

# RICOMET 2017

**Risk perception, communication and ethics of exposures to ionising radiation**

## **International conference: RICOMET 2017** **Social and ethical aspects of decision-making in radiological risk situations**

Vienna, June 27-29, 2017, IAEA, Austria

hosted by the IAEA



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## Programme

### Tuesday, June 27, 2017 | Day 1

08:00 – 08:30 REGISTRATION

#### 08:30 – 09:35 **Welcome words**

- Introduction words by organising committee, Horst Monken Fernandes, IAEA, Tanja Perko SCK•CEN, Blanka Koron, REC
- Welcome address by Ayhan Evrensel, Communication Adviser of the Nuclear Energy Department - IAEA
- Key note, **Being Nuclear: Why we need to understand "the nuclear" as always entangled with "the social"; Ulrike Felt**, Professor of Science and Technology Studies, University of Vienna and Head of the Research Platform "Responsible Research and Innovation in Academic Practice"
- By H2020 project coordinators:
  - **CONCERT**, Thomas Jung, BfS, coordinator (OBO)
  - **CONFIDENCE**, Wolfgang Raskob, KIT, coordinator
  - **HONEST**, Albert Presas i Puig, UPF, coordinator (OBO)
  - **TERRITORIES**, Marie Simon Cornu, IRSN, coordinator

In memory of Kjell Andersson, Karita Research: *Britt-Marie Drott Sjøberg & Gaston Meskens on behalf of social science and humanities community*

9:35 – 09:50 TEA/COFFEE BREAK sponsored by SCK•CEN, Belgium



09:50 – 11:45

### **Challenges and solutions for societal aspects of environmental remediation**

Session chairs: *Horst Monken Fernandes, Decommissioning and Environmental Remediation U, IAEA, Austria* and *Tanja Perko, SCK•CEN, Belgium*

- How effective were the decontamination efforts in Fukushima in reducing individual doses in Fukushima? Lessons from Date City, *R. Hayano, The University of Tokyo, Japan*
- Challenges posed by stakeholder engagement in recovery and radioactive waste management after the Fukushima accident, *A. Izumo, IAEA, Austria*
- Practices of the nuclear regulatory authority in stakeholder engagement - perspectives of social communication: challenges and proposals – Caetité Uranium Mining Case, *A. R. Scislewski, Brazilian Nuclear Energy Commission (CNEN), Brazil*
- Implement communication and stakeholders involvement activities in relation with the projects for remediation of closed uranium mining sites in Argentina, *J. P. Molinari, Argentina*
- Public perceptions of D&ER activities and development of remediation criteria, *I. Abalkina, Nuclear Safety Institute, Russian Federation*
- Stakeholder Engagement in Environmental Remediation Projects: Lessons Learned and the Path Forward, *H. Monken-Fernandes, IAEA, Austria*

11:45 – 12:00 **Oral poster presentations** (3min each)

- National challenges of environmental remediation at former uranium mines in Romania, *A. Constantin, et al. Institute for Nuclear Research, Romania*
- Joint ICTP-IAEA Workshop on Environmental Mapping — Effective education and training for involving citizens in environmental monitoring, *A. Brown, SAFECAT, Japan*
- Basic Safety Standards requirements on public information in the event of an emergency: New project to investigate how well prepared we are, *M. Martell, et al., Merience, Spain*

12:00 – 13:00 LUNCH + POSTER SESSION

13:00- 15:30 **History of risk regulation, including Basic Safety Standards**

Session chairs: Ted Lazo, OECD/NEA, France and Markku Lehtonen, Universitat Pompeu Fabra, Spain

- KEY NOTE: Risk Management is the Problem: A short history of how risk estimates led management of the Chernobyl disaster into darkness, *Kate Brown, University of Maryland, Baltimore County, USA*
- How To Communicate With The Public In The Event Of An Emergency – Legal Aspects Of Public Information In Revised EURATOM Legislation, *Verena Ehold, BSS project, Austria/Belgium/ Spain*
- Civil society investigation of nuclear EP&R provisions in Europe, *Nadja Železnik, Nuclear Transparency Watch and REC, Slovenia*
- Access to information and participation of the public in the context of a nuclear accident – insights from the Aarhus Convention and UN Guiding principles on internal displacement, *S. Baudé, et al., Mutadis, France*
- Nuclear Safety Goals in Japan: History, Context and Challenges, *Shin-etsu Sugawara et al., Central Research Institute of Electric Power Industry, Japan*
- The nuclear safety evolution after the accident at Three Mile Island (1979): focus on the risk of core meltdown, *Ismail Goumri, IRSN, France*
- Analyzing seismic risk assessment evolutions from an historical perspective: French nuclear safety after the Fukushima Daiichi nuclear accident, *Mathias Roger, IRSN, France*
- Building trust whilst communicating risk: nuclear waste disposal in the UK and France, *S. Butler et al., Universitat Pompeu Fabra, Spain*

15:30 – 16:00 TEA/COFFEE BREAK, sponsored by the BSS communication project

16:00 – 18:00 **Stakeholder engagement in decommissioning of nuclear installations**

Session chairs: Meritxell Martell, Merience, Spain & Vladimir Michael, Decommissioning and Environmental Remediation Team, Waste Technology Section, IAEA, Austria

- Perspectives of IAEA on stakeholder involvement in decommissioning of nuclear installations, *V. Michal, IAEA, Austria*
- Managing social challenges in the nuclear decommissioning industry: a responsible approach towards better performance, *D. C. Invernizzi, et al., University of Leeds, UK*

- A multi-stakeholder and inter-territorial perspective on decommissioning issues: the White Paper of the French National Association of Local Information Commissions, *S. Baudé, MUTADIS, France*
- Stakeholder engagement strategy for initiating decommissioning planning activities of BAEC Research Reactor, *M. M. Uddin, CRR, Bangladesh*
- Communication from public information to stakeholder engagement, *V. Andrei, et al., Association "Nuclear Energy", Romania*
- Geological disposal: community decision making in a consent-based siting process, *M. Gough, Radioactive Waste Management Limited, UK*
- Stakeholder involvement for decommissioning process from Indonesian's regulation perspective, *D. Rushartono, BAPETEN, Indonesia*
- Current situation and development at TEPCO's Fukushima Daiichi Nuclear Power Station, *T. Masaki and O. Takao, TEPCO, Japan*

18:15 RECEPTION, IAEA restaurant; sponsored by the SSH platform founding members

## Wednesday, June 28th, 2017 | Day 2

08:30 – 10:30 **Integrating societal concerns and ethical considerations in emergency preparedness and response (part I.)**  
 Session Chairs: Wolfgang Raskob, KIT, Germany, Catrinel Turcanu, SCK•CEN, Belgium and Svetlana Nestoroska Madjunarova, Incident and Emergency Centre, IAEA, Austria

- Building community resilience: Emergency preparedness and Involvement of Interested Parties, *S. Nestoroska Madjunarova, IAEA, Austria*
- Humanitarian organisations – partners in reducing societal uncertainties in nuclear disaster management, *M. Krottmaier, IFRC, Switzerland*
- Justice and good governance in nuclear disasters, *B. Taebe, Delft University and Harvard University, Nederland*
- Lay people responses and information needs in radiological emergencies: insights from a literature review, *R. Sala, et al., CIEMAT, Spain*
- Ethical challenges in health surveillance: a case study of thyroid screening after Fukushima, *D. H. Oughton et al., NMBU, Norway*
- Optimizing nuclear emergency planning, *H. Sannen, STORA, Belgium*

10:30-10:45 **Oral poster presentations** (3 min each)

- Individual and historico-societal factors influencing decision-making processes related to RP behavior in post-accidental period, *L. Liutsko et al., FMU, Fukushima, Japan*
- The radiation measurements and the involvement of the population. Lessons from the Chernobyl and Fukushima accidents: results of the SHAMISEN project, *P. Fattibene et al, ISS, Italy*
- Effectiveness of narrative and numerical evidence for communicating uncertainties related to radiological risks: Experiment proposal, *H. V. Wolf, et al., University Antwerpen, Belgium*

- The challenge of Safety Transportation of Disused Radioactive Sources and Improvement of Emergency Response, *B. Zlobenko, Institute of Environmental Geochemistry, Ukraine*

10:45 – 11:00 TEA/COFFEE BREAK + POSTER SESSION sponsored by the CONFIDENCE project

11:00 – 12:30 **Integrating societal concerns and ethical considerations in emergency preparedness and response (part II.)**

Session Chairs: Lisa Berthelot, Incident and Emergency Centre, IAEA, Austria and Deborah H. Oughton, University of Life Sciences, Norway

- Protecting the public and mitigating fear through effective communication in emergency preparedness and response, *L. Berthelot, Incident and Emergency Centre, IAEA, Austria*
- Working with journalists for better reporting on radiation incidents, *P. G. Rickwood, Atomic reporters and Stanley Foundation*
- News that matters for the casualties of nuclear accidents, *P. Thijssen, et al., University of Antwerp, Belgium*
- "Just one click away" - Satisfying societal demand for open source facts, *D. T Sim, Wikipedia author, UK*
- Crisis preparedness among inhabitants in the nuclear zone of Mol/Dessel (Belgium): results of a survey on the knowledge of citizens regarding reflex measures, *A. Bergmans, University of Antwerp, Belgium*
- New Challenges in Crisis Communication – the Results of Sociological Survey in the Czech Republic; *Karla Petrova, et. al., State Office for Nuclear Safety, Czech Republic*

12:30 – 13:30 LUNCH

13:45 – 14:00 **Oral poster presentations (3min each)**

- Social aspects of the implementation of the Polish Nuclear Power Programme, *K. Kiegiel, Inst. Nuclear Chemistry and Technology, Poland*
- Ecological, social and medical research on the long-term effects of Chernobyl nuclear power station accident. A comparative epidemiological study, *S. Salomaa, University of Eastern Finland, Finland*
- Gauging the perception of radiation risk: a public facing survey set up within the CONCERT European Joint Programme, *S. D. Monaca et al., ISS, Italy*
- Empathy as a procedural value for radiation protection, *F. Zölzer, University of South Bohemia, Czech Republic*

14:00 – 16:00 **Social and ethical aspects in, and of, long-term exposure situations**

Session Chairs: Pascal Crouail, CEPN, France, Michiel Van Oudhesden, SCK•CEN, Belgium and Marie Simon Cornu, IRSN, France

- Stakeholder's involvement in management of contaminated goods in emergency and post-accidental preparedness and response, *V. Durand, et al. IRSN, France*
- The SHAMISEN project: from lessons learned from the past nuclear accidents to improvement of preparedness of post-accident response on medical and health issues, *L. Liutsko, et al., IS Global, Spain*

- The closely-watched case of litate village: the need for global communication of local problems, *A. Brown, SAFECAS, Japan*
- Building trust in the scientific basis for long-term nuclear waste management through quantitative story telling, *F. Diaz-Mauri, Universitat Pompeu Fabra, Barcelona, Spain*
- Making Radioecological Knowledge, *S. Molyneux-Hodgson, Exeter University, UK*

16:00 – 16:30 TEA/COFFEE BREAK + POSTER SESSION sponsored by the TERRITORIES project

16:30 – 18:00 **Establishing a European Platform for Social Sciences and Humanities research relating to Ionizing Radiation**  
Chair Persons: Susan Molyneux-Hodgson, Exeter University, UK, Piet Sellke, DIALOGIK, Germany

- On the way to our SSH platform, *S. Molyneux-Hodgson, Exeter University, UK and P. Sellke, DIALOGIK, Germany*
- Absent, yet present? Tracing “Responsible Research and Innovation” in Radiation Protection Research, *M. Van Oudheusden, Belgian Nuclear Research Center SCK•CEN*
- SHINE project – start up of the platform, *T. Perko, SCK•CEN & University of Antwerpen, Belgium*
- The relevance of knowledge management and a shared knowledge base for supporting social science and humanities in ionising radiation research and protective measures, *C. Pözl-Viol, BfS, Germany*
- Slovak partners in SHINE? The recent situation, and some explanations of what can be read in between the lines of PLATENSO project deliverables, *P. Mihók, Matej Bel University in Banská Bystrica, Slovak Republic*
- Non-Medical Medical Exposures? Dilemmas and Logic from Wonderland? *J. Malone, Trinity College Dublin, Ireland*

19:30 CONFERENCE DINNER  
Zum Martin Sepp  
Cobenzlgasse 34  
1190 Wien

(Please, register for the conference dinner at the RICOMET desk before Wednesday, 12.00h)

## Thursday, June 29th, 2017 | Day 3

8:30 – 10:00 **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*
- 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*
- Strategic Research Agenda for Social Sciences and Humanities in radiation protection field – overview, *T. Perko, SCK•CEN, Belgium et. al*

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

10:00 – 10:15 TEA/COFFEE BREAK sponsored by the CONCERT project

10:00 – 12:00 **CLOSING with reporters from different sessions**

### Farewell drink

See you at the **fourth RICOMET conference organized in the week of 4<sup>th</sup> – 8<sup>th</sup> of June 2018 in The Hague, Nederland** in parallel with the IRPA 2018 congress. The conferences will have some common events and a panel.



Involving a wide range of interested parties in the decision-making on nuclear power programmes can enhance public awareness, understanding and confidence. This is also important for those stakeholders that do not have a direct role in making those decisions.

Member States often identify the effective communication with stakeholders, and their awareness and understanding, as one of the biggest challenges when initiating a nuclear power programme or undertaking related activities. Creating awareness and promoting understanding among the various interested parties, who do not only come from the nuclear industry or government institutions but also the media, local communities and non-governmental organizations, is essential to build mutual trust related to nuclear science and technology questions. Therefore, designing and implementing productive stakeholder involvement programmes starts with communication about energy policies and strengthening stakeholders' understanding of nuclear power, including its benefits and risks.

The IAEA provides guidance on mechanisms that can be used to communicate and engage with both internal and external stakeholders. It regularly holds national and regional workshops on stakeholder involvement and integrates this issue in its review missions.

The IAEA publications on stakeholder involvement and other social aspects throughout the fuel cycle present approaches to, responsible and sustainable stakeholder involvement in different situations.

## **PISA- a Programme for the study and Integration of Social Aspects into nuclear research**

The Belgian Nuclear Research Centre SCK•CEN is one of the largest research institutions in Belgium. As a foundation of public utility, the mission of the Belgian Nuclear Research Centre is to conduct research into nuclear energy and ionising radiation applications for civilian use, and to develop nuclear technologies for socially valuable purposes.

