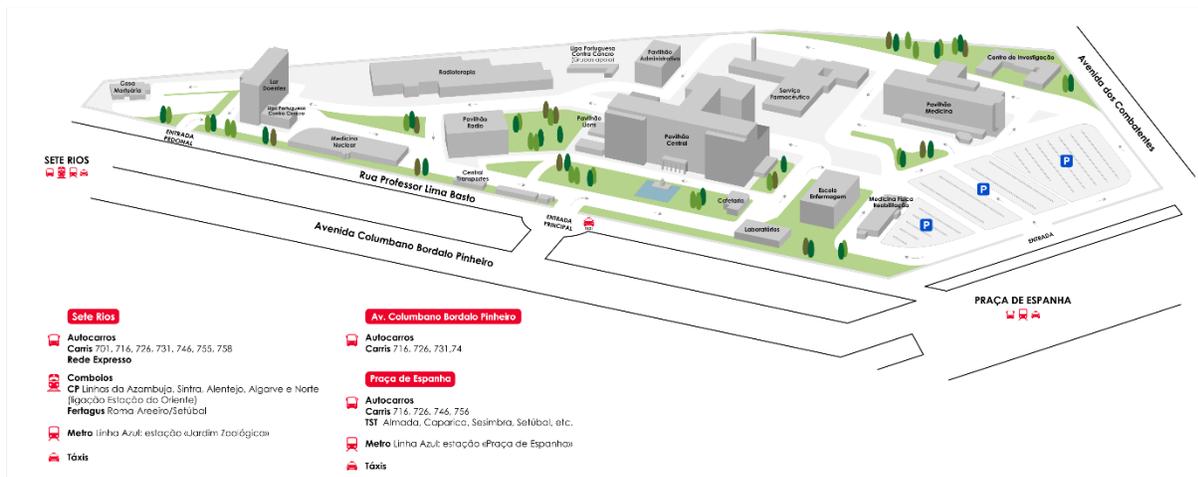
Output

The result of this workshop will be a short report on the regulatory and practical framework needed to identify acceptable and sustainable radiological protection choices, and the aspects important to consider in a variety of prevailing circumstances. This should highlight that:

- Prevailing circumstances, understood in the broad sense, will create and drive stakeholder concerns of all sorts;
- Protection decisions to address radiological situations and stakeholder concerns will carry consequences, both positive and negative. All such consequences should be assessed in order to appropriately make the optimum protection choice. Broad understanding of the consequences of protection options, (be they radiological, political, social, economic, individual, local, regional, national, etc.) is needed in order to appropriately identify the full repercussions of protection options, so as to thoroughly balance possible options;
- A broad, all-hazards approach should be used to characterise the prevailing circumstances as best possible, in order to help assure that all relevant aspects of decision consequences are visible and can be judged as to their importance and relevance.

Logistics

The workshop will take place at the auditorium of the IPOLFG (Portuguese Institute of Oncology) – see attached map.



Hotels

The following hotels are located near the venue.

Hotels in Lisbon near the Meeting Venue: IPOLFG

<p>HOTEL AÇORES LISBOA ****- Website Av. Columbano Bordalo Pinheiro 3, 1070-060 Lisboa, Portugal Room Cost: 112€</p>	
<p>HOTEL SANA MALHOA****- Website Av. José Malhoa 8, 1099-089 Lisboa, Portugal Room Cost : 158€ → 179 € Phone number: +351 21 006 1800</p>	
<p>HOTEL MERCURE LISBOA ****- Website Av. José Malhoa 23, 1099-051 Lisboa, Portugal Room Cost : 111€ Phone number: +351 21 720 8000</p>	
<p>CORINTHIA HOTEL LISBOA *****- Website Av. Columbano Bordalo Pinheiro 105, 1099-031 Lisboa, Portugal Room Cost: 207€ → 214€ Phone number : +351 21 723 6300</p>	
<p>HOTEL IBIS LISBOA JOSÉ MALHOA**- Website Av. José Malhoa 10, 1070-158 Lisboa, Portugal Room Cost : 93€ → 101€ Téléphone : +351 21 723 5700</p>	

Registration

Registration for the workshop is obligatory, and can be done electronically through the following link:

<http://www.oecd-nea.org/confdb/confdb/conf?id=404>

Draft Workshop Agenda

Day 1: 13 January 2020			
Time		Topic	Speaker
09:00		<p>Session 1: Welcome and Introduction The NEA, the CRPPH and the Host organisation(s) will welcome participants.</p> <ul style="list-style-type: none"> • NEA Welcome • CRPPH Welcome • Service de Radiologie, Institut Portugais Welcome • Instituto Superior Técnico Welcome 	<ul style="list-style-type: none"> - William D Magwood, IV - Mike Boyd - José Venancio - Pedro Vaz
09:20	1	<p>How Safe is Safe Enough? Optimisation is a question of finding the best protection under the prevailing circumstances. This science-based judgement will depend on many aspects, and will be very case-specific. Regulators, licensees, elected officials, NGOs and members of the public often have different judgements in such circumstances. This presentation will discuss the various aspects of such considerations, and will tee-up discussions of how to improve the situation.</p> <p>Discussion</p>	<p>William D Magwood, IV - NEA Director General</p>
09:40	2	<p>Reasonableness: A Practical Overview The Workshop Chair will present the context of this meeting, noting the work that has been done by the CRPPH and the key issues that have been identified, and will discuss the objectives and expected outputs of the meeting.</p> <p>Discussion</p>	<p>Mike Boyd - CRPPH Chair - US EPA</p>
10:00	3	<p>Where We Are Now The topic of reasonableness is currently seen as extremely relevant for all branches of radiological protection, and has been discussed in several national and international fora. These have been brought together through the International Radiological Protection Association, who will present the status of discussions.</p> <p>Discussion</p>	<p>Roger Coates - IRPA President</p>
10:20		BREAK	

Time		Topic	Speaker
10:50		<p>Session 2: Framework as it is today, evolution for the future This session will present various aspects of the decision framework as it exists today for radiological protection circumstances, and the direction of evolution that is developing as a result of implementation experience. Approaches to identifying and addressing relevant aspects will be discussed, as will the emerging direction for moving forward.</p> <p>Chair: Pedro Vaz: Instituto Superior Técnico</p>	
11:00	4	<p>Recommendations and Rationale This presentation will discuss how the international system of radiological protection describes the principle of optimisation, and how it recommends that the concept and application of should be understood and implemented. Feedback since the 2007 issuing of ICRP Publication 103 will be discussed, as will the various RP criteria (e.g. dose limits, dose constraints, reference levels, clearance and exemption levels, etc.) that are used for protection purposes, and will address the rationale used to select their numerical values.</p> <p>Discussion</p>	<p>Don Cool - EPRI, USA ICRP C4 Chair</p>
11:30	5	<p>Standards This presentation will discuss how the Safety Fundamentals and relevant Safety Requirements standards describe the principle of optimisation, and how they recommend that the concept and application of should be understood and implemented.</p> <p>Discussion</p>	<p>Miroslav Pinak - Section Head: Radiation Safety and Monitoring</p>
11:50	6	<p>Regulation This presentation will discuss the regulatory approach to the optimisation of protection, and how national-level regulations implement radiological protection criteria in the context of optimisation.</p> <p>Discussion</p>	<p>María Fernanda Sánchez Ojanguren - Technical director Radiation Protection, CSN TBD</p>
12:10		LUNCH	
14:00	7	<p>Stakeholder Involvement This presentation will discuss how stakeholder involvement is managed in radiological-protection decision making, and how this can affect radiological protection choices, and the social and economic aspects of such decision.</p> <p>Discussion</p>	<p>Andy Mayall - CRPPH Bureau - Environment Agency, UK TBD</p>

Time		Topic	Speaker
15:00		BREAK	
14:20	D2	<p>Discussion of the RP Framework This will be a moderated panel and audience discussion of these presentations, focusing on the overall framework of optimisation decisions, and on what aspects will drive the identification of the optimum protection solution.</p> <p>Moderator: Alan Waltar,</p>	
15:30		<p>Session 3: Practical Approaches to the Implementation of Optimisation at Nuclear Facilities</p> <p>This Plenary Session will have a series of case studies, each representing very different prevailing circumstances, and each raising different stakeholder concerns, protection options, and decision consequences. Each case study will present what is meant by “optimum protection” for that circumstance, will address the relevant aspects considered when identifying optimum protection solutions, and will discuss where conservatism may affect the reasonableness of final solutions.</p> <p>Chair: Marilyn Kray, ANS President</p>	
15:35	9	<p>Overview of Optimisation Issues in the United States This presentation will give a high-level view of issues affecting choices of optimum protection solutions in various circumstances in the United States</p> <p>Discussion</p>	Marilyn Kray - ANS President
15:55	10	<p>Operational NPPs This presentation will discuss how operational NPPs interpret regulations and other protection-optimization considerations when making radiological protection decisions, including such aspects as economic, image, and trust.</p> <p>Discussion</p>	Guy Renn - ISOE Chair - EDF Energy UK
16:15	11	<p>Decommissioning This presentation will discuss how NPPs in decommissioning interpret regulations and other protection-optimization considerations when making radiological protection decisions, including such aspects as economic, image, and trust.</p> <p>Discussion</p>	Michel Pieraccini - EDF International Cooperation Director TBD
16:35	D3	<p>Discussion of Optimisation of Protection for NPPs This will be a moderated discussion of these presentations, focusing on the practical and operational aspects that affect optimisation decisions, and on what aspects will drive the identification of the optimum protection solution, and on what aspects can push solutions to be increasingly conservative.</p> <p>Moderator: Tony Brooks</p>	

