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D 2.8 Joint research needs and priorities addressing radiation protection research relevant for Social Sciences and Humanities (SSH)

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Executive Summary

This document is improved version of the CONCERT deliverable D2.3. It describes the research priorities and the Strategic Research Agenda (SRA) for Social Sciences and Humanities (SSH) in radiation protection for the next 20 years. It is a live and constantly developing text that will be modified according to the state-of-the-art and societal needs. This will be done by a continuous engagement of the SSH community in radiation protection field and other stakeholders, especially technical and research platforms. To this end, the SSH community in radiation protection field will structure and enhance dialogue at the European level among the different stakeholders, fostering the sharing of knowledge and information among various disciplines working on aspects of radiation protection and identify the SSH research needs in the field of radiation protection.

This strategic research agenda is a “self-standing” SRA and, although it has common points, it is not included as such in other platforms’ SRAs. The integration of SSH topics in the existing platforms’ SRA is a parallel action to this self-standing SSH SRA. These two actions facilitate a coherent integration of SSH in European radiation protection programmes and guide the process of preparing calls in this field.

Moreover, the SSH community in the CONCERT project stimulates a better integration of social sciences and humanities (SSH) in research, practice and policy related to ionizing radiation, including a wide variety of topics such as low dose risk, radioecology, emergency preparedness and response, dosimetry, medical applications, radioactive waste management, nuclear energy production, safety, NORM, site remediation.

The objective of Strategic Research Agenda (SRA) for Social Sciences and Humanities (SSH) in radiation protection is to contribute towards improvement of the Radiation Protection (RP) system by coordinating European research in the field of SSH in radiation protection; supporting education and training; knowledge management and sharing; and identifying SSH state of the art across domains. It is only by enabling SSH research to play a fuller and stronger role through a coordinated SRA mechanism that societal perspectives on research relating to radiation protection will be realised.

The underlying principles of the SSH SRA are that:

- SSH can support existing and future research, policy and practice, in all areas relating to radiation protection to take into account better the concerns, values and needs of a wider range of stakeholders, including citizens and communities;
- the findings of social sciences and humanities (SSH) research should be co-ordinated, shared and integrated in European research and development on radiation protection; for this, also collaboration with the European radiation protection associations will be an integral component;
- the research relating to radiation protection should be conceived as transdisciplinary and inclusive, integrating citizen, science and stakeholder input from the start.

With these principles in mind, the SSH strategic research agenda will support identifying the priorities for future European SSH research in the field of radiation protection.

Table of Contents

I.	Context of the project	5
II.	Challenges to be addressed by the SSH SRA	5
III.	Working Method	7
IV.	Statement on the SSH research priority.....	8
V.	Research lines and topics in Strategic Research Agenda (SRA) for Social Sciences and Humanities (SSH) in radiation protection field (RP).....	8
	Research line 1: Effects of social, psychological and economic aspects on radiation protection behaviour and choices of different actors	8
	Research line 2: Holistic approaches to governance of radiological risks.....	9
	Research line 3: Guiding principles for Responsible Research and Innovation in Radiation Protection.....	10
	Research line 4: Stakeholder engagement in radiation protection research, development, policy and practice.....	11
	Research line 5: Risk communication.....	11
	Research line 6: Radiation protection culture.....	12

I. Context of the project

In 2009, the European High Level and Expert Group (HLEG) identified key policy and scientific questions to be addressed through a strategic research agenda for low dose radiation risk. This initiated the establishment of a European Research Platform, called MELODI (Multidisciplinary European Low Dose Research Initiative) and launching of the DoReMi Network of Excellence in the Euratom 7th Framework Programme. A major activity of MELODI is the establishment and updating of a long term (>20 years) Strategic Research Agenda (SRA) for research on low dose risk for radiation protection in Europe. The SRA is intended to guide the priorities for national and European research programmes and the preparation of competitive calls at the European level. Encouraged by the success of MELODI, other scientific disciplines involved in radiation protection research also started the integration process at the European level. The development of European strategies and roadmaps for future research has been a highly successful process. By 2017, the following key areas for radiation protection research are covered: low dose health risk assessment (MELODI), exposure assessment (EURADOS), environmental issues (ALLIANCE), emergency management (NERIS) and medical use of radiation (EURAMED). The most recent achievement has been the development of a strategic research agenda (SRA) for social sciences and humanities (SSH) in radiation protection, covering areas such as risk communication, ethics and safety culture, thus enabling the integration of science in societal context (S. Sisko, 2017 at RICOMET).