In an effort to create links between nuclear research and innovation and society in mutually beneficial ways, the Belgian Nuclear Research Centre initiated in 1999 a multi-disciplinary 'Programme for the Integration of Social Aspects into nuclear research' (PISA). Given the status of SCK•CEN as a foundation of public utility, the establishment of the PISA programme was seen not only as an opportunity to explore alternatives to the so-called technocratic approach to science and technology development, but also as a responsibility towards society.

The current objectives of SCK•CEN' PISA programme are to:

- Study the social, cultural, ethical and political aspects of research, policy and practice related to ionising radiation and its applications;
- Support the development of reflexive, anticipatory and socially engaged attitudes among science, technology and innovation communities in the nuclear field,
- Promote improved governance approaches attending to social and ethical implications of research and innovation related to applications of ionising radiation;
- Integrate social science and humanities (SSH) by stimulating transdisciplinary collaboration in national and international programmes.

In line with broader science-policy agendas, such as Responsible Research and Innovation, the PISA program facilitates a better understanding of the interactions between nuclear science technology and society, and how these interactions can be improved. From its onset, PISA promoted interaction with various stakeholders: researchers from nuclear and non-nuclear fields and policy-makers, representatives of the industry, and members of the organised civil society or the lay public.

The scope of PISA research covers the following themes:

- Socio-technical aspects and decision making processes in the management of radioactive waste, in particular high level radioactive waste management;
- Perception and communication of nuclear technology and radiological risks;
- Ethical aspects of radiological protection and, more generally, the justification of risk-inherent technological applications;
- Safety culture, in the broader context of safety governance;
- Governance of nuclear energy and ionising radiation risks, with focus on new modes of governance, such as citizen science, stakeholder involvement in decision-making, and the translation of Responsible Research and Innovation to the nuclear field.

**More information about PISA at:** <http://science.sckcen.be/en/Institutes/EHS/SPS/STS>



## CONCERT

### **CONCERT - The H2020 European Joint Programme for the Integration of Radiation Protection Research**



#### **Introduction**

The 'CONCERT-European Joint Programme for the Integration of Radiation Protection Research' under Horizon 2020 aims to contribute to the sustainable integration of European and national research programmes in radiation protection. CONCERT is operating as an umbrella structure for the research initiatives jointly launched by the radiation protection research platforms MELODI, ALLIANCE, NERIS and EURADOS, addressing low dose risk, radioecology, nuclear accident preparedness and response and dosimetry, respectively. Based on the Strategic Research Agendas (SRAs) of the platforms and joint programming, CONCERT develops research priorities, aligns them with priorities from participating Member States and seeks further input from society and stakeholders. CONCERT is reaching out to engage the wider scientific community in its projects, aiming to answer the needs in radiation protection for the public, occupationally exposed people, patients in medicine, and the environment.

#### **Materials and methods**

The integrative activities of CONCERT include SRA and road map development, joint programming, organization of research calls, stakeholder activities, promoting the access to and developing research infrastructures and supporting the training of researchers.

By joint programming, defining joint research priorities and road mapping CONCERT is guiding radiation protection research in Europe. This joint effort is performed with a strategic perspective on supporting excellent science, on building and maintaining high competence in radiation and radiation protection science as well as further promoting integrative and multidisciplinary research on a European level. CONCERT contributes to the sustainable integration of European and national research programmes in the field of radiation protection. A crucial step is to initiate and fund concerted joint research actions. Based on the platform SRAs and joint programming, CONCERT is developing research priorities, aligning them with priorities from participating Member States and seeking further input from society and stakeholders. It will reach out to engage the wider scientific community in its projects, aiming to answer the needs in radiation protection for the public, occupationally exposed people, patients in medicine, and the environment. CONCERT is supporting the implementation of the revised European Basic Safety Standards by giving best possible advice based on evidence from research.

CONCERT strives for a better integration of the radiation protection scientific community at the EU level, leading to a better coordination of research efforts and the provision of more consolidated and robust science based policy recommendations to decision makers in this area. In the long-term, these efforts will translate into additional or improved practical measures in view of the effective protection of people and the environment.

Next to research, education and training activities closely linked to research will be carried out by CONCERT to build and maintain the high level of competence in radiation sciences and radiation protection in Europe. In addition, CONCERT will make best use of the available research infrastructure in Europe, mainly by enhancing the visibility of infrastructures and facilitating access to them. Finally yet importantly, CONCERT has the mission to further reduce uncertainties in the assessment and management of radiation risks to the environment and to humans by targeted science. To achieve this CONCERT will initiate an open exchange of knowledge and information between science, regulation and society.

CONCERT is open to new national Programme Owners and Programme Managers at any time.

## **Results and Discussion**

The development of European strategies and roadmaps for future research has been a highly successful process. By 2017, all 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 for social sciences and humanities in radiation protection, covering areas such as risk communication, ethics and safety culture, thus enabling the integration of science in societal context.

Within CONCERT two major open RTD calls of approximately 10 M€ in spring 2016 and 7 M€ in spring 2017, respectively, have been launched. CONCERT as a co-fund action (70% EC and 30% national funding) is aiming at integrating national and European research programmes. Three large multinational projects were funded from the first call and it is planned that additional 3-5 smaller projects would be supported from the second call.

## **Conclusions**

As of 2017, the Program Owners and Managers from practically all European Member States that have a national radiation protection research program are now involved in CONCERT. CONCERT is successfully developing European strategies and roadmaps on radiation protection research and organising RTD calls. While mechanisms are now in place for developing joint research priorities, there are still challenges in finding fluent joint funding mechanisms that guarantee open participation of all relevant actors in research calls.

## **Acknowledgements**

The CONCERT EJP is supported by the Euratom program of European Commission (H2020 grant agreement 662287).



### **The H2020 CONFIDENCE project: a multidisciplinary approach to coping with uncertainties for improved modelling and decision making in nuclear emergencies**

#### **Introduction**

In nuclear emergency management and long-term rehabilitation, addressing scientific and social uncertainties is an intrinsic problem of decision-making. The former issue from incomplete or lack of knowledge about the current situation or its predicted evolution, or the consequences of protective actions. The latter reflect uncertainties faced by the different actors (decision makers, experts, affected population, other stakeholders) along their own decision-making processes.

To protect the population, conservative assumptions are often taken which may result in more overall harm than good due to secondary causalities, as observed following the Chernobyl and Fukushima accidents. Therefore, developing approaches to deal with uncertainty is crucial to improve protection, health and well-being of the affected population, and to minimise disruption of daily life.

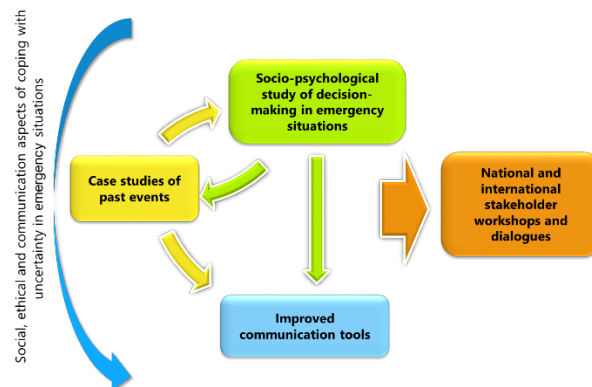
Uncertainty is different at various stages of an emergency, which typically can be subdivided into the pre-/release, the post-release and the long-term recovery phases. The recently commenced project CONFIDENCE (COPing with uNcertainties For Improved modelling and DEcision making in Nuclear emergenCiEs) focuses on identifying and reducing uncertainties in the release and post-release phases of an emergency. The latter includes the transition between the short-term post-release and recovery phases (e.g. the first year(s)). CONFIDENCE brings together multidisciplinary expertise from the Radiation Protection Platforms and Social Sciences and Humanities such that it can address the scientific challenges associated with model uncertainties and improve radioecological predictions and emergency management (NERIS and ALLIANCE), situation awareness and monitoring strategies (EURADOS), risk estimation in the early phase (MELODI), decision making and strategy development at local and national levels (NERIS), including the social and ethical aspects (Social Sciences and Humanities).

#### **Materials and Methods**

A dedicated work package of the CONFIDENCE project focuses on social, ethical and communication aspects of uncertainty management. The research objectives of this work package are: to identify social uncertainties in emergency and post-accident situations, from the early phase to recovery; to highlight the ethical implications of uncertainty management; to investigate the understanding and processing of uncertain information by lay persons and emergency actors, and their subsequent decision-making behaviour in nuclear emergency situations; and to develop improved communication of uncertainties, specifically for low radiation doses.

The methodology (Fig. 1) includes case study research of past nuclear and radiological accidents through interviews with affected population and emergency management actors (experts, decision-makers, first responders), media analysis, and document review; development and testing of socio-psychological behavioural models (quantitative empirical research through surveys); investigation of mental models;

naturalistic observation of actors in the context of emergency exercises; communication experiments; national and international workshops.



**Fig. 1 CONFIDENCE approach to social, ethical and communication aspects of coping with uncertainty in emergency situations**

## Results and Discussion

The results of the work foreseen can be summarised as follows:

- Understanding stakeholders' response to uncertainty in past incidents and accidents (Chernobyl, Fukushima, Fleurus, Asco, Krsko);
- Identifying social uncertainties, and clarifying the implications of the different types of uncertainty and the relationships to ethical issues;
- Gaining new insights into behavioural intentions and information needs in relation to protective actions in emergency situations;
- Assessing differences in mental models of uncertainty management for lay citizens and emergency actors in various national contexts;
- Elucidating the conceptualisation and management of uncertainties during emergency exercises in EU countries;
- Developing and testing improved communication tools through consideration of uncertainty;
- Eliciting stakeholders' preferences and priorities for uncertainty management;
- Establishing a dialogue between international experts related to coping with uncertainty in emergency and post-emergency situations.

## Conclusions

CONFIDENCE will address key uncertainties relevant for decision making, reduce them if possible and communicate them such that decisions can be made in a more robust manner, reflecting the complexity of the real situation.

## Acknowledgements

CONFIDENCE receives funding from the H2020 CONCERT project (<http://www.concert-h2020.eu/>).

**The H2020 CONCERT-TERRITORIES project: towards integrated and graded risk management of humans and wildlife in long-lasting radiological exposure situations****Introduction**

The TERRITORIES project (To Enhance unceRtainties Reduction and Stakeholders Involvement TOWards integrated and graded Risk management of humans and wildlife In long-lasting radiological Exposure Situations) has been selected for funding following 1st CONCERT Transational Call, topic 2 (Reducing uncertainties in human and ecosystem radiological risk assessment and management in nuclear emergencies and existing exposure situations, including NORM). Eleven partners (IRSN, BfS, CEPN, CIEMAT, NMBU, NRPA, PHE, SCK.CEN, STUK, University of Tartu, Mutadis) are involved in this 3-year-project (2017-2019).

**Materials and Methods**

The TERRITORIES project targets an integrated and graded management of contaminated territories characterised by long-lasting environmental radioactivity, filling in the needs emerged after the recent post-Fukushima experience and the publication of International and European Basic Safety Standards.

A graded approach, for assessing doses to humans and wildlife and managing long-lasting exposure situations (where radiation protection is mainly managed as existing situations), will be achieved through reducing uncertainties to a level that can be considered fit-for-purpose.

The integration will be attained by:

- Bridging dose and risk assessments and management of exposure situations involving artificial radionuclides (post-accident) and natural radionuclides (NORM),
- Bridging between environmental, humans and wildlife populations monitoring and modelling,
- Bridging between radiological protection for the members of the public and for wildlife,
- Bridging between experts, decision makers, and the public, while fostering a decision-making process involving all stakeholders.

The innovative approach of TERRITORIES will be consolidated throughout the duration of the project and will comprise:

- a novel global methodology for fit-for-purpose dose assessments and risk management addressing the uncertainties and including dialogue among stakeholders; the methodology will encompass a conceptual umbrella framework and generic guidance for the radiological exposure situations included in the project, and will build upon previously developed knowledge and recommendations;

-an adaptation of this methodology to two types of long-lasting exposure situations (radioactively contaminated territories after a nuclear accident, and NORM exposure situations), and the definition of guidance specific to each of them.

Consolidation and illustration of the methodology (umbrella framework and guidance) will be supported by a number of "case studies", focusing on a set of radioactively contaminated sites, having been previously scientifically studied by consortium members. This set, named the TERRITORIES Library, covers a large geographical scope (Europe and Japan), and a wide range of source terms (natural and artificial radionuclides), of ecosystems, of spatial extent and occupation features (from fenced sites to inhabited areas), of temporal scales of interest (with long-term series up to 3 decades after Chernobyl), and of remediation histories.

The research and innovation actions of TERRITORIES are organised in work packages, as summarised in Figure 1.

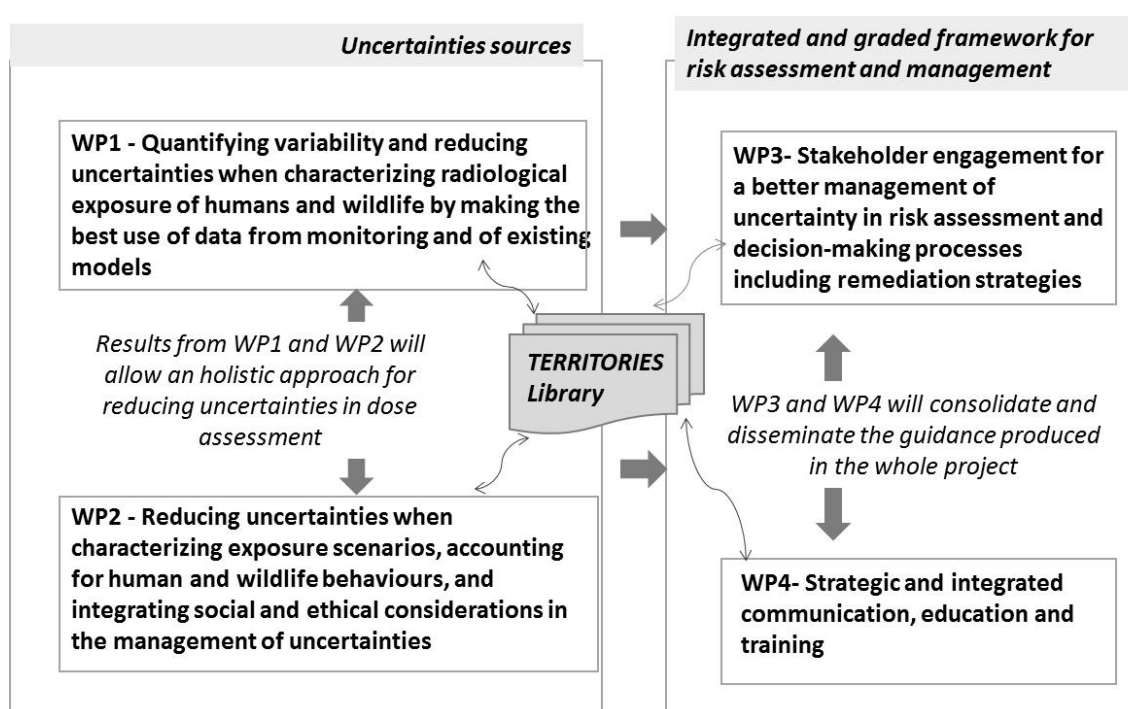


Figure1 : work packages 1 to 4 of the TERRITORIES project

WP1 (Quantifying variability and reducing uncertainties when characterizing exposure of humans and wildlife by making the best use of data from monitoring and of existing models) targets mechanistic fit-for-purpose knowledge for diagnosis and prognosis of the environmental behaviour of the radionuclides and exchanges with the public. WP2 (Reducing uncertainties when characterizing exposure scenarios, accounting for human and wildlife behaviour, and integrating social and ethical considerations in the management of uncertainties) aims to validate the added value of a realistic description of the exposure scenarios versus a generic scenario approach, and to integrate social and ethical considerations about uncertainties. WP3 (Stakeholder engagement for a better management of uncertainty in risk assessment and decision-making processes including remediation strategies) develops methods for a holistic management of uncertainties associated with remediation (dose reduction, socio-economic cost, generated waste amount etc.) and for an integrated decision-making process. WP4 (Strategic and integrated communication, education and training) aims to share with a wide audience (stakeholders

and decision-makers, young scientists, students) the methodological approach and novel guidance documents developed. Last, coordination between work packages, between partners, and with the steering committee is achieved through WP5 (Project coordination and management).