17:30		END OF FIRST DAY	
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Day 2: 14 January 2020			
Time		Topic	Speaker
09:30		<p>Session 4: Practical Approaches to the Implementation of Optimisation in Other Circumstances</p> <p>This Plenary Session will present a series of case studies, each representing very different prevailing circumstances, and each raising different stakeholder concerns, protection options, and decision consequences. Each case study will present what is meant by “optimum protection” for that circumstance, will address the relevant aspects considered when identifying optimum protection solutions, and will discuss where conservatism may affect the reasonableness of final solutions.</p> <p>Chair: Shaheen Dewji, Texas A&M University</p>	
09:40	12	<p>Waste Management</p> <p>This Case Study will discuss the aspects to be considered when making optimisation decisions regarding the planning, operational, and post-operational phases of radioactive waste management. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	SKB, Swedish Waste Management TBD
10:00	13	<p>Emergency Management</p> <p>This Case Study will discuss the aspects to be considered when making optimisation decisions regarding urgent protective measures. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	Matthias Zaehringer - WPNEM Chair
10:20	14	<p>Recovery Management</p> <p>This Case Study will discuss the aspects to be considered when making optimisation decisions regarding post-accident recovery. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	Per Strand - DSA, Norway
10:55		BREAK	
11:20	15	<p>Legacy Management</p> <p>This Case Study will discuss the aspects to be considered when making optimisation decisions regarding the planning, operational, and end-state phases of decommissioning and legacy management. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	Port Hope Experience (TBD)

Time		Topic	Speaker
11:45	16	<p>NORM and Radon This Case Study will discuss the aspects to be considered when making optimisation decisions regarding the management of NORM and radon situations. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	Ciara McMahon
12:10		LUNCH	
13:40	17	<p>Radionuclides in Food and Drinking Water (WHO) This Case Study will discuss the aspects to be considered when making optimisation decisions regarding the post-accident management of food and drinking water. The focus will be on the processes used to achieve accepted, sustainable solutions for protective actions.</p> <p>Discussion</p>	TBD (Maria Perez, Zahnat Carr)
14:05	D4	<p>Discussion of Optimisation of Protection for Other Circumstances This will be a moderated discussion of these presentations, focusing on the practical and operational aspects that affect optimisation decisions, and on what aspects will drive the identification of the optimum protection solution, and on what aspects can push solutions to be increasingly conservative.</p> <p>Moderator: Thierry Schneider, CRPPH Bureau, CEPN, France</p>	
14:30		BREAK	
14:45		<p>Session 5: Breakout Discussions - Led by Young Professionals The Group will break into 3 groups to hold discussions, each addressing a series of questions to be considered. Each breakout will address all the case studies presented in Sessions 3 and 4. The objective of breakout discussions is to identify:</p> <ul style="list-style-type: none"> • What could change: Practices, regulations, science application, etc.? Today? Tomorrow? • What aspects should be considered, discussed and balanced in different prevailing circumstances? • What is needed for more broad-based decisions? • How should risk transfers be addressed, e.g. worker to public, worker to environment, etc.? 	Breakout Session Discussions will be Moderated by Young Professionals
18:00		END OF SECOND DAY	