II. Challenges to be addressed by the SSH SRA

The need for multi- and transdisciplinary research and broader societal involvement in radiation protection is increasingly recommended at national and supra-national levels for all aspects of exposures to ionising radiation.

This strategic research agenda aligns with recent proposals for more open and responsive modes of research and science policy-making, and attends to the following **challenges** put forward in contemporary EU-wide policy discourses on “Science with and for society” and “responsible research and innovation”:

- **Health and wellbeing**
- **Secure, safe and resilient societies**
- **Communication, collaboration and citizenship**
- **Integration, impact and reflexivity**

Health and wellbeing comprises the mental and physical of individuals and the social health of populations. Achieving health and wellbeing requires investments on behalf of decision makers and research communities at a time of economic restraint and the aging of populations across Europe. Research in the field of SSH explicitly addresses these aspects and draws connections between health and wellbeing to ensure quality of life for all.

European nations face major natural hazards and human-induced threats. SSH research seeks to make significant contributions towards enhancing societal resilience and preparedness in the face of these threats by examining contemporary approaches to safety and security, and by opening a broader societal debate on the kinds of resilience that can, and should, be achieved.

SSH research on communication, collaboration and citizenship advances our understanding of how individuals and people are included and excluded, and how processes like communication and

collaboration foster novel forms of identity, sense making and belonging. It does so with the aim of creating societies in which citizens thrive and feel confident to express themselves.

SSH research on integration, impact and reflexivity assesses the impact of research activities on the values and choices made by researchers in their communities. This includes giving due consideration to the societal and ethical implications of research agendas, processes, and outputs.

Recognizing the intertwined character of social and technical resonates with the idea that science and technology are open to individual creativity, collective ingenuity, economic priorities, cultural values, institutional interests, stakeholder negotiation, and the exercise of power and it is thus important to reflect on how this shapes the organisation of radiation protection research and the formulation of its policies.

This SRA for Social Sciences and Humanities Research in radiation protection is structured in six research lines for which a joint European effort has been identified as key to addressing the contemporary challenges outlined above.

- Research line 1: Effects of social, psychological and economic aspects on radiation protection behaviour and choices of different actors
- Research line 2: Holistic approaches to governance of radiological risks
- Research line 3: Guiding principles for Responsible Research and Innovation in Radiation Protection
- Research line 4: Stakeholder engagement in radiation protection research, development, policy and practice
- Research line 5: Risk communication
- Research line 6: Radiation protection culture

Each of these research lines includes a number of specific research topics relevant to a future European research agenda in the field of radiation protection.

Creating and updating the SRA for social Sciences and Humanities is a live and constantly developing process and the output will be regularly adopted according to the state-of-the-art and societal needs. This will be done by a continuous engagement of the SSH community in radiation protection field and other stakeholders, especially technical and research platforms.

III. Working Method

The research topics were collected through activities carried out in the H2020 projects CONCERT and the FP7 projects OPERRA, PREPARE and EAGLE (notably the RICOMET 2015, 2016 and RICOMET 2017 conferences and Symposium on Ethics of Environmental Health), as well as in dialogues with members of the radiation protection platforms, carried out in a context of the CONCERT 2.6 task group. The collection of the research topics was discussed at the Radiation Protection Week in Oxford (19-23 September 2016) with task 2.6 members, SSH community and platforms, and the most urgent topic for an SSH research was identified. (For a detailed methodology see the CONCERT deliverable 2.2, 2015).