## **Results and Discussion**

The very first deliverables of TERRITORIES are on-line:

- Its website: <http://territories.eu/>
- Its blog: <https://territoriesweb.wordpress.com/>

The next major event is the organization of two workshops from 14 to 16 November 2017, in Oslo, about:

- Key factors contributing to uncertainties in radiological risk assessment (14 and 15 of November).
- Communication of uncertainties of radiological risk assessments to stakeholders (16 November).

## **Conclusions**

The targeted outcome of the TERRITORIES project is to provide guidance on producing fit-for purpose information to co-build decision amongst stakeholders for the management of territories where human populations and wildlife are exposed to long-lasting environmental radioactivity significantly above the natural radiological background.

## **Acknowledgements**

The TERRITORIES research project is part of the H2020 grant agreement 662287 - CONCERT.

## The H2020 HoNESt project – History of Nuclear Energy and Society

### Introduction

Four decades after large-scale anti-nuclear protests in the 1970s the issue of nuclear energy still continues to polarise civil society across Europe. Debates on and engagement with this issue are highly charged with emotions and are characterised by entrenched lines of conflict. At the same time, the perceptions and societal acceptance of nuclear energy vary widely between the European countries, as the diversity of political repercussions from the Fukushima accident in March 2011 demonstrate. Why is this the case? To what extent is this the result of the differences in the ways in which policymakers, utilities and industry have engaged with citizens and the civil society? What are the lessons to be learned from the historical experience? These are among the key questions that the three-year HoNESt (History of Nuclear Energy and Society) research project set out to explore. The project runs from September 2015 until the end of August 2018, and is funded by Horizon2020/Euratom.

The HoNESt project critically examines past experiences, and thereby contributes to a more reflexive debate on future energy sources and the transition to sustainable, secure, and clean energy provision in the future. It has three key ambitions:

1. Providing an overview of the rich and diverse historical experience of the relations between the nuclear energy sector and society in the past 70 years.
2. Drawing conclusions on “mechanisms” of successful public engagement between the nuclear sector and society.
3. Helping to learn from the experience with a view to improving decision-making on new technologies in democratic societies. HoNESt researchers will share and discuss their findings with the stakeholders, whether they come from the nuclear sector, industry, associations, or civil society. A specific dissemination work package runs throughout the entire duration of the project; it employs state-of-the art communication and engagement techniques, including films and podcasts, a newsletter, presence in social media, and webinars, but also traditional means of dissemination such as conferences, engagement events, and academic publications.

### Interdisciplinary joint endeavour of 24 research institutions

HoNESt is the work of an interdisciplinary consortium of researchers in 24 partner institutions across Europe and the US, many leading experts in their fields. The consortium is led by the Universitat Pompeu Fabra in Barcelona. The project will provide the first comprehensive comparative and transnational analysis of nuclear developments and their relations with society, offering novel explanations and arguments. The scope of the research is unprecedentedly broad in both time and space, covering the experience of 20 countries and international organisations over the past 70 years. The comprehensive historical comparison, the transnational frame of analysis, and the inclusion of international organisations (e.g. IAEA and Euratom) will allow HoNESt to overcome the limitations of “methodological nationalism” that has often characterised past research in this area.

In order to develop an innovative interdisciplinary framework, HoNESt combines insights from various disciplines, in particular the history of technology; science and technology studies; environmental history;



economic and business history; social movement research; and the study of societal engagement. Through its interdisciplinary approach, the project embraces the complexity of political, technological, economic and environmental dimensions, and covers issues such as safety, risk perception and communication, societal acceptance and engagement, and media framing.

### **Work packages**

In addition to WP1 (project management) and WP6 (dissemination), the project comprises four research work packages.

**WP2**, focused on the history of the civilian production and use of nuclear energy in Europe from 1945 to the present day, collects historical data on nuclear developments in nineteen European countries and in the USA. In addition to presenting a comparative overview of the diverse national histories of nuclear energy and societies, it provides the social science researchers (work packages 4 and 5) with the best available historical evidence for their analysis. An extensive array of historical data and testimonies on nuclear developments and experience from over 20 countries in and outside Europe was collated in WP2. The summaries of the 20 short country reports can be accessed here: [http://honest2020.eu/sites/all/themes/Porto\\_sub/downloads/Summary\\_short\\_country\\_reports.pdf](http://honest2020.eu/sites/all/themes/Porto_sub/downloads/Summary_short_country_reports.pdf)

**WP4** examines the perceptions and mechanisms for societal engagement. It develops in-depth analytical frameworks able to interrogate the evidence generated by the empirical historical research in WP2. The research seeks to identify the interrelated factors that underlie the societal perception of nuclear developments, and to examine the two-way articulation between such shaping factors, perceptions, and societal engagement. Crucially, the analysis is based on the core assumption of the project: that perceptions and engagement cannot be understood in isolation, because nuclear-societal relations are embedded in complex historical, political, economic, societal and cultural contexts. Only by taking seriously the varying importance of these contexts throughout time and space will it be possible to understand why nuclear energy is so controversial, why these dynamics differ across countries, and what can be done to adequately engage society.

**WP5** engages in a “backcasting” exercise, whose intention is to develop scenarios of “ideal futures” in the nuclear sector. It will derive key lessons from past historical nuclear interactions with civil society and propose desirable future engagement scenarios for energy projects. In developing more democratic, more inclusive and more effective engagement futures, WP5 will employ participatory backcasting methods that allow working backwards from imagined desired future visions towards concrete engagement measures and processes.

Crucial for an interdisciplinary project, **WP3** is devoted to translating, linking and bridging between the two main strands of work: history (WP2) and social sciences (WP4 & WP5). This entails establishing a brokerage system designed to facilitate dialogue between historians and social scientists working within HoNESt.

More information can be found on HoNESt website: <http://www.honest2020.eu/>

## Challenges and solutions for societal aspects of environmental remediation

Experience from nuclear events happening in the past, notably the Chernobyl and Fukushima accidents, showed that the intertwined character of social, ethical and technical aspects of radiation protection requires inclusion of stakeholders' values, needs and concerns in all aspects of decision-making. Governance of nuclear and radiological emergencies and post-accident recovery imposes specific challenges also due to the scientific and societal uncertainties associated to radiological risk. Citizens, emergency actors and other stakeholders have to make sense of and respond to various uncertainties, such as the health effects of low radiation doses, the overall effectiveness of protection actions and remediation strategies, and the future socio-economic development in affected areas.

This session invited papers focusing on the societal, ethical and communication aspects of decisions made in emergency and post emergency situations under large uncertainties. We welcomed case studies, practitioner reports, as well as academic research within this theme.

Contributions address, but are not limited to, the following topics:

- Societal uncertainties and ethical issues in emergency and post-accident situations
- Factors influencing individual and group decision-making in emergency situations
- The potential of citizen science in the governance of nuclear incidents/accidents
- Enhancing societal resilience capacities
- The impact of social and traditional media
- Improved communication methods and tools

## How effective were the decontamination efforts in Fukushima in reducing individual doses in Fukushima? - lessons from Date City -

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### Abstract

In this paper, lessons learned from the monitoring and decontamination efforts conducted in Date City, Fukushima Prefecture, after the Fukushima Daiichi Nuclear Plant accident are presented.

Date City in Fukushima Prefecture has conducted a population-wide individual dose monitoring program after the Fukushima Daiichi Nuclear Power Plant Accident, which provides a unique and comprehensive data set of the individual doses of citizens.

Using the data provided by Date City, we examined the relationship between the individual external doses and the corresponding ambient doses assessed from airborne surveys. The results show that the individual doses were about 0.15 times the ambient doses, the coefficient of 0.15 being a factor of 4 smaller than the value employed by the Japanese government.

We then estimated the lifetime doses of the Date City residents, based on continuous glass badge monitoring data, extrapolated by means of the ambient-dose-rate reduction function obtained from the airborne monitoring data. As a result, we found that the mean additional lifetime dose of residents living in Date City is not expected to exceed 18 mSv.

In addition, we examined the effect of decontamination on the individual doses of the residents, who continued to use glass badges and lived in the designated decontamination area throughout the study period. We found that the decontamination did not have statistically-significant effects in reducing long-term cumulative doses.

### References:

Miyazaki M and Hayano R, "Individual external dose monitoring of all citizens of Date City by passive dosimeter 5 to 51 months after the Fukushima NPP accident", J. Radiol. Prot. 37 1.

## Challenges posed by stakeholder engagement in recovery and radioactive waste management after the Fukushima accident

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### Abstract

Following the accident at TEPCO's Fukushima Daiichi Nuclear Power Station (NPS), vast areas in north-eastern Japan were contaminated by the release of radionuclides and more than 150,000 people were evacuated. At this moment in 2017, many of them are still unable to return to their homes. In the off-site areas affected by the accident, decontamination of the lands, houses, buildings, farms and forest have been implemented, which resulted in significant amount of radioactive waste. At the on-site of Fukushima Daiichi NPS, decommissioning of the damaged buildings, clean-up of the site environment, and treatment of the contaminated water have been going-on. Those activities are also generating a large volume of radioactive waste.

It is generally acknowledged that stakeholders need to be adequately involved in the decision-making process for decommissioning, environmental remediation, and radioactive waste management as well as in the whole recovery process, to address political and societal aspects and to ensure the smooth implementation of those activities. Affected people, land owners, local governments, local industry people (e.g., farmers, fishermen) and other stakeholders are widely engaged in the consultation and decision-making throughout the process to determine many issues, such as the level of decontamination work, the places to store the radioactive waste, the end-state of the site, and the timing of lifting evacuation orders.

Experience in Japan on stakeholder engagement after the accident has demonstrated the challenges to define the adequate level or depth of stakeholder engagement. For instance, national government and municipal governments had a series of consultation and obtained consent from an individual household or land owner, which seemed appropriate but prolonged the whole process. Similarly, subsequent to the decontamination in the evacuated areas, the national government need to check if the evacuees would be willing to return to their homes before lifting the evacuation orders, which delayed the decision due to lack of consensus among the stakeholders. Eventually, Japan lost the chance for many people to return, partly because many evacuees enjoy their lives in the new communities and don't want to return.

The presentation will address major challenges associated with Japan's stakeholder engagement in the decommissioning, environmental remediation and radioactive waste management as well as in the recovery process, explaining national and cultural background different from international perspective.

## Practices of the nuclear regulatory authority in stakeholder engagement - perspectives of social communication: challenges and proposals – Caetité Uranium Mining Case

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### Abstract

According to the Brazilian Constitution (1988), the Union has the exclusive competence for managing and handling all nuclear energy activities, including the operation of nuclear power plants, and also holds the monopoly of the survey, mining, milling, exploration and exploitation of nuclear minerals through state-owned companies. All the uranium and thorium mining and milling facilities are considered nuclear installations, being subject to both licensing process: (a) Nuclear Licensing by CNEN and (b) Environmental Licensing by IBAMA, with the participation of state and local environmental agencies, when available. Concerning the nuclear licensing process, the mechanism of licensing is individualized in steps encompassing the issuance of reports and, in case of subsequent approval, their respective administrative acts. It is important to highlight that the performance of Public Hearings are only considered and supported by law within the environmental licensing.

Since the 80's, the Brazilian State have been developing actions in the direction of opening and transparency of information, using as framework the 1988 Constitution. On that case, even before a legal mechanism concerning Access Information, Brazil has taken some measures in the way to facilitate the citizen access to public data. In 2003 was enacted in Brazil the Law nº 10.650, concerning, specifically, the public access to environmental information data that are available in public and member institutions of SISNAMA, however, the nuclear licensing information was not included. Although, in 2011 was enacted in Brazil the Law nº 12.527, known as "Information Access Law" (IAL), where all the public institutions must provide specific informations in their websites and, also, must create the "Information Service to Citizens" (ISC), in order to answer any questions proposed by any citizen. Thus, promoting a significant change in the conception of what is public information and in the transparency culture.

In the last years, some events occurred in the Caetité uranium mining site, and their impacts on social media, reflect the concerns and challenges surrounding the perspectives on social communication. In some cases, was possible to perceive that despite the environmental monitoring program conducted by the operator did not demonstrate any contamination by the event, the doses associated were not relevant and the uranium concentration were linked to natural processes, the environmental regulator ordered the closure of several wells, and, specially, the local community did not feel confident about the operation of this uranium mining facility.

In view of past events and the concerns in terms of stakeholder engagement and social communication, some aspects shall be included in further discussions: credibility is continuous process of engagement and effort, a "License" does not mean an universal acceptance by the community, acceptance of opposition and questioning as experiences of improvement and new considerations, continuous evaluation of the community engagement and concerns, improvement of transparency, effective communication in terms of providing timely and complete information.

## Implement communication and stakeholders involvement activities in relation with the projects for remediation of closed uranium mining sites in Argentina

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### Abstract

Nowadays CNEA is undertaking The Uranium Mining Environmental Restoration Project (PRAMU) which has the objective of carrying out environmental restoration actions to ensure the protection of human health and the environment once uranium has been extracted from the ore.

