European Partnership on Metrology
Call 2025 – Health, Integrated European Metrology, Regulation and Research Potential

Selected Research Topic number: **SRT- n08**
Version: 1.0

Title: Optimised and justified decision-making in radiological and nuclear emergencies – trustworthy and accurate data for regulators

Abstract

In the event of a radiological or nuclear emergency, regulators and authorities are required to decide and act fast. These actions are initially based on models of radiation exposure which are then replaced by real data hours or days after the event. Uncertainties of these data have a direct impact on the effectiveness of protective actions and on the safety of emergency workers and citizens. These uncertainties are not sufficiently considered in decision making, and nonoptimal actions may cause either overprotection and costs, or they can lead to unwanted adverse health effects. Regulators and authorities need better quality data to optimally fulfil the requirements of EU directives and the International Atomic Energy Agency (IAEA).

Keywords

Emergency preparedness and response (EPR), In-situ measurements, Uncertainty, Environmental monitoring, Decision making, Protective actions, Protection strategies, Regulations, Radioactivity.

Background to the Metrological Challenges

Regulators and authorities must, in a case of large-scale emergency involving chemical, biological, radioactive, nuclear (CBRN) substances and/or explosives (E), ensure the safety of the public by deciding and coordinating the protective actions. Decision making in these situations relies on protection strategies, predetermined procedures and operational interventional levels (OILs) based on measurements. Reliable data are an essential requirement for the decision-making. Fukushima Daiichi nuclear power plant accident showed that incomplete knowledge and non-shared awareness of the situation can lead to nonoptimal protective actions and excess casualties.

Heads of the European Radiological protection Competent Authorities (HERCA) and Western European Nuclear Regulators' Association (WENRA) have highlighted the significant uncertainties present, especially in the early phases of an emergency. At the same time, HERCA and WENRA called for rapid decisions, simplified schemes for protective actions, and rapid information exchanges with neighbouring countries. Therefore, the data quality and associated uncertainties are of paramount importance for optimal and justified actions that are harmonised across borders.

Even though strategies have been developed, the uncertainties in the measured or modelled data are largely unknown and lead to unknown uncertainties in the decision-making process by authorities. Moreover, uncertainties are not sufficiently considered when protection strategies, sampling strategies, and measurement plans are prepared.

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

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The proposal shall focus on metrology research necessary to support regulation in radiation monitoring.

The specific objectives are

1. To investigate early warning networks, aerosol sampling (optimal positioning and usage of sampling stations), and environmental sampling strategies that have direct impact on implementation of regulations and decision making by regulators.
2. To analyse and improve the measurement methods, based on the improved data from objective 1, used to ensure the safety of food, drinking water, and industrial products and reduce harm to trade (import and export of goods). To provide guidance to harmonise protective actions across national borders.
3. To provide metrology input to regulators to help with implementation of proposed new radiation protection quantities of the International Commission on Radiation Units and Measurements (ICRU) report 95 in emergency preparedness and response.
4. To provide recommendations on how to use measurements done by citizens and drones during an emergency, including on how to interpret the results and the response actions taken. To develop guidelines, based on these measurements, and support regulators and authorities in their decision making.
5. To support the implementation of Council Directive 2013/59/Euratom, International Basic Safety Standards, and International Atomic Energy Agency and facilitate the take up of the technology, methods and measurement infrastructure developed in the project by end users (European radiation protection platforms, national regulators manufacturers, laboratories, Emergency preparedness and response platforms and networks).

The proposed research shall respond to documented requirements related to specific regulations and legislation or explore the background and feasibility of expected possible future regulation. To enhance the impact of the research, the involvement of the appropriate user community such as regulatory authorities, conformity assessment bodies, standardisation bodies, and industry, is strongly recommended. Where relevant, proposals are encouraged to build on, or seek collaboration with, existing projects and develop synergies with other relevant European, national or regional initiatives and funding programmes. In particular, links are encouraged with (i) the projects funded under earlier relevant topics of the Horizon Europe programme; or (ii) other relevant European Partnerships.

Proposers should establish the current state of the art and explain how their proposed research goes beyond this.

Proposers should note that the programme funds the activity of researchers to develop the capability, not the required infrastructure and capital equipment, which must be provided from other sources.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 1.0 M€ and has defined an upper limit of 1.3 M€ for this proposal.

EURAMET also expects the EU Contribution to the external funded beneficiaries to not exceed 30 % of the total EU Contribution across all selected projects in this TP.

Any industrial beneficiaries that will receive significant benefit from the results of the proposed project are expected to be beneficiaries without receiving funding or associated partners.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the 'end user' community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the "end user" community (e.g. letters of support) is also encouraged.

You should detail how your proposal's results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,
- Feed into the development of urgent documentary standards through appropriate standards bodies,
- Facilitate improved industrial capability, or improved quality of life for European citizens in terms of personal health, protection of the environment and the climate, or energy security,
- Transfer knowledge to industries utilising or producing radiation, the radiation protection sector and regulatory authorities.

You should detail other impacts of your proposed JRP as specified in the document “Guide 4: Writing Joint Research Projects (JRPs)”

You should also detail how your approach to realising the objectives will further the aim of the Metrology Partnership to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically, the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased
- organisations other than NMIs and DIs to be involved in the work.

Timescale

The project should be of up to 3 years duration.

Additional information

The links provided in this section are only correct at the time of publication up until the end of the Call year.

These references have been provided by EURAMET.

[1] Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation https://eur-lex.europa.eu/eli/dir/2013/59/oj

[2] 001 CLC TC 45B Implementation of new quantities in radiation protection https://www.metpart.eu/go/need01

[3] EMN Radiation Protection Strategic Research Agenda https://www.euramet.org/european-metrology-networks/radiation-protection