The final prioritisation for the 2nd CONCERT call was done by the following active discussants at the task 2.6 meeting in Oxford : S. Salomaa, STUK/UEF; G. Baumont, IRSN; T. Lazo, OECD/NEA; P. Simmons, UEA, D. Brazien, Environment Agency; C. Schieber, CEPN; M. Meitre, CEPN; E. Salminen, STUK; M. Martell, Merience; C. Mays, SYMLOG; I. Chaffel de Witte, IRSN; D. Luctte, IRSN; M. Nobuaki, Hiroshima University; F. Zölzer, USB; M. Gaston, SCK•CEN; T. Duranova, VUJE; M. Suric Mihic, IMROH; J. Malone, Trinity College; S. Baude, MUTADIS; P. Fattibene, ISS; S. Della Monaca, ISS; T. Schneider, CEPN; M. C. Cantone, UNIMI; C. Turcanu, SCK•CEN; C. Pözl-Viol, BfS; Y. Tomkiv, NMBU; D. Oughton, NMBU; I. Prlic, IMROH; T. Perko SCK-CEN

1400 individuals from radiation protection field have been asked to contribute to the further development of research and priorities in Social Sciences and Humanities in June 2017. The e-mail addresses from the OPERRA questionnaire and the EAGLE and PLATENSO projects have been used for this purpose. Respondents were asked to share their opinion, remarks or give advice on the current version of the SRA for Social Sciences and Humanities.

In addition, the Strategic Research Agenda (SRA) for Social Sciences and Humanities (SSH), developed based on a broad stakeholder engagement process, has been part of the debate at the RICOMET Conference 2017 (June 27th to 29th, Vienna). This was the third conference on risk perception, communication and ethics of exposures to ionizing radiation. The conference has been attended by 130 delegates and has been live streamed from the IAEA venue on the RICOMET Facebook Group. The SSH SRA discussion has been structured as follows:

RICOMET 2017: Strategic research agenda for Social Sciences and Humanities in radiation protection

Session Chairs: Sisko Salomaa, UEF, Finland and Christiane Pözl-Viol, BfS, Germany

- Strategic research agendas in European radiation protection research, *S. Salomaa, UEF, Finland*
- Strategic Research Agenda for Social Sciences and Humanities in radiation protection field – overview, *T. Perko, SCK•CEN, Belgium et. al*
- Ethics and justification – On the need for reflection on the justification of radiological protection research itself, *G. Meskens, SCK•CEN, Belgium*
- Towards renewed forms of civil society engagement in radiation protection issues – lessons, *S. Baudé, MUTADIS, France*
- Improving risk communication about low dose exposure – appropriately considered in the Strategic Research Agenda for Social Sciences and Humanities in Radiation protection, *C. Pözl-Viol, BfS, Germany*
- Developing research on Radiation Protection Culture, *C. Schieber, et al., CEPN, France*

- **Discussion of talks / impact on SRA; Inclusion of comments via social media**, moderated by C. Pözl-Viol, BfS, Germany

This document D2.8 presents the improved version of D2.2 taking all feedback received in to account.

IV. Statement on the SSH research priority

Based on the broad input from SSH and Radiation Protection communities, a preliminary list of the most important research themes was identified, as follows.

- 1. Stakeholders' sense-making of ionising radiation concepts, risks, uncertainties and link with behaviour in different exposure situations. Possibly focus on low doses and include risk communication, mental models.*
- 2. Legal instruments for public information and participation and their application. Analysis of participatory tools and methodologies, in particular ethical principles guiding deliberative processes.*
- 3. Analysing and increasing awareness of radiation protection R&D and ethical principles guiding RP research; harmonisation of radiation protection approaches.*
- 4. Holistic approaches to accident management (psychological aspects and socio-economic aspects) and role of local knowledge in decision-making.*
- 5. Ways to build/ transmit radiation protection culture => transversal issue.*
- 6. Risk communication for medical applications.*

V. Research lines and topics in Strategic Research Agenda (SRA) for Social Sciences and Humanities (SSH) in radiation protection field (RP)

This SRA for Social Sciences and Humanities Research in radiation protection is structured in six research lines for which a joint European effort has been identified as need to address the contemporary challenges outlined above. Each of these research lines includes a number of specific research topics relevant to a future European research agenda in the field of radiation protection.