The PRAMU restores several sites and contributes to generate practical experiences in the country concerning environmental restoration. The site, the former Malargüe uranium processing facility, located in the state of Mendoza, is the first restoration site where remediation works were ended this year and the final planned usage of the area is agreed to be a park / recreational area. (Remediation was a priority because about 70% of the town's population resides within a distance of 0.5 to 6 km from the tailings, but there are several houses closer to the site). Seven other sites will be restored under the Project, located in the states of Cordoba, San Luis, Salta, La Rioja, Mendoza and Chubut, all of which are being monitored and evaluated.

The Argentine Program PRAMU requires the participation and involvement of social stakeholders at a national, provincial and local level. When a stakeholder analysis is conducted, its role and responsibility must be identified, along with their actions and its positioning in relation to the topic.

In this framework, CNEA conducted between 2015 and 2016 a "Study on the Perception of Population and Social Stakeholders on Remediation of the Sites Malargüe, Cordoba and Los Gigantes". The general objective of the work was to conduct an opinion study with the aim of knowing the information, perceptions and opinions that have the different social stakeholders.

The most widespread among the population is that the problem of the sites with uranium mill tailings in the province (which are scarcely recognized) can be solved. Likewise, in the questionnaire survey, a low confidence level is evidenced related to CNEA with regards to other institutions, and a perception significantly unfavorable on nuclear energy.

## Public perceptions of D&ER activities and development of remediation criteria

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### Abstract

Nuclear Safety Institute of the Russian Academy of Sciences (IBRAE) has been involved in many activities related to development of radwaste and SNF-management systems, as well as providing scientific and technical assistance to Chernobyl-related and nuclear legacy programs. As part of these activities IBRAE has undertaken several projects addressing risk communication issues. This expertise is incorporated in an ongoing project on development of remediation criteria for nuclear sites.

IBRAE experience suggests that in Russia new nuclear facilities (i.e. new nuclear sites) are perceived by the general public as more dangerous compared to the existing ones while it is not so in terms of risk. Consequently, decommissioning activities do not draw too much public attention, especially if the nuclear installation is small (which is the case of many research installations) and/or decommissioning takes place at a larger multi-facility site. This phenomenon may be partly explained by the community's hostile attitude to any new facility described as "new risk no matter how high or low" vs "no facility, no risk". In case of decommissioning the attitude is more favorable as it is inspired by "back to no-risk state" idea (implying that loss of jobs is not at stake). In case of environmental remediation the popularity of decontamination activities compared to other solutions may also take its origin from the perception "making the dirty thing clean or, at least, not so dirty" and, additionally, the visibility of taking the action [1]. The issue that rockets public interest/participation is waste disposal. Difficulties in siting new disposal facilities and possible delays in their construction due to social factors may become a serious obstacle to large-scale D&ER activities.

The other obstacle is absence of remediation criteria. IBRAE develops criteria for areas within the nuclear site boundaries which are based on CSM and radiation exposures of the workers onsite. Presentation will discuss these issues in further detail.

1. Analysis of Information Needs of the Population Affected by the Chernobyl Accident. Research in Russia. - International Chernobyl Research and Information Network (ICRIN). - Moscow, 2005.

## Stakeholder engagement in environmental remediation projects: lessons learned and the path forward

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### Abstract

It is highly recommended that stakeholders are engaged in the decision-making concerning environmental remediation/clean-up projects. Their views will be relevant in determining the site end-state, site future use and eventually the strategies that will be used, for example, in the decontamination of structures and land. All these decisions have the potential to cause significant impacts on project implementation and costs; one of them being the amount of waste to be generated if decontamination works are to be carried on. Depending on how broad the consultation is taken, more difficult it may become to find consensus within the decision-making process. Two basic principles shall be used considered in the remediation of contaminated sites: justification and optimisation. The first tells us that any intervention should do more good than harm, in other words, the benefits shall outweigh the costs/risks; the second implies that different elements (of technical and social nature) need to be taken into account when residual contamination levels are to be determined. The result does not necessarily imply in returning the site to its background conditions. If on one hand remediating the site to background levels would, in principle, be technically possible, on the other the associated costs could be prohibitively high. It may also be conclude that no major intervention at the site would be necessary. Experience seems to suggest that stakeholder engagement in remediation projects (especially after nuclear/radiological accidents) may have contours that are markedly different from those that are characteristic from other situations e.g. those related to decommissioning or waste repository construction. Therefore, adequate mechanisms for considering stakeholder views in remediation projects need to be established as a way to avoid that uniformed decisions, especially those made in circumstances characterized by intense emotional stress, lead to the implementation of remedial actions that will end-up showing not to be sustainable. This paper, more than proposing solutions, is intended to present some lessons learned and suggest potential paths forward.



## **Oral poster presentations**

## National challenges of environmental remediation at former uranium mines in Romania

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### Abstract

Worldwide many countries have initiated programs of environmental remediation, but they faced not only financial and technical constraints, but also social and political challenges that led to stagnation or very slow evolution of these programs. Active involvement and participation of stakeholders is crucial for a viable solution regarding radioactive waste management and associated environmental remediation work. Lack of information and trust, as well as the opposition of stakeholders in implementation of the appropriate programs are some of the factors that impede the progress.

This paper aims to reflect the current state of the former uranium mines in Romania requiring environmental remediation projects and identifies the political, economic, social and technical challenges involved. Finally, a series of measures to address these challenges are proposed.

## **“Joint ICTP-IAEA workshop on environmental mapping” — Effective education and training for involving citizens in environmental monitoring.**

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### **Abstract**

In March, 2017, a 3-week workshop entitled “Joint ICTP-IAEA Workshop on Environmental Mapping: Mobilising Trust in Measurements and Engaging Scientific Citizenry” (smr2858) was held at the Abdus Salam International Center for Theoretical Physics (ICTP) in Trieste. This workshop, jointly organized by staff from the ICTP, IAEA, and the NPO Safecast, brought together expert instructors from related fields to provide participants with both broad and in-depth knowledge and skills in citizen-science-based environmental monitoring. This was a very significant workshop for several reasons:

- Participants came from 25 countries, primarily Africa, Central and South America, and the Middle East. Most can be considered developing nations.

- The countries represented generally do not have existing citizen science movements, and underdeveloped civil society institutions.

- 29 participants were trained in hardware and software for citizen science, including the Safecast radiation measurement system, but also learning about air quality monitoring and other citizen science efforts. This included a strong focus on data analysis using GIS and other tools.

- An entire week was spent discussing social, legal, scientific, and other aspects of citizen science projects.

- The participant formed a skilled, and highly motivated group. They have returned to their home countries and have been submitting data to the Safecast database. They remain in frequent communication with each other and with us.

- We are very interested to see what grows from this. We feel this workshop has seeded citizen science-based environmental monitoring in many parts of the world that need it the most.

For all these reasons, we believe this workshop is a case-study of effective education and training for involving citizens in environmental monitoring.

## **Basic Safety Standards requirements on public information in the event of an emergency: New project to investigate how well prepared we are.**

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### **Abstract**

#### Background

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Spent Fuel and Radioactive Waste Directive, a revised Safety Standards Directive and the amended Nuclear Safety Directive. The latest has to be transposed into Member States' national legislation by 2017 whilst the new Basic Safety Standards Directive must be transposed by February 2018. The implementation of these two Directives provides opportunities to review existing procedures and improve implementation measures in the area of public information, transparency and communication requirements in the event of an emergency.

This paper presents a study, funded by DG Energy and led by SCK•CEN in collaboration with Merience, which has the aim to assess the current practices in public information and communication in EU Member States under the existing legal requirements, and to highlight good practices.

#### Methods

The project approach will be developed together with stakeholders in order to tackle particular stakeholder groups' needs, perceptions and good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive. As a first step, a legal analysis of the provisions in the applicable EU legislation will be undertaken. Secondly, a comprehensive survey will be conducted among all EU Member States in the first stage to examine how administrative and organisational systems, procedures and practices have been set up and work in practice. Additionally, expert evaluations, interviews with national stakeholders and regional, national and international stakeholder workshops will be carried out to complement this information. These workshops will include SWOT analysis and table top scenario exercises to collect and assess the strengths and weaknesses of different approaches undertaken regarding public information and communication in the event of an emergency. A Project Stakeholder Group will also be set up as a consultative body to provide advice and expertise to the consortium.

#### Results and conclusions

The study has just started and results and conclusions are not available. However, we would like to invite anyone interested in the study and co-authoring a book to contact the authors.

#### Acknowledgements

This study is carried out in response to the call for tenders N° ENER/D3/2016-409.

## History of risk regulation, including Basic Safety Standards

This session addresses the evolution of risk estimation by various actors, including current scientific understanding, to give an historic perspective to our current approaches to radiological risk regulation and its implementation through ALARA and the Basic Safety Standards. From a more sociological standpoint, this session also addresses how stakeholders have been involved in risk regulation, and how their views, needs and opinions have influenced radiological risk regulation and implementation, in particular through ALARA, the BSS, and specific national regulations.

Regulation and management of risks related to nuclear installations have, throughout the history of nuclear power, developed in reaction to major accidents (Windscale, TMI, Chernobyl, Fukushima), and also through increasing international collaboration, especially within international organisations such as IAEA, OECD-NEA and WENRA. Improvements in regulation and management have included technical, organisational and human factors aspects, with particular emphasis on clearly separating responsibilities of organisations responsible for R&D, development, operation and regulation of nuclear installations. This has included increased transparency, greater independence of regulatory authorities, but also greater involvement of civil society. While international coordination is advancing, it is not clear whether or not this influences national regulatory regimes, or in fact whether national authorities have followed their own country-specific trajectories?

Contributions sought to this session address the historical development of radiological risk regulation and management, from a comparative inter-country perspective, or examine the evolution within a single country or region.

Topics include but are not limited to the implementation of Basic Safety Standards, impact of major accidents, the shifting role of economic considerations, the role of international collaboration, and the role of civil society in the evolution of risk management and regulation.

## **Risk Management is the problem: A short history of how risk estimates led management of the Chernobyl disaster into darkness**

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### **Abstract**

In 1986, after the explosion of nuclear reactor no. 4 at the Chernobyl Nuclear Power Plant, there existed two different silos of knowledge on radiation medicine that split along Cold War lines. Scientists in the west relied on the Life Span Studies for doses that served as a baseline for estimating health problems in other nuclear events. Soviet scientists during the Cold War generally did not have access to doses of exposures their patients received. Instead they relied on observing changes in their patients' bodies to determine both dose and health damage. After the collapse of the USSR, the western-based computational studies predominated. As risk estimates proved wrong, radiation medicine specialists at UN agencies scrambled to explain away the reality of increasing illness and early onset of childhood thyroid cancer among the Chernobyl-exposed. The work to shore up the failing risk estimates, upon which nuclear sites were regulated, led to a tunnel vision that missed the catastrophic health problems emerging in the Chernobyl contaminated territories.

## How to communicate with the public in the event of an emergency – legal aspects of public information in revised EURATOM legislation

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### **Abstract**

#### Background

In the early stages of an emergency, accurate and timely information is key. With Social Media changing traditional emergency response systems, the one-way communication with the public is clearly challenged. Rapid yet well-coordinated effective decision making and communication across borders is critical to prevent fast-paced misinformation while ensuring credibility and public confidence.

With a view to the lessons learned from the Fukushima accident, the new Basic Safety Standards (BSS) updates and consolidates previous Public Information Requirements in the event of a radiological emergency. Articles 70 and 71 oblige Member States to provide information (Annex XII) to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency. In addition reliable communications and arrangements for informing the general public are included in the emergency management system. But already now all EU Member States impose such a legal obligation - so what has changed?

The present paper looks at the legal aspects and contributes to an assessment of current practices in public information and communication in EU Member States under the existing legal requirements with the objective to highlight good practices.

#### Methods

The paper identifies and analyses the strengthened legal requirements to provide information to the public in the event of a radiological emergency. It explores current information rights and obligations in the relevant EURATOM and EU legislation. By comparison with international recommendations and best practice for public communication in emergencies the paper strives to identify possible gaps and weaknesses in the legal system.

#### Results and conclusions

The study has just started and results and conclusions are not yet available. This paper provides a basis for discussion for an effective and efficient implementation of the new EURATOM legislation based on the assessment of legal requirements.

#### Acknowledgements

This study is carried out by SCK-CEN in collaboration with Merience in response to the call for tenders N° ENER/D3/2016-409, funded by the European Commission, DG ENER.

## Civil society investigation of nuclear EP&R provisions in Europe

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### Abstract

The Fukushima accident in March 2011 has intensified European concerns about off site nuclear emergency preparedness and response. As this important aspect of defence in depth was not included in the EC/ENSREG process of stress tests, several initiatives took place afterwards. The HERCA association formed a working group on "Emergencies" and started to work on the proposition leading to a uniform way of dealing with any serious radiological emergency situation, regardless of national border lines, and focusing on the harmonisation of variety of national concepts. In 2013 DG ENER commissioned a "Review of current off-site nuclear emergency preparedness and response arrangements in EU member States and neighbouring countries" which provided the evaluation of the EU EP&R provisions based on self-assessment of nuclear regulators. In parallel a civil society association Nuclear Transparency Watch (NTW) has organised an assessment of EP&R provisions across the Europe from civil society point of view and reported findings.

The findings of all investigations show that current arrangements and capabilities for off- site nuclear EP&R appear, on paper, to be broadly compliant with current EU legislative requirements and international guidance. However, more deep examinations of arrangements in practice identified a number of gaps and inconsistencies that need to be addressed, like not harmonised criteria and cross - border arrangements, mainstreaming of nuclear emergency preparedness into civil protection mechanisms, long term protective measures and strategies, involvement of local population and communication, inclusion of societal development (new social media, new spatial and demographic development,...). New Basic Safety Standard (BSS) directive, adopted in 2013, and addressing also EP&R requirements could be a good opportunity to improve the EP&R arrangements if not taken only formally. For now, it looks like that many regulatory authorities are still searching for ways how to transpose the requirements from BSS directive, and might happened that this opportunity will not be exploited optimally. The paper will present the findings of civil society investigation on EP&R, compare and discuss the findings of different other surveys and provide the direction of NTW future work related to improvement of EP&R arrangements.



## Access to information and participation of the public in the context of a nuclear accident – insights from the Aarhus Convention and UN Guiding principles on internal displacement

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### Abstract

In the fields of industrial risks we are confronted to, a nuclear accident constitutes a very singular object due to its potential of disruption of life on a large territory for a very long time (at least several generations). Current debate around the preparation and management of the situation that could result from a nuclear accident are subject to polarised principle positions. The debate on the consequences of a nuclear accident includes an ethical dimension about the legitimacy of choices that imply to expose populations to the risk of a major nuclear accident. This ethical debate is necessary insofar as it does not lead to denying the reality of post-accident situations or the necessity of managing them.