		Day 3: 15 January 2020	
		Topic	Speaker
09:00	D5	<p>Breakout Topic Plenary Summary: Decisional aspects to be considered in RP situations</p> <p>This session will address the conclusions reached in each breakout session, and will include plenary discussion of conclusions. Focused will be on identifying commonalities of approaches for broad, overall well-being. In order to hear from tomorrow's RP leaders, young RP experts will present views on what they consider to be the most significant in decision-making situations. "Modern" approaches used to dialogue with stakeholders and to understand their views and concerns will be a focus of discussions.</p> <p>Moderator: TBD</p>	Panel of Young Experts
10:20		Break	
10:50		<p>Session 6: Stakeholder Involvement and Communications</p> <p>Stakeholder involvement and communication are key aspects of decision processes for the optimization of protection. This session will discuss approaches to dealing with stakeholder situations such that decisions will be scientifically and situationally informed, so as to be accepted and sustainable.</p> <p>Chair:</p>	
11:00	18	<p>Risk Communication</p> <p>The results of the NEA's Stakeholder Involvement workshop on Risk Communication will be presented.</p> <p>Discussion</p>	Thierry Schneider -CEPN, CRPPH Bureau
11:20	19	<p>Communicating with Stakeholders: Key Elements</p> <p>This presentation will discuss the science of social interactions needed to identify and implement optimum protection solutions, and approaches to help to ensure that protection decisions are taken in an informed framework.</p> <p>Discussion</p>	Paul Locke
11:40	20	<p>CRPPH Stakeholder Involvement Experience</p> <p>The NEA's Committee on Radiological Protection and Public Health, CRPPH, has since the early 1990s studied and addressed the involvement of stakeholders in radiological protection decisions. This presentation will summarise the pathway and current status of the Committee's thinking on this important area.</p> <p>Discussion</p>	Ted Lazo, CRPPH Scientific Secretariat

Time		Topic	Speaker
12:00		LUNCH	
13:30		<p>What Science is Needed? The science behind the reactions of living cells, tissues, organs and individuals to ionizing radiation's interactions is far from being fully understood. This session will speak briefly on what science currently says about the shape of the low-dose response curve, and will provide suggestions as to what further studies are needed to better understand the dose/response curve.</p> <p>Chair:</p>	
13:40	21	<p>Is there or is there not a Threshold? The radiation biological science behind the threshold and hormesis theories will be presented, highlighting the direction that further research should pursue to help show either the generic nature of this low-dose response, or it's applicability in some but not all exposure situations.</p> <p>Discussion</p>	Tony Brooks
14:00	22	<p>Is LNT Sufficiently Scientifically Supported? The LNT hypothesis has been used for some time as a practical tool for the management of exposure to ionizing radiation. This presentation will discuss whether or not radiation biological science is sufficiently supportive of LNT to continue its use as the basis for radiological protection regulation and application.</p> <p>Discussion</p>	TBD: Dominique Laurier, IRSN
14:20	23	<p>How Radiological and Chemical Toxicological Studies Can Support Each Other The OECD Adverse Outcome Pathway (AOP) studies have developed an advanced framework for understanding the toxicity of chemical exposures for the purposes of regulation and the need for further study. This presentation will discuss the AOP framework, and how radiological protection research could benefit and contribute to furthering understanding of toxicity.</p> <p>Discussion</p>	TBD
14:40	24	<p>NEA High-Level Group on Low-Dose Research The CRPPH recently launched the HLG-LDR to build a global network of low-dose research funding organisations, with the objective to facilitate coordination and cooperation of research projects. The Strategic Research Agenda, and Road Map approach being used by platforms under the European Commission are used as examples of good practice. This presentation will discuss the NEA's programme and progress.</p>	HLG-LDR Chair

		Discussion	
15:00		Conclusions <ul style="list-style-type: none"> ○ Communication Strategy ○ Areas for Further Consideration ○ Suggestions for Future ICRP Recommendations 	Mike Boyd José Venancio
15:30		End of Workshop	

Questions for Use in Breakout Sessions

The case studies presented during Sessions 3 and 4 addressed finding the optimum protection solutions for the prevailing circumstances listed below. Each of the Breakout Session groups is invited to address the following questions for each of the prevailing circumstances, listed below, addressed by the case studies.

- NPP Normal Operation
 - NPP Decommissioning
 - Nuclear or Radiological Emergency Management
 - Nuclear or Radiological Recovery Management
 - Post-Accident Food and Drinking Water Management
 - Radiological Waste Management
 - Legacy Management
 - NORM and Radon Management
1. Who are the stakeholders that need to be involved, in some fashion, in decision processes to identify and implement optimal protection?
 2. Who is the decider?
 3. What type of concerns are stakeholders likely to have with regard to the prevailing circumstances and residual exposures following the implementation of optimal protection solutions?
 4. What regulatory requirements impact the identification and implementation of optimal protection solutions?
 5. Where are protection options, aspects, criteria, etc. most likely to be conservative in nature?
 6. What type of approach(es) to stakeholder engagement would best address stakeholder concerns?
 7. What aspects of identifying and implementing optimal protection solutions are likely to support achieving accepted, sustainable decisions?