Following the cross-cutting approach, part of the research topics are linked with challenges and research needs identified by the radiation protection associations MELODI, ALLIANCE, NERIS and EURADOS. In particular, there is a stronger relation to NERIS challenges and key topics. Exchanging views on these joint challenges will be part of the further procedure to improve the SRA, set priorities and formulate projects.

Research line 1: Effects of social, psychological and economic aspects on radiation protection behaviour and choices of different actors

RL1 seeks to improve the understanding of behavioural aspects related to radiological risks, including the interrelation between behaviour, perception of radiological risks, knowledge, culture, historical memory and other potentially influencing factors.

Relevant topics include:

Topics
<p>1.1 Links between perception of radiological risk and radiation protection behaviour, or individual strategies to cope with perceived risk in relation to radiation exposure, using both cross-sectional and longitudinal studies focusing on one or more of these aspects:</p> <ul style="list-style-type: none"> - different exposure contexts (workers, population living in areas affected by radiological contaminations), - different time scales (e.g. different generations), - cultural context, - socio-economic issues of behaviour change
<p>1.2 Comprehensive approaches to studying the perception of radiological risk and environmental remediation actions in post-accident and existing exposure situations.</p>
<p>1.3 Social and traditional media impact on perception of radiological risk and general well-being linked to radiation exposures. This includes the influence of citizen journalism on radiation protection behaviour in different exposure situations and developing models for integrating scientific journalism in radiation protection.</p>
<p>1.4 The interplay of individual differences and psychological aspects associated with radioactivity, social environment and radiation protection behaviours.</p>
<p>1.5 The understanding of ionizing radiation concepts, risks and uncertainty by different stakeholders (e.g. practitioners, patients, local population) and the respective amplifier effects. Contexts are medical exposures, industrial applications and natural radiation. T</p>
<p>1.6 Perception of radiological risks from low doses of radiation, accounting for cultural differences in routine, emergency and other exposure situations.</p>
<p>1.7 Socio-psychological and economic aspects of medical follow-up after accidental or other exposures.</p>

Research line 2: Holistic approaches to governance of radiological risks

The research line 2 develops holistic and inclusive approaches for the governance of radiological risk situations by assessing non-radiological aspects (socio-economic, psychological and cultural), raising awareness about these aspects and integrating them into decision making. Evaluate and balance radiological and non-radiological aspects as input for decision-making.

Relevant topics include:

Topics
<p>2.1 Assessing values and expectations underlying 'integration approaches,' and the choices made in the name of SSH integration. This includes assessment of the limitations of risk governance as it is conceived of today, e.g. by examining which knowledge, approaches, frameworks cannot be transferred from one field to another.</p>
<p>2.2 Assessment of the synergetic effects (radiological and non-radiological) of radiation accidents (e.g. medical) through transdisciplinary research, and development of policy appraisal tools to inform decision-making.</p>
<p>2.3 Holistic approaches to accident preparedness, management and recovery, taking into account multiple risks, social, economic and psychological factors. These holistic approaches should account for the development of psychological support for evacuees as part of preparedness</p>