We do not position ourselves in this ethical field but in the concrete field of the analysis of existing situations resulting from the Chernobyl and the Fukushima accident, which have affected and still affect a considerable number of people. Without making hypothesis about the future of nuclear industry, we must acknowledge the possibility of such major accident happening again in the future, as different nuclear safety authorities of countries using nuclear energy did.

This communication aims to give insights on the complexity of a post-nuclear accident situation and on the ways to manage it, at the light of different European and international texts: the Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental issues in the EU and the United Nations' Guiding Principles on Internal Displacement and develop their implications for the response to a post-accident situation, the Council Directive 2013/59 / EURATOM of 2013/12/05 on Basic Safety Standards (BSS Directive) and the Council conclusions on "Off-site nuclear emergency preparedness and response" n°15313/15 of 15<sup>th</sup> December 2015.

## Nuclear safety goals in Japan: History, context and challenges

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### Abstract

Establishing safety goals could be a response to the fundamental question of risk management: "How safe is safe enough?" In recent years, a lot of countries utilizing nuclear energy have set out safety goals in line with the development of PRA/PSA. Japan has also addressed this issue for about 20 years. Japanese Nuclear Safety Commission proposed a draft version of safety goals in 2003 after profound discussion and consideration in its special committee. Before the Fukushima accident, however, these safety goals had not been utilized appropriately, and thereby, PRA had not been widely used in the decision making for risk management of either utility companies or the regulatory authority.

This presentation addresses the following research question: "Why the 2003 draft safety goals have not taken root in Japanese nuclear community?" The authors analyzed the ways of utilizing safety goals and its context in our country through bibliographic survey and in-depth interviews with the key persons who had been involved in making the draft safety goals.

Our key findings can be summed up in three points. At first, safety goals had been originally expected to be used for improving risk management, however, these goals have not been sufficiently utilized in that manner. In reality, however, safety goals could not be a driver for accelerating risk assessment and management because they had functioned as tools for emphasizing an assertion that "our facilities had already been safe enough". Finally, we found that the relationship with external stakeholders, such as local government and residents, had made a huge impact on the ways of operators' and regulator's risk management. In Japan, nuclear community had experienced the difficulty of communicating risks honestly with the society. Such "dis-communication" has been a major constraint on the appropriate use of safety goals.

### Acknowledgements:

This research was partially supported by the Japan-Belgium joint research project "After and Beyond Fukushima: Probing the Role and Potential of Citizen Science in Nuclear Science and Technology Governance in Japan and Belgium".

## The nuclear safety evolution after the accident at Three Mile Island (1979): focus on the risk of core meltdown.

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### Abstract

The accident at Three Mile Island Power plant in 1979 constituted a huge shock for the nuclear industry. It challenged the certitudes of the engineers and experts [Foasso 2003]. Some design faults and various human failures led to the first nuclear core melt of a commercial power plant. This talk proposes to reexamine the role played by this accident in the development and the adaptation of nuclear safety research programs in France to consider and treat the risk of a core melt down. I will focus on the safety philosophy changes after Three Mile Island concerning the core meltdown risk treatment. I will first show that the strategy of margins has been completed by a better understanding of the physical and chemical behavior of nuclear fuel in the event of an accident. To do so, the French *Institut de Protection et de Sûreté Nucléaire* (IPSN) decided to adapt the protocol of the "Phébus PF" Program (1988-2010) to analyze the core degradation process during a Loss Of Coolant Accident (LOCA) on Pressurized Water Reactors. The TMI accident also led IPSN to consider the overdesign accidents and to pay attention to the conclusion of probabilistic safety assessment with the creation of an innovative department in charge of probabilistic assessments. All these tools and knowledge are nowadays commonly used for nuclear safety. I link these evolutions with the awareness of a possible core melt down that safety margins cannot always fully prevent. Many protagonists explain that experts were convinced by the efficiency of the "maximum credible accident" and the "envelope accident" concepts that the TMI accident challenged. It forced the experts to take into consideration the less probable accidents, but also the "small" weaknesses that may lead to an accident as suggested the Rasmussen Report.

## Analyzing seismic risk assessment evolutions from an historical perspective: French nuclear safety after the Fukushima Daiichi nuclear accident

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### Abstract

After the nuclear accident at Fukushima Daiichi power plant, the seismic risk assessment methodologies of French nuclear safety agencies are evolving. Indeed, due to stress tests initiated by the European Commission, and following international peer review's recommendations, a probabilistic hazard assessment is now promoted in comparison to the current deterministic approach. This proposal is drawn from my PhD work, which concerns the characterization of seismic methodological evolutions in French nuclear safety after the events at Fukushima. Our aim is to highlight contemporary safety procedure updates with the technical history of their management over time. The fleet of French nuclear power plants is mainly comprised of pressure water reactors under the license of the American brand Westinghouse. The two first nuclear power plants, located at Fessenheim and Bugey, were built following an implementation of American standards with French interpretation. During the 1970's, there emerged in France the necessity to set up a specific safety approach for the seismic risks associated with nuclear power plants. In 1975, the SCSIN, from the Ministry of Industry, launched a working group of twenty experts and scientists from multiple organizations (most from the nuclear industry and regulatory bodies, but also from universities and the private sector) to develop new legislation. In 1981, the first deterministic seismic hazard assessment standard for French nuclear safety was enacted. Based on archival studies, I will show that this French approach was the result of a succession of technical and epistemic choices that reflect current social, economic, industrial, and political circumstances. Placed into the current post-Fukushima context, this study will highlight the growing influence of supranational organizations in improving national nuclear safety. I aim to show with this proposal that nuclear safety is historically a transnational matter, and that the relation between national and international scales has evolved over time.

## Building trust whilst communicating risk: nuclear waste disposal in the UK and France

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### Abstract

Surveys from 1977 to the present indicate that nuclear waste is a key issue preventing the public from supporting nuclear power, yet establishing waste repositories has been difficult in most countries. This paper explores relatively successful attempts in France and unsuccessful attempts in the UK to establish a pathway for waste disposal. In both cases, various national actors have attempted to persuade local populations of the scientific, geological and engineering safety of deep geological disposal, with varying results.

In the UK attempts to establish a geological waste facility began with the formation of the Nuclear Industry Radioactive Waste Executive (NIREX), in 1982. Brushing aside local concerns about risk as NIMBYism and focusing instead on educating the public about the 'correct' quantitative risk involved ("less than crossing the road") led to an increasing mistrust in NIREX. This mistrust was critical in blocking NIREX's efforts to expand geological investigations, and led to a fundamental shift in the way UK authorities approached the siting process.

In France, the site investigations initiated in 1987 by the national radioactive waste management agency, ANDRA, generated vehement local opposition, which prompted the government to declare a moratorium in 1990. The subsequent 'reversibilisation' (Barthe 2006; 2009) opened the process to a broader range of actors, inaugurated a 15-year period of R&D on three management options, introduced the principle of reversibility, and strengthened ANDRA's independence. By re-establishing trust amongst the involved parties, this 'reversibilisation' unblocked the stalemate, and introduced new perspectives to risk debates. However, the subsequent "closing up" (Parotte 2016) of the process has fed mutual mistrust amongst the involved parties, and compromised the future success of the project.

Our comparison reveals the pervasive difficulties in attempts to generate trust, but also invites reflection on the potential downsides of trust and virtues of mistrust in risk regulation.

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## **Stakeholder engagement in decommissioning of nuclear installations**

By 2025, it is estimated that over a third of the EU's currently operational reactors will be at the end of their lifecycle and therefore, the decommissioning of nuclear installations will become an increasingly significant activity for the nuclear sector. The whole process involves all activities from shutdown and removal of nuclear material to the environmental clean-up of the site and can extend over a period of up to 30 years. Whilst the techno-economic aspects of decommissioning have been largely investigated, aspects related to stakeholder engagement remain largely neglected. Furthermore, although some issues of public concern during this phase may be similar to those of the preceding phases (planning, construction and operation), others may be quite different.

The purpose of this session is to contribute to a better understanding of the underlying concepts and principles of stakeholder engagement in decommissioning projects and programmes and incite new thinking about how to meet the challenges. Contributions address, but are not limited to the following topics:

- Comparison of engagement of stakeholders in decommissioning projects and programmes with other phases of the nuclear lifecycle (planning, construction or operation);
- the needs, values and interests of different stakeholders (local communities, operator, environmental groups, regulatory authority, etc) and how to reach a compromise;
- engagement of, interactions and tensions between the local, regional and national levels, as the local views are often considered more important than national views, but the views of stakeholders at national level are also important if there is a need to find alternative sources of electricity;
- addressing the socio-economic consequences, like decreasing employment rate, the reduction of revenues for the host municipality, the environmental impact, etc;
- engagement and visualization exercises for the future use of the land use.

Case studies, stakeholder engagement reports, as well as academic research within this theme are included.

## Perspectives of IAEA on stakeholder involvement in decommissioning of nuclear installations

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### Abstract

Decisions on decommissioning of nuclear facility are to be made with considerable attention to relevant stakeholders. This ensures that stakeholder needs and concerns are properly addressed which improves the probability of successful implementation of the decommissioning activities towards their completion.

The paper will provide overview of IAEA perspectives on stakeholder involvement in decommissioning of nuclear installations as it is addressed e.g. in Nuclear Energy Series report No. NW-T-2.5 published in 2009. A few other IAEA publications also deal with stakeholder interactions in decommissioning, but only as one component within a broader range of activities. An example is IAEA-TECDOC-1702 on planning, management and organizational aspects of the decommissioning of nuclear facilities published in 2013.

The IAEA continues to highlight that the active involvement of stakeholders in nuclear issues, including decommissioning activities, can provide a substantial improvement in safety and can enhance the general acceptability of the ultimate decisions made. Technological progress needs to be adequately communicated to the general and professional non-nuclear public who are displaying increasing interest in the economic and environmental issues of industrial activities in general, and nuclear ones in particular.

## **Managing social challenges in the nuclear decommissioning industry: A responsible approach towards better performance**

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### **Abstract**

At the end of their lifecycle, several large infrastructure will have to be dismantled, presenting unfamiliar challenges. Therefore, project management will need to focus extensively on the delivery of successful decommissioning projects to meet stakeholders' expectations and funding constraints. While there is an extensive literature that investigates the techno-economic aspects of decommissioning, social aspects remain remarkably under-investigated. Even if stakeholder communication, involvement and engagement are widely believed to be key enablers for the success of a project, often the needs and preferences of local communities are neglected and a participatory-based form of dialogue averted. Consequently, decommissioning projects fail to meet their intended objectives. Focusing on the nuclear decommissioning industry, this paper addresses the literature gap concerning social responsibility. A deductive method to formulate and validate theories regarding the social challenges for decommissioning is developed through a review and analysis of salient case studies.

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## **A multi-stakeholder and inter-territorial perspective on decommissioning issues: the White Paper of the French National Association of Local Information Commissions**

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### **Abstract**

In France, Local Information Commissions (CLI) are attached to every nuclear site. The CLIs are multi-stakeholder forums gathering local elected representatives, local civil society organisations, representatives of the workers of the power plant and qualified personalities. They have a general mission of follow-up, information and dialogue on nuclear safety, radiation protection and impact of nuclear activities on people and the environment with regard to the facilities of the site. The National Association of CLIs (ANCCLI) has a role of supporting the CLIs in their works and expressing the voice of the CLIs at a national level.

From June 2014, the ANCCLI has developed actions to raise awareness of the CLIs on decommissioning issues, which led a group of CLIs to structure in a dedicated working group and develop a White Paper titled "What conditions for an influent participation of the CLIs and the ANCCLI to the local and national follow-up of decommissioning operations?", published in January 2017. This White Paper aimed to express how the CLI conceive decommissioning issues from a territorial perspective, send messages to decision-makers as regards the role of the CLIs and the ANCCLI in the follow-up of decommissioning, and serve as a guide for CLIs that would wish to address decommissioning issues. The method for developing the White Paper involved the use of a structured dialogue method and of independent facilitation.

The communication presents, from the point of view of the facilitator, the process of engagement of CLIs and the ANCCLI on decommissioning issues from 2014 to 2017. It will also show how the specific territorial and multi-stakeholder perspective of the ANCCLI led to reframe complex decommissioning issues. Finally, it will present the proposals of the White Paper for the engagement of local stakeholders in the governance of decommissioning, at a territorial, inter-territorial and national level.

## Stakeholder engagement strategy for initiating decommissioning planning activities of BAEC research reactor

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### Abstract

BAEC TRIGA Research Reactor (BTRR) was established by General Atomics (GA) in 1986. It is located in the campus of Atomic Energy Research Establishment (AERE), Savar, which is about 40 km away from Dhaka. The AERE is the largest R&D facility of Bangladesh Atomic Energy Commission (BAEC). The reactor achieved its first criticality on 14 September 1986. The reactor has already passed its 30 years successful operation except few incidents. It is expected that present lifetime of the reactor can be extended up to 20 years through implementing proper ageing management program. Decommissioning planning activities should be started as soon as possible for this reactor. This paper will describe briefly about the strategy of involvement present stakeholders in the future decommissioning activities of BAEC 3 MW TRIGA MK-II research reactor. The main stakeholders for decommissioning activities of BAEC research reactor are Center for Research Reactor (CRR) and BAEC. The other important stakeholders are Ministry of Science & Technology, Ministry of Environment, Ministry of Health, Bangladesh Atomic Energy Regulatory Authority (BAERA) and IAEA. At this stage coordination of decommissioning planning is the main concern for BAEC research reactor. CRR will play important role for coordination and engagement of all stakeholders to launch this decommissioning plan. As IAEA TC department is playing very important role to disseminate knowledge on implementing projects for decommissioning, environmental and remediation of nuclear facilities through arranging meeting, workshops, seminars so CRR has the opportunity to acquire knowledge from all kinds of IAEA decommissioning activities. In this respect CRR can engage with IAEA through TC projects on decommissioning planning activities. Under this TC project various stakeholders' representatives will allow for training, scientific visits, expert missions, seminars and participating workshops. The knowledge gained from this TC project and other IAEA decommissioning activities will aware different stakeholders regarding their responsibilities on decommissioning activities of nuclear facilities which will ultimately accelerate decommissioning planning activities for BAEC 3 MW TRIGA MK-II research reactor of Bangladesh.

**Keywords:** Stakeholder, Engagement, Strategy, Decommissioning, IAEA

## Communication from public information to stakeholder engagement

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### Abstract

The acceptance process for many major projects has indicated that in public communication the breaks would not be affordable or permissible. Good results today are ephemera without professionalism and continuity in action. Ensuring effective transparency policy or process might be met when communication covers and proper addresses different and various stakeholders' needs, interests or attitudes. This is not an easy task.

Distinctive communication and stakeholder engagement plans are highly needed to be integrated in planning major nuclear projects. This statement has been supported by the research results of a graded systematic study on the national context risks, including risks induced by political and social factors, which was made by the authors for contributing to developing a sustainable geological disposal program in Romania. The case-study concluded that some boundary conditions of the national context should exist in support of a sustainable geological disposal planning. The conditions refer to the activities that should be planned as responses to several national context risks and the optimum solution for their integration in the planning of geological disposal program. The authors will reflect for RICOMET forum those aspects of the case study thought as applicable for a decommissioning project, too, depicting how an integrated response to the national context risks is only ensured by planning of specific processes in relation with planning of distinctive processes of communication with stakeholders and stakeholder engagement. Some proposals on how some challenges on communication with stakeholders might be approached and stakeholder engagement might be differentiated would be emphasized having the results of the case-study mentioned above.

## Geological Disposal: Community decision making in a consent-based siting process

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### Abstract

The failure of many attempts to site radioactive waste disposal facilities can be traced to a combination of real or perceived 'costs', a lack of trust that stakeholder issues and concerns will be addressed, and a lack of confidence in the developer's ability to deliver on promised performance in key areas such as radiological safety, environmental protection and community investment. Fairness is also an issue – often manifest in concerns about national benefits vs local costs. Over time, attempts to address such issues have resulted in a progressive shift from closed processes with centralised decisions and little community involvement, to open, inclusive processes with partnership working and de-centralised decisions.

Despite this trend, more open, inclusive processes do not necessarily guarantee success. Experience shows that once attention becomes focussed on one (or a few) preferred locations, or affirmative decisions have to be made to move to the next stage of a siting process, local opposition can be galvanised into action and the process can quickly lose momentum.

This paper will contrast the approach to community decision making in the UK siting process for a geological disposal facility which ran from 2008 to 2013 with an approach currently being developed for the launch of a new siting process later in 2017.

Underpinning both approaches are the principles of partnership working and community consent, but in terms of community decision making they may be quite different. The previous process was characterised by a number of discrete stages where participating communities had to make an affirmative decision to move from one stage to the next. Following a lessons learned review, a more continuous approach is being considered – once communities are constructively engaged in the siting process acceptance is assumed and they progress through successive phases unless they (or the developer) exercise a right of withdrawal.

## Stakeholder involvement for decommissioning process from Indonesian's regulation perspective

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### Abstract

Indonesia has already have three (3) research reactors ; Triga 2 MW (th) Research Reactor in Bandung, Kartini 100 KW (th) Research Reactor in Yogyakarta and RSG – GAS 30 MW (th) Research Reactor in Serpong. All those research reactors are managed by National Nuclear Energy Agency (BATAN). Most of them are over 30 years old in operation.

As stated on the Government Regulation Number 2 Year 2014 on Licensing of Nuclear Installation and Utilization of Nuclear Material, three (3) years before the license operation reach to the termination date, the operating organization of research reactor has to plan the reactor will continue to operate by request renewal license application or the reactor will be decommissioning. If the research reactor wants to be decommissioned, the operating organization have to prepare the decommissioning program.

An underlying principle of stakeholder involvement in the decommissioning process is that stakeholders have the chance to influence the decision-making process. This differentiates stakeholder involvement from communications processes that seek to issue a message or influence groups to agree with a decision that is already made.

This paper will elaborate from Indonesian's regulation perspective how stakeholder involvement have been accommodated in the legal framework of decommissioning process.

Keywords: Research Reactor, decommissioning process, stakeholder involvement

## Current situation and development at TEPCO's Fukushima Daiichi Nuclear Power Station

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### Abstract

This presentation is aimed at informing the public widely the actual conditions of Revitalization in Fukushima, Japan after the nuclear accident in 2011.

6 years after the Fukushima accident, the progress of Decommissioning at Fukushima Daiichi NPS or Revitalization in Fukushima has been underreported internationally. And misunderstanding or incorrect media coverage is concerned caused by the lack of information, as "Fukushima is still highly polluted", or "the local areas are left deserted as what they were in 2011".

TEPCO steadily continues revitalizing the community, decommissioning the plant, and aid those affected by the accident. Introducing the conditions in Fukushima to the world is one of the most important role of TEPCO and it is expected to add genuine value to the actions of accomplishing Fukushima Revitalization.

## **Integrating societal concerns and ethical considerations in emergency preparedness and response (part I.)**

Experience from nuclear events happening in the past, notably the Chernobyl and Fukushima accidents, showed that the intertwined character of social, ethical and technical aspects of radiation protection requires inclusion of stakeholders' values, needs and concerns in all aspects of decision-making. Governance of nuclear and radiological emergencies and post-accident recovery imposes specific challenges also due to the scientific and societal uncertainties associated to radiological risk. Citizens, emergency actors and other stakeholders have to make sense of and respond to various uncertainties, such as the health effects of low radiation doses, the overall effectiveness of protection actions and remediation strategies, and the future socio-economic development in affected areas.

This session invited papers focusing on the societal, ethical and communication aspects of decisions made in emergency and post emergency situations under large uncertainties. We welcomed case studies, practitioner reports, as well as academic research within this theme.

Contributions address, but are not limited to, the following topics:

- Societal uncertainties and ethical issues in emergency and post-accident situations
- Factors influencing individual and group decision-making in emergency situations
- The potential of citizen science in the governance of nuclear incidents/accidents
- Enhancing societal resilience capacities
- The impact of social and traditional media
- Improved communication methods and tools

## Building community resilience: Emergency preparedness and involvement of interested parties

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### Abstract

How quickly and easily the community will recover from the consequences of a nuclear or radiological emergency strongly depends on how well the community prepared itself to deal with such consequences and what the societal acceptance of the arrangements planned at the preparedness stage is. Facilitating social acceptance necessitates having a good understanding of the community needs for sustaining the physical, emotional, social and economic well-being of individuals in the aftermath of the emergency. In this context, relevant IAEA Safety Standards, published or under development, call for the involvement of, and consultation with, relevant interested parties to start as early as possible during the preparedness stage as well as to continue, as appropriate, during the emergency. However, the consultation process is expected to vary in form and extent throughout the various phases of an emergency, allowing for an effective response during the emergency response phase with limited or no consultation at all. Later on, in the transition phase, as the situation stabilizes and more information becomes available, the consultation with relevant interested parties will gradually increase to enable a progressive engagement of interested parties and their contributions to implementing an effective protection strategy. The efficient involvement of interested parties in line with this guidance will increase public trust, credibility and the social acceptance of efforts being made in addition to contributing to an effective emergency response and to the enhancement of community resilience to nuclear or radiological emergencies. This presentation will discuss these aspects and focus on arrangements countries need to make to allow for an effective and efficient consultation built on effective communication and coordination mechanisms that allow for feedback to be accommodated in a timely fashion in the overall decision-making processes.



## Humanitarian organisations – partners in reducing societal uncertainties in nuclear disaster management,

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### Abstract

The Red Cross Red Crescent Movement, with its global network of staff and volunteers, is often on the front line of disasters and as local community based organisation also stays when International relief organisation move on. However, if the disaster includes nuclear and radiological incidents, we still face significant challenges in having the right information at the right time to ensure safety of our staff, let alone to support the victims.

Since the nuclear disasters of Three miles island, Chernobyl and Fukushima the Red Cross movement recognises the specific challenges related to the humanitarian consequences from nuclear disasters and their long term effects on the population. The complexity of the issue of radiation protection linked with the aim to assure the National Red Cross / Red Crescent societies' duty of care for staff and volunteers but also the special requirements that need to be taken into account for operating in conditions with potential contamination has led in the RC movement to the development of new tools and guidelines, which are based on the experiences from the 23 year Chernobyl Humanitarian Assistance and Rehabilitation programme (CHARP) and from the recent activities in the emergency relief and recovery efforts in Fukushima.

We have made some significant steps ahead in the last years, reviewing operational guidance and also our approach to receiving and sharing information. A case study from the response to the Fukushima accident highlights the challenges and the humanitarian dilemma Red Cross emergency health responders have faced during their operation after the earthquake and tsunami in March 2011 when they suddenly learned about a nuclear accident. The days that followed had a significant impact on the way humanitarian response is performed when operating in the vicinity of nuclear installations.

In all discussions around the best way to structure the Red Cross Red Crescent response and recovery programmes Participatory Communication approaches like the Beneficiary communication and engagement methodology we use on a regular basis played a vital role in strengthening the resilience and empower the communities to help themselves.

Beneficiary communication and engagement is the pillar that underlies the success of all other recovery measures. Engaging communities in a meaningful dialogue and creating a space for their feedback is a priority in the prevention and response efforts. Establishing processes to engage with communities through established communication channels allows people to voice their understanding of the issue (like for example the risks related to food stuff, aso) and provide feedback, while building trust and encouraging community driven solutions. In addition, accurate and up-to date information and knowledge (from national and international experts) is shared, which can literally save lives.

## Justice and good governance in nuclear disasters

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### Abstract

Radiation risks associated with nuclear technology are different than other technological risks in that, first, there are larger uncertainties associated with radiation impacts (i.e. there is no safe level of radiation and health impacts of accumulated low-dose radiation might only manifest themselves after a long time) and, second, major nuclear disasters could have devastating impacts far beyond national and generational borders. This creates several problems of justice with regard to nuclear technology, which should play a role in different stages of disaster mitigation, preparation, response and recovery. This paper aims to conceptualize *disaster justice* for nuclear energy technology through the lenses of *ethics of risk* and *good governance*.

While the notion of good governance has mostly been discussed in relation to developing countries, various cases of *bad* or *poor governance* – such as the Fukushima-Daiichi disaster – showed its broader relevance. Current discussions on good governance often neglect its normative dimension. I aim to spell out these normative issues for nuclear technology by focusing on distributive and procedural justice. As regards distributive justice, questions will be addressed such as: (why) is it morally justified that radiation workers, people in the vicinity of reactors and others are exposed to different levels of radiation? What is the proper unit of *distribution*? How should we deal with the intergenerational distributions? As regards procedural justice, I will focus on the role of scientific uncertainties and controversies in decision-making. Could *citizen science* contribute to more reliable and *transparent* information and more *accountable* local/national governments and corporations?

### Acknowledgement

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## Lay people responses and information needs in radiological emergencies: insights from a literature review

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### Abstract

**Background:** Understanding lay people and emergency actors' sense making of uncertainties in nuclear emergency situations and their subsequent behaviour is critical to improving preparedness plans and communications strategies. This communication presents the main findings from a literature review on people's behaviour in radiological and non-radiological emergency situations. The study was undertaken in the framework of the European project CONFIDENCE. We specifically reviewed social science studies aimed at investigating actual and potential public behaviours following technological (nuclear and non-nuclear) accidents and natural disasters and aimed at answering one or more of the following research questions:

- How do people expect to react to an emergency?
- How do people actually react to an emergency?
- Are lay people willing to follow the protective actions recommendations?
- What is their perception of protective actions?
- Which factors influence expected or real behaviour?

**Methods:** A literature review has been carried out using Google Scholar and Web of science databases, searching for peer-reviewed articles. Different keywords have been considered, such as "behaviour, reactions", "communication", and "emergencies", "protective actions". Articles on nuclear emergencies, as well as other technological hazards (industrial accidents involving hazardous releases) and natural disasters (floods, hurricanes, earthquakes, forest fires, volcanic eruptions, etc.) following EEA (2010) have been included.

The literature review aims at elucidating the main findings of previous studies, as well as methodological issues such as the main variables studied, the methods used and the theoretical framework, such as to draw insights for the nuclear and radiological emergency domain.

**Results:** While perception of risks from nuclear accidents and radiological contaminations of the environment have been extensively investigated in the literature, very few empirical studies focused on lay public behaviour in nuclear emergency situations. However, a substantial body of research exists regarding lay public preparedness for natural hazards such as flood, earthquakes or hurricanes.

Some dependent variables used in the reviewed studies are: reactions and protective behaviour in past emergency situations, anticipated likelihood of taking protective action, anticipated response or behavioural expectations. Some of the predictive factors investigated were demographic variables, previous experience, risk perception, affect (concern, worry), perception of protective actions, trust, knowledge, self-efficacy beliefs, attitudes to technology and energy, and environmental cues. The most common research methodologies employed are survey questionnaires and interviews. Two main populations have been studied: general public and affected populations. Among the theoretical models used by previous studies are the Protective Action Decision Model by Lindell & Perry (2012), the Theory of Planned Behaviour (Ajzen, 2011), and the Health Belief Model (Maiman & Becker, 1974)

**Conclusions:** The findings have implications for the design of preparedness plans and communication strategies in the context of radiological emergencies. The review will set the theoretical basis for a

forthcoming study on behavioural expectations and information needs in nuclear emergency situations, using data from large scale opinion surveys. Specifically, it will help designing a questionnaire to be applied in Belgium, Norway and Spain in the context of the CONFIDENCE project. At the same time, the needs for future research will be highlighted.

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## Ethical challenges in health surveillance: a case study of thyroid screening after Fukushima

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### Abstract

Medical and cancer screening creates a number of ethical challenges. Although many screening programmes can benefit populations by preventing disease or reducing casualties due to early prognosis and treatment, it is important that the programme will cause more good than harm. In some cases, surveillance and screening may increase anxiety, in others it may be a form of reassurance. Problems with over diagnosis, false positives and unnecessary surgery are well recognized.

Thyroid cancer screening introduced after Fukushima faces many of these challenges and there have been questions about the ethical justification of the programme. While many parents are concerned about the potential impacts of radiation, the majority of children being screened have low radiation doses. There have been problems with communicating the results of the screening, to participants and parents as well as the media. The paper evaluates the case against the recent ICRP report on ethical foundations of radiation protection, addressing issues relevant for beneficence/non-maleficence, dignity, justice and prudence. We conclude that more attention should be paid to the societal and psychological consequences of screening, if such programmes are to avoid causing more harm than good. A solid communication plan is paramount, and the participation of affected populations in designing screening programmes should be encouraged.

Acknowledgement: this paper is part of the EU SHAMISEN project, and the author thanks all project members for constructive discussions.

## Optimizing nuclear emergency planning

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### Abstract

#### Background

STORA is looking after the interests of the local community of Dessel with regards to the planned disposal project for the Belgian low level radioactive waste. One of the conditions set by STORA for acceptance of the disposal project in Dessel was that the existing nuclear emergency planning should be optimized.

#### Methods

Neither the local community nor NIRAS (Belgian agency for the management of radioactive waste) has any formal role to play in the emergency planning, so the first challenge was to find a common ground between all parties involved and to create a common understanding of each party's own viewpoints, problems and considerations.

This was done by :

- 1) Problem analysis through desk research and interviews with experts and authorities (2014). Carried out by University of Antwerp, Faculty of Social Sciences.
- 2) Organisation of two workshops (29/1/2015 and 19/4/2016) with the aim of bringing together all involved parties and finding common ground. The local community was able to clarify its concerns, the experts and authorities were able to explain their own viewpoints and considerations.

#### Results

Based on the previous steps, a summary of local concerns, questions and recommendations was compiled and sent (in 2016) to the authorities at municipal, provincial and federal level. Currently, consultations with the authorities are ongoing to try and find a remediation for the local concerns.

#### Conclusions

With the support of NIRAS and the University of Antwerp, it was possible for the local community of Dessel (and Mol), even in the absence of a formal role or responsibility, to participate in a meaningful and constructive manner, to integrate societal concerns in emergency preparedness and response.

## **Oral poster presentations**

## Individual and historico-societal factors influencing decision-making processes related to RP behavior in post-accidental period

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### Abstract

**Background:** Decision-making processes are based both on individual (local/specific) and cultural or historic-societal (global/general) factors. However, these are interrelated, especially in collectivistic cultures, since individuals grow up in, and belong to, a specific culture and society at a specific historical moment.

**Methods:** Analysis of testimonies of affected individuals after the Chernobyl and Fukushima accidents.

**Results:** Knowledge of radiation protection (RP) is crucial for prudent preventive behaviour of populations affected by exposure after an accident, and there was much advance in its practical application from early Chernobyl to Fukushima. However, previous experiences have shown that different people react in different ways even after receiving the same information or instructions. During the emergency evacuation, a part of lack of information on accident, radiation levels and RP; fear, emotional feelings towards loved ones and domestic animals interfere with individuals' prudent decision making processes, resulting in higher radiation exposure levels. In Fukushima, the absence of effective emergency plans on evacuation had an additional negative impact. In Chernobyl, economic difficulties pushed rural populations to grow own products and collect wild products in the contaminated territories. Adaptation difficulties to new places made individuals unhappy. Particularly elderly evacuees, with their strong feeling of "attachment", wished to return to their homes. Disruption of social networks, loss of work and social stigma of evacuees add additional burden to health and well-being of evacuees. However, psychological counselling in health surveillances and engaging populations in their own RP has been shown to alleviate psychological problems.

**Conclusions:** Post-accidental individual decision-making is based not only on RP and cultural behaviour, but is affected by crucial factors on which peoples' lives, safety and emotional well-being depend. These factors need to be considered for effective RP strategies together with development of emotional intelligence in professionals and affected populations to make better resilience processes.



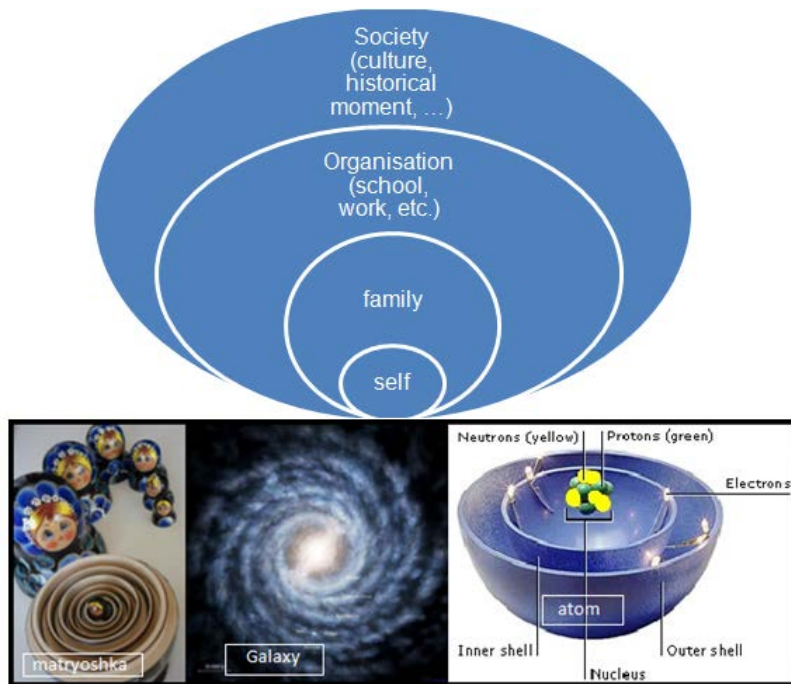


Figure 1. Multilevel structure of a personality, a Galaxy and an atom: the complex structure of “self” construction (adapted from Liutsko, 2013).

### Acknowledgments

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Key words: nuclear accidents; decision making; radiation protection behavior; individual and historic-societal factors; emotional intelligence; individual differences

## The radiation measurements and the involvement of the population. LESSONS from the Chernobyl and Fukushima accidents: results of the SHAMISEN project

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### Abstract

**Background:** Scope of the work was to draw lessons from Chernobyl and Fukushima experiences on radiation measurements and dosimetry, with a focus on the methods used to evaluate individual/group doses which are especially relevant for medical surveillance, health effects studies, and remarkably communication to stakeholders and local population.

**Methods:** Critical review of peer-reviewed documents, grey literature, recommendations, expert-based information, and face-to-face meetings among partners, about individual/group dose assessment/reconstruction in Chernobyl and Fukushima accidents. Information focuses on how and when they were performed, which category of people, use for medical actions and evacuation and how they were communicated to the population.

**Results:** The main lessons learned were:

*For workers and for the public:* crucial was the detection of internal contamination: during the early phase, , monitors for thyroid measurements were insufficient or insufficiently planned, and whole body counting on site was complicated due to logistics and high radiation background.

*For workers,* personal dosimeters went lost, out of work or were inadequate to match the scope of exposure pathways, accompanied by a generally scarce coordination and harmonization of dosimetry systems for workers of different facilities/companies.

*For the public* (evacuees and those living in contaminated territories), there was a general confusion in record keeping, especially critical for those exposure data that, if lost or collected late, significantly increase uncertainty in dose assessment. More recent Fukushima experience revealed that self-made measurement of radiation (by mobile apps or by conventional dosimeters) create opportunities for providing information to individuals and empowering them to take an active role in their own radiation protection decisions. This also facilitates comprehension of individual exposure and official limits.

Conclusions: Built on the evidenced shortcomings in radiation measurements and dosimetry, improvements in the procedures, to provide a better support to populations affected by previous and future radiation accidents, are recommended.

Acknowledgments: This project is supported by Grant Number 604984, OPERRA (Open Project for Radiation Research Area) of the European Union Seventh Framework Programme for Research and Technological Development (EURATOM) and has also been supported by the NFR Research Council (project nr. 257214).

Key words: nuclear accidents; recommendations; medical and health surveillance; dosimetry; evacuation; epidemiology; training and communication

## Effectiveness of narrative and numerical evidence for communicating uncertainties related to radiological risks: Experiment proposal

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### Abstract

Uncertainties in pre- and post-nuclear emergency and can be affectively addressed by sound communication. Communicated messages need to be understood, remembered, trusted, and followed. An exemplary pre-crisis uncertainty is the intake of iodine tablets, whereas the consumption of products from Fukushima present a post-crisis uncertainty communicators struggle to convey to the public.

A core element needed for effective communication is evidence used to support a claim. Often, either numerical or narrative evidence is used, the former describing a fact presented in the form of, for instance, a percentage, the latter a personal testimony. The effectiveness of evidence types has largely been investigated within health communication; however, their effectiveness may be particularly relevant for radiological risk communication, which involves a distant rather than imminent threat and which addresses the general public rather than a selected, involved audience. The overarching question this research aims to answer is whether narrative or numerical evidence is more effective for communicating uncertainties related to protective actions applied before or after a nuclear emergency.

To this end, we will conduct an experiment embedded within a representative survey in Belgium (start: August 2017), in which we manipulate the evidence type in a short newspaper article on one of the two aforementioned uncertainties. Dutch-speaking participants receive an article on Fukushima food products, whereas French-speaking participants read an article on iodine tablets. In both language groups, participants are randomly assigned to a narrative, numerical or combined (numerical+narrative) condition and subsequently asked about their risk perception, message ratings, and message acceptance.

We expect that numerical messages (1) lower the perceived risk more effectively than narrative messages, (2) are rated more positively than narrative messages, (3) lead to higher message acceptance, and that (4) a combination of both evidence types is most effective. The results of the experiment could help in developing an effective communication strategy for such uncertainties.

Poster will present the research plan in details and authors will collect valuable feedback from the conference participants in order to improve the experiment partly supported by the H2020 project CONFIDENCE.

## The challenge of safety transportation of disused radioactive sources and improvement of emergency response

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### Abstract

Radiation disused sources originating from medicine, science, different fields of industry in the relevant Ukrainian regions are collected and placed in the facilities of the SSE "RADON" for safe and secure storage. Centralized disused SRS facility (CDSRSF) is being built with the financial support of the United Kingdom and European Commission. CDSRSF is a key element to create a system for safety management of spent radiation sources in Ukraine. The design of the facility foresees capacities for acceptance, processing, sorting, identification, conditioning and packaging of spent sources and placing for long-term storage according to the type of activity ( $\alpha$ -,  $\beta$ -,  $\gamma$ -, n-emitting). General amount of spent radiation sources planned to be accepted is 500,000 pieces. With assistance of the U.S. Department of Energy were developed of the disused SRS management system in Ukraine; 4 specialized vehicles has been produced; automated system of radioactive materials transportation management and staff trainings for emergencies by transportation radioactive materials.

Transport of disused radioactive sources is a very important problem considering the potential risks and radiological consequences associated with carrying out this activity. Transport of large radioactive sources often involves movement through the public domain with minimal physical protection. SSE "RADON" is working out of the logistical plan of transportation disused SRS from SSE "RADON" to CDSRSF and support of safe transportations.

Ukraine has established an emergency preparedness and response system in the event of nuclear/radiation accidents. This system is completely applicable to the transportation of ionizing radiation sources. An accident during the transportation to centralized storage of disused SRS, is which might result in, a radiation dose to people and environment which exceeds the allowable limits determined by regulations and standards of safety. Ukrainian requirements for physical protection during transport are limitations of public sphere information. However, detailed data on the response of shipments accidents are largely classified, as are detailed design specifications, and information on the way transports are carried out (e.g. information on security arrangements). A full analysis of the risks and consequences of shipment accidents could not be carried out without this information. Estimation of the potential radiological risks associated with transport of radioactive materials requires input data describing population densities adjacent to all portions of the route to be traveled. The risks assessment requires close interaction with scientists working to predict and explain emerging threats, assess risks and devise ways to manage and mitigate them.

## **Integrating societal concerns and ethical considerations in emergency preparedness and response (part II.) – Communication aspects**

Latest years a broad shift have seen throughout Europe (and beyond) from 'a right to know' to 'individual responsibility' of citizens to be prepared for emergencies. As a result, communicative activities that place responsibility for preparedness actions in the hand of citizens are gaining relevance. Moreover, new trends like citizens journalism, citizens science, open source information, social media, new regulations on public rights for information and stakeholder engagement have changed risk perception factors such as controllability, familiarity, trust ... as well as communication practices related to nuclear emergency preparedness, response and recovery.

Mass media has changed the way radiation risks are communicated before, during and after an emergency. On the one hand, mass media communication offers great opportunities for emergency management since it is by definition capable of reaching a large number of people simultaneously. On the other hand, mass media communication is a challenge for the emergency management since it has become a multiple-way process where information is disseminated at an, often, uncoordinated, incredibly rapid pace, and is able to easily reach all kinds of audiences: affected, indirectly affected and not affected by radiological risks.

This session invited papers and case studies focusing on the communication aspects as:

- **Risk message** which should increase attentiveness, be understandable, comprehensive and memorable;
- **Risk dialogue** which includes local knowledge to improve risk management, increases knowledge, builds trust and improves mitigation actions;
- **Risk governance** which aims at changing behavior and values, it relies on 'logic of individual choice and self-discipline, rather than explaining new norms of conduct;
- **Instrumentalist risk approach** which aims at actively changing people's behavior and pays close attention to the interactions between information, attitudes, behavior and factors that influence people's motivation to take responsibility and action in order to increase their preparedness.

## Protecting the public and mitigating fear through effective Communication in emergency preparedness and response

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### Abstract

Communicating effectively with the public and the media is key to saving lives and protect public health through the implementation of protective actions and mitigating the consequences of fear and other psychological effects linked to nuclear and radiological emergencies. The provision of clear, understandable and reassuring messages to the public is a crucial aspect for the successful implementation of protective actions. Public communication planning for nuclear and radiological emergencies should start with continuous and targeted stakeholder involvement activities, which on a routine basis contribute to building and maintaining trust in organizations that serve as the sources of official information in an emergency (i.e. operator, regulator, government, emergency response organizations). At the preparedness stage, a public communication programme needs to be set up with objectives, plans, infrastructure, resources and budget activities, all of which should be tested and exercised as part of the overall emergency preparedness arrangements. In an emergency, the public, media and interested parties will demand immediate and comprehensive information, which is most likely not available at the onset. Therefore, arrangements should be made to communicate at the earliest possible stage of a response, including on social media. This proactivity supports efforts to build and maintain public trust, which is essential in ensuring that people follow the implementation of protective actions. To complete the "cycle" of effective public communication in emergency preparedness and response, efforts need to continue in the transition phase to an existing exposure situation and throughout long-term remediation activities, back to the routine stakeholder involvement programme that existed before and continues to include emergency preparedness. This presentation will look at addressing public needs and concerns through all inter-connected stages, with emphasis on the preparedness and response stages, and at how effective communication strengthens an overall response by protecting health, and mitigating fear and the taking of unwarranted protective actions.

## Working with journalists for better reporting on radiation incidents

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### Abstract

In the event of a radiation incident such as the use of a dirty bomb or nuclear reactor incident, accurate and swift reporting is vital to public safety. Journalists play a key role in communicating information to the public in the aftermath of an emergency. The public is told to “stay tuned” for announcements and instructions that will be delivered via news media sources. In the case of a radiation incident, health physicists need to partner with journalists to get their message out in a timely and accurate manner.

A guide for journalists was developed with their input to both help protect journalists to be safe while covering a radiation incident, and to provide them with the basic safety information that can be conveyed to the public to limit the risk of radiation exposure. This presentation will review the contents of the “Safety Guidelines for Journalists: Radiation Incidents” and recommendations for how health physicists can assist journalists in getting their message out in an accurate manner.



## News that matters for the casualties of nuclear accidents

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### Abstract

Existing research on the support and solidarity feelings for casualties of major nuclear accidents has stressed factors such as the perceived seriousness of the suffering, the assessment of similar vulnerability, and whether the predicament can somehow be seen as self-inflicted (Nussbaum, 2013). Moreover, important background variables for all three of these factors are geographical and psychological distance from the place where the disaster took place and empathy (Latré, Perko & Thijssen, 2017). However, because people often have to rely on media information to evaluate each of the fore-mentioned factors for remote disasters, 'media framing' is a neglected factor. In our study, based on a survey analysis of the SCK-CEN Risk Barometer and a media content analysis, we argue that the way the media frame the news, whether they employ mainly episodic or thematic frames, is crucial (Iyengar & Kinder, 1987). Notably, we will demonstrate that the reason why the Flemish showed more solidarity than the Walloon with the casualties of the Fukushima nuclear accident is probably closely related to the differential media framing in the news reports immediately after the accident took place. This finding is relevant because it shows that more attention should be given to the framing of post crisis communication.

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## **“Just one click away” – Satisfying societal demand for open source facts**

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### **Abstract**

At IRPA13 in Glasgow, the speaker was moved by the demonstrable inability of established institutions to meet a societal demand for knowledge of ionising radiation following the Fukushima incident. A subsequent search of the internet revealed huge gaps in reliable open-source facts. Modern societies require useful and relevant facts to be just one click away.

The speaker will describe his own odyssey into the world of open source writing using Wikipedia and Wikimedia Commons to help produce widely-read but credible articles on ionising radiation protection in the intervening years.

Case-studies of building and improving widely-read articles on fundamental aspects of radiation in Wikipedia will be described, and the power of this open source will be demonstrated. This will include a guide to how these work, and ideas on how it can be best harnessed.

## **Crisis preparedness among inhabitants in the nuclear zone of Mol/Dessel (Belgium): results of a survey on the knowledge of citizens regarding reflex measures**

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### **Abstract**

As part of the preparations for a local information campaign in the nuclear zone of Mol/Dessel to raise the knowledge on reflex measures in the first phase of an major (nuclear) incident, we sounded the knowledge of a representative sample of inhabitants from different age groups, for both the municipalities of Mol and Dessel.

Risk communication literature speaks about a relationship between preparedness for a crisis (knowledge on reflex measures) and high risk perception, feeling of responsibility to prepare for a crisis and information seeking behavior. To test whether this relationship also applies to inhabitants of Mol and Dessel we inquired about their risk perception, information seeking behavior and responsibility.

Data was collected through telephone interviews with residents of the respective municipalities older than sixteen years. We based our questions partly on the existing SCK•CEN Risk Perception Barometer [1] and on a survey that was conducted by the Ministry of Internal Affairs after the federal iodine information campaign in 2011. In our study we build on the conclusions from this research and use our additional insights to make recommendations for developing a targeted local information campaign.

Our results show that spontaneous knowledge on reflex measures is relatively low, considering that all respondents live in a nuclear zone. There were no differences between age groups. Contradictory to previous research, we found that low risk perception goes hand in hand with high knowledge of the reflexes. Respondents who knew little on reflexes had a higher risk perception. This study confirms that investing in raising knowledge on reflex measures alone is not sufficient. There should be a bigger focus on explaining them and on discussing their effectiveness with citizens.

[1] [http://science.sckcen.be/en/Institutes/EHS/SPS/STS/Risk\\_perception/Barometer](http://science.sckcen.be/en/Institutes/EHS/SPS/STS/Risk_perception/Barometer)

## New challenges in crisis communication – the results of sociological survey in the Czech Republic

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### Abstract

The presentation will give an overview and interesting results of sociological survey performed by the Faculty of Social Sciences of Charles University in Prague, Czech Republic. This survey was initiated by State Office for Nuclear Safety (SUJB) and Radiation Protection Institute as a reaction to the increased public fear in relation to the elevated level of radioactive iodine in air in the beginning of 2017 year. The level of radioactivity was negligible from the point of view of radiation protection but the regular media and public reacted not adequately to this situation and SUJB received a lot of questions by phone, emails, letters and despite of statements published on the official web site, TV, newspapers, etc..., the concerns of people was almost not possible to rebut and it was, in opposite, growing. This situation was not normal based on our previous experience with the communication with media and public so we were searching what is the reason. Finally based on the reference of some people to the information published on special web sites we have identified that so called propaganda web sites presented completely incorrect and fake information concerning this slightly elevated level of I131 in air and advised people to buy and eat stable iodine tablets, not to stay outside, not to consume vegetable, to buy personal dosimeters, dosimetric devices, etc... Obviously the main goal was to manipulate a public opinion and behaviour. SUJB in co-operation with Ministry of Interior – special team established for fighting with disinformation campaigns - published very strong statements and denied these information. Finally within few days we have observed decrease of interest in this topic. We have identified this unofficial sources of information as a new challenge in communication with public in case of emergency or unusual radiation situations. The idea to organize a public survey has been realized with the aim to have an overview how many people was influenced by this disinformation, what they did, how they shared them and if they were looking for official information and how far they believed them. The presentation will give a results of this interesting survey.

## **Oral poster presentations**

## Social aspects of the implementation of the Polish Nuclear Power Programme

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### Abstract

The aim of the studies was an assessment of social impacts of nuclear programme in Poland with special consideration of public participation process. Poland is one of the few European countries without nuclear power, however in 2009 the government has started to develop nuclear power programme. For the country, which has just entered nuclear power development the assessing the social effects of nuclear programme is of great importance. There is a need for a detailed analysis of these aspects in order to improve the implementation process towards the openness and getting social acceptance.

In order to gain the understanding of different groups' subjectivity two methods were used: Focus Group Interviews which concerns in gathering general information about the studied issue as well as the Q-methodology which is a quantitative-qualitative approach measuring the subjectivity (opinions, beliefs, attitudes of the respondents)[1].

The first step of the study was a creation of research questions related to the following topics: perception of nuclear energy (understanding the term and the Polish Nuclear Power Programme itself), deliberation (implementation, information and consultation processes) and communication (e.g. some associations) and analysis of dialogue with the public; social risk assessment and awareness of environmental and energy. Afterwards, a tool to research perception of people who are opponents and supporters of nuclear energy using Q-sort statement and implemented pilot interviews with groups of common people divided by the variables (sex, age and opinion) was developed and tested.

[1] Kamal S., Kocór M., Grodzińska-Jurczak M. 2014. Quantifying Human Subjectivity Using Q method: When Quality Meets Quantity. *Qualitative Sociology Review* 3, 61-79

### Acknowledgement

The studies were supported by financial resources for science in the years 2016-2017 granted for the implementation of the international co-financed project No 3672/IAEA/2017/0 and IAEA Research Contract 18541.

## Ecological, social and medical research (ESMER) on the long-term effects of Chernobyl nuclear power station accident. A comparative epidemiological study.

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### Abstract

A comparative epidemiological study was carried out in the Bryansk region in 1993 to investigate the long-term social and medical consequences of the Chernobyl accident. The basic material consisted of people aged 3-54 years in two villages in Bryansk region, Mirnyi (contaminated, 1300 kBq/m<sup>3</sup> of <sup>137</sup>Cs, study) and Krasnyi Rog (non-contaminated area, < 37 kBq/m<sup>3</sup> of <sup>137</sup>Cs, control).

The mental wellbeing was assessed using a 12-item General Health Questionnaire, GHQ (Viinamäki et al. 1995). Mental wellbeing of women in the study group was poorer than in controls. A minor mental disorder was observed among 48% vs. 34% (women), and 26% vs. 28% (men). Those living with partner coped better. The level of education was not associated with the GHQ score. 59% of study group vs. 14% of controls wanted to move away from the area of residence, but it was not associated with the GHQ score. Independent factors explaining the GHQ score were uncertainty about the future in the men and, in addition, poor financial situation and insufficient social support in the women.

A structured questionnaire focusing on the possible effects of the Chernobyl accident on the perceived health status, attitudes and socioeconomic situation was filled by study subjects (Myllykangas et al. 1993). According to the pilot study, people were trustful for the future, their attitudes toward the nuclear power had changed towards more negative, they saw actions and the information of the authorities after Chernobyl accident as inappropriate and untrustworthy, and they trusted on science and technology in solving the present problems. There were no remarkable differences between the attitudes of the people in the contaminated and uncontaminated areas.

## Gauging the perception of radiation risk: a public facing survey set up within the CONCERT European Joint Programme

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### Abstract

**Background:** Work package 5 of the EJP-CONCERT deals with the stakeholder engagement and communication strategies in radiation protection; task 5.3 of the work package, in particular, concerns the development of survey activities for a more efficient interaction with civil society and the use of social media for public communication. This task falls into the scope of the CONCERT consortium of answering the needs in radiation protection for the public, occupationally exposed people, patients in medicine.

**Methods:** Within this context, a public facing e-survey has been developed and the launch date is expected in the first days of June 2017. The survey aims to gauge the perception of radiation risk amongst a wide range of people who are not radiation specialists and their opinion on information that would be helpful to a general audience to understand radiation risk. The first general part of the survey includes a section about the responders' personal information, their attitude towards science and technology, their satisfaction towards the actors in the radiation protection domain and the actions undertaken by RP authorities, their opinion towards the communication channels about radiological and nuclear risk. In the second part of the survey, specific sections are addressed to particular categories of people like professionally exposed persons, patients submitted to medical exposure or people that have a cultural interest for radiation protection issues (such as journalists or students). To reach a larger segment of the population, trying to minimize the impact of linguistic barriers, the text of the survey is being translated in several European languages.

**Results and conclusions:** The structure of the survey will be presented in details, together with information about the spreading strategies and some previews about the response rate.

### Acknowledgments

This work is supported by the EJP-CONCERT (European Joint Programme for the Integration of Radiation Protection Research) of the EURATOM research and training programme 2014-2018, under the grant number No. 662287.



## Empathy as a procedural value for radiation protection

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### Abstract

The recently established ICRP task group on “Ethics of Radiological Protection” (TG94) in its final report, identifies four core values which have driven the development of radiological protection over the last decades: beneficence and non-maleficence, prudence, justice, and dignity. In addition, it has suggested that three procedural values are important for the practical implementation of the ICRP recommendations: accountability, transparency, and inclusiveness. I will argue here that a fourth procedural values should be added: empathy.

Empathy can be defined as “the ability or the commitment to understand another person's emotions, perspective or circumstance whether you agree with this person or not.” As such, it has received attention in different contexts, such as design processes from urban planning to product development. It is the key concept underlying “human centred design”, also sometimes called “empathy driven design”. Admittedly, some see it as no more than a means of making such processes more effective, but others consider it as an independent value which should be pursued for its own sake.

As the above-mentioned ICRP task group emphasised the cross-cultural validity of the core values underpinning the system of radiological protection as well as the related procedural values, one may well ask if empathy can also be identified as a part of “common morality.” The term “empathy”, of course, goes back to the 19<sup>th</sup> century, and cannot therefore be expected to appear as such in the much older written and oral traditions which are referred to for guidance by people in different cultures. However, related concepts can clearly be found across the globe, be it compassion, loving kindness, a caring attitude, or „putting oneself in the shoes of others.”

Clearly, then, empathy is called for when radiation risks have to be managed. This applies to different exposure situations, not least to those which are of a long-term nature. Regulation and communication have to reflect accountability and transparency, and stakeholders should be included in decision making. But that is not enough. People’s concerns, their needs and wishes have to be taken seriously, even if they are considered unfounded or exaggerated. Otherwise, our understanding of beneficence would be oddly limited.

## **Social and ethical aspects in, and of, long-term exposure situations**

This session invited presentations that address the social and ethical aspects of long-term radiological risk situations.

We start from the assertion that long-term radiological exposure situations (e.g. post-accident, NORM or TeNORM sites) constitute a complex, often unstructured problem that cannot be remedied by scientific expertise alone. Nor, indeed, does scientific expertise necessarily agree on long-term effects or implications of radiological contexts. Many situations necessitate an expansive process of decision-making with multiple stakeholders (decision makers, scientists and technologists, civil society, publics) and for extended periods of time. Beyond this need for co-decision-making, long-term radiological situations raise a multitude of other questions e.g. how can technical debates on exposure limits and associated risks be informed by Social Science and Humanities perspectives? Building on this, we urge presenters to explore with us the how's, why's, and wherefores of practices, action and decision-making in long-term exposure situations.

Papers address the following, and more:

- Who should be involved in decision-making?
- What forms could co-decision-making take and what is required to bring these about?
- What are the advantages and disadvantages of different approaches (e.g. dialogues) and what is at stake (e.g. knowledge, uncertainties, solutions)?
- What can be reasonably expected outcomes from dialogues and other approaches? What are appropriate levels of scale and complexity in the assessment of radiological situations?
- How are 'acceptable levels' of uncertainty produced and why?
- Can evidence be enhanced through comparing and/or combining technical and social knowledge (e.g. combining environmental and human monitoring data and simulation results)?

## Stakeholder's involvement in management of contaminated goods in emergency and post-accidental preparedness and response

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### Abstract

#### 1. Background

Recommendations and requirements for the management of foodstuffs, feedstuffs and other commodities contaminated after a nuclear accident or a radiological event have been developed by international bodies (e.g. FAO/WHO, IAEA, Euratom) as well as by individual countries.

However, the experience from severe nuclear accidents (Chernobyl, Fukushima) and radiological events shows that the implementation of such systems (based on criteria expressed in activity concentration) does not prevent difficulties like stigmatisation, rejection from consumers or retailers.

#### 2. Methods

During the PREPARE\* project, a dialogue has been engaged with stakeholders who expressed their opinions on possible contaminated goods strategies within 10 different national panels. This dialogue will be continued through CONFIDENCE\* and TERRITORIES\* projects and within the NERIS "Contaminated Goods" WG.

Discussions address foodstuff management and decision criteria that are intended in national plans, regulations and international recommendations. The feedback experiences and lessons learned from the management of contaminated goods after the Fukushima accident is also continuously provided by Japanese stakeholders.

#### 3. Results

This paper highlights the key topics tackled by the different stakeholders (national panels and Japanese interviews) related to the inherent complexity of the faced situation, preparedness modalities, management of consumer goods production on the basis of the justification and optimization principles, use of numerical criteria (e.g. management of agricultural sectors), dissemination of information to different publics, stakeholder participation process, role of the market and trade organization, ethical considerations and development of solidarity.

#### 4. Conclusion

All stakeholders who were involved expressed that preparedness for managing contaminated goods is crucial to be ready to react promptly if an accident would occur. Long-term perspective has to be considered while implementing countermeasure actions. Feedback and lessons learned provided by Japanese actors engaged in the recovery of the Fukushima accident