<p>policies; socio-economic aspects of preventive distribution of iodine tablets in different EU countries; and psychological consequences of emergency management decisions.</p>
<p>2.4 Social and psychological issues related to preparedness and response to nuclear and radiological terrorism and other delinquent behaviour.</p>
<p>2.5 Ethical aspects of crisis situations, particularly ethical questions of evacuation, and post-accident management (“emergency ethics” vs. “normal ethics”), and the transition from emergency to existing radiation exposure situations.</p>
<p>2.6 Development of socio-economic valuation and multi-criteria decision aid methods to formally structure the evaluation and integration of radiological and non-radiological factors for different ionising radiation exposure situations</p>
<p>2.7 Decision making mechanisms in post-accident situations, with emphasis on local knowledge and decision-making.</p>
<p>2.8 Policy analysis of how the Aarhus convention and other reference documents are mobilised in the radiation protection field and to which impact.</p>
<p>2.9 Democratic culture in radiation protection in order to construct joint actions with institutional and non-institutional actors.</p>
<p>2.10 Comparison of medical guidelines and principles of radiation protection with a view on the underlying ethical values.</p>
<p>2.11 Investigation of approaches to uncertainty in different professions (e.g. general practitioners, surgeon, food scientist, environmental scientist, public).</p>
<p>2.12 Ethical perspective of compensation for damage incurred due to various situations of radiation exposure and differences among countries.</p>

Research line 3: Guiding principles for Responsible Research and Innovation in Radiation Protection

Research line 3 aims at assessing how radiological protection research and development (R&D) is conducted, with the aim of inciting more socially responsive and ethically sound R&D and outcomes. This should enhance the impact of social science and humanities research on science and technology policy and research agendas in the field of radiation protection.

Relevant topics include:

Topics
<p>3.1 Enhancing the reflexive awareness of actors involved in R&D about the societal implications of nuclear technology applications and radiation exposure situations that require radiation protection research.</p>
<p>3.2 Examining the social, cultural, and historical context of radiation protection research; the rationales, possibilities, and limitations of research approaches and methods; the social relevance of research hypotheses.</p>
<p>3.3 Ascertaining conflicts of interest in radiation protection research and finding ways to remedy such conflicts.</p>
<p>3.4 Identifying and developing sound ethical principles and approaches (e.g. deliberation) to guide radiation protection research in a socially responsive and responsible manner.</p>
<p>3.5 Operationalizing, as well as problematizing and developing, principles like trans-disciplinarity and holism, which sustain the integration of SSH into radiation protection research.</p>
<p>3.6 Evaluating the institutional uptake of research projects and findings.</p>
<p>3.7 Making the SSH integration meaningful and operational</p>

3.8 Developing methodologies and tools for the dynamic mapping of stakeholders’ concerns, views and needs to identify R&D priorities in the radiation protection field

Research line 4: Stakeholder engagement in radiation protection research, development, policy and practice

Research line 4 aims at fostering stakeholder engagement in radiation protection research, policy and practice in ways that enhance responsiveness to societal needs and concerns. By stakeholder we denote anyone who has a stake in radiation protection research, its development or applications and/or is potentially affected by radiation protection R&D and the outcomes it generates.

Relevant topics include:

Topics
4.1 Mediation, facilitation and representation on the triangle scientists, public and other stakeholders (e.g. industry, elite, policy makers) for different exposure situations and nuclear applications, research and development, including lessons from Fukushima.
4.2 Establishment of a collaborative framework for stakeholder engagement (radiation protection experts, radiation protection policy makers, authorities of different governmental levels, disaster management organisations and civil society organisations) in radiation protection research, policy and practice in ways that enhance responsiveness to societal needs and concerns. Particular focus on low radiation doses and related uncertainties.
4.3 Analysis of societal needs for and evaluation of legal instruments and governance frameworks supporting access to information, public participation and access to justice in relation with RP issues.
4.4 Examination, assessment and design of stakeholder and public participation tools and methodologies for different radiological exposure situations. Roles and rules of stakeholders in the engagement process. Motivational factors, ethics, and link between theory and practice.
4.5 Potential and pitfalls of citizen involvement in knowledge production for radiological risk governance.
4.6 Preservation of knowledge and experience of local stakeholders’ (e.g. local community, schools, citizens) involvement and participation. Community research and tracing for development of participation culture in relation to different exposure situations

Research line 5: Risk communication

The research line 5 aims at developing research to support communication about ionising radiation between different stakeholders and citizen-centred risk communication, in order to clarify choices and options in a variety of exposure situations and empower citizens and other stakeholders to make informed decisions.

Relevant topics include:

Topics
5.1 Risk communication about radioactivity and radiation protection principles in medical applications of ionizing radiation and the impact of communication on radiation protection behaviour of practitioners.
5.2 Improving decision-making through informed consent of patients for medical procedures involving ionising radiation; by empowering patients in decision making; ethical issues and communication about uncertainties.
5.3 Developing long term communication models to improve radiation protection culture and public well-being in long term exposure situations.
5.4 Use and perception of technical information and risk estimates in communication with various publics (lay people, experts, informed civil society).
5.5 Media communication about ionizing radiation, in particular low radiation doses and related uncertainties in the field of radiological protection including inter-media agenda setting in different exposure situations.
5.6 Ethical basis and values underpinning risk communication about ionizing radiation exposures,
5.7 Risk communication and stakeholder involvement in post-accident recovery in order support decision making process related to daily life and to improve public health.
5.8 Developing risk communication about low doses: Use of state of the art knowledge from mental models and other socio-psychological research with focus on low doses of ionizing radiation and related uncertainties.
5.9 Ethical principles guiding deliberative processes on questions that cannot be decided by radiation specialist alone: role of uninformed risk perceptions, applicability of informed consent, appropriateness of risk comparisons, dealing with refusal to communicate.

Research line 6: Radiation protection culture

The research line 6 supports the development and building of a radiation protection culture among stakeholders in various exposure situations (planned, existing and emergency) and categories of exposure (occupational, patient, general public). This should:

- favour the understanding of radiation protection norms and standards
- favour better decision-making processes concerning the management of radiation exposure situations, and identification and implementation RP actions
- enable individuals, where relevant:
 - to reflect on their own protection and/or that of other individuals
 - to consider consciously radiation protection aspects in their activities or decisions
 - to make their own decision with regard to their own protection against ionising radiations
 - to participate to decision making processes related to the management of exposure situations

- enable professionals in RP field and other stakeholders to dialogue and share a common language, in a view to enhance the efficiency and reliability of the radiation protection system and its capacity to effectively answer the concerns of all concerned stakeholders.

Relevant topics include:

Topics
<p>6.1 Characterization of RP culture, including</p> <ul style="list-style-type: none"> • Specificities associated with exposure situations; • Organisational/societal/political/economic/ psychological aspects and value judgments influencing RP culture or RP behaviours; • Cultural differences between countries; • Ethical frameworks underlying RP cultures; • Links between RP culture at the level of an organisation/ community and the level of groups or individuals from this organisation/community; • Impact of evolving RP technologies, knowledge or communication technologies on RP culture • Relationships between RP culture and safety culture (notably in the nuclear industry).
<p>6.2 Criteria /methodologies / tools for the qualitative and quantitative evaluation of the level RP culture, at group and /or individual level</p>
<p>6.3 The role of RP culture, in particular</p> <ul style="list-style-type: none"> • The contribution of RP culture in the implementation and improvement of the protection “system”; • How RP culture can improve health and well-being of populations? • Practical achievements from developing / building a RP culture (impact on level of exposure, protective actions, decision making processes,...)
<p>6.4 Development of tools, methods, processes to build, maintain and transmit RP culture</p> <ul style="list-style-type: none"> • Needs and concerns of stakeholders regarding RP culture, with attention to the development of participatory tools and low dose exposure situations. • Development of tools / methods / processes to enhance RP culture in specific fields: emergency and late phase nuclear accident preparedness, NORM activities, Radon exposure, paediatric imaging • Processes to maintain/ transfer RP culture through generations; • Guidance for enhancing RP culture for specific publics (communities around nuclear installations, schools, patients, pregnant women, medical doctors);
<p>6.5 Social, psychological and economic aspects of radiological protection choices by different actors.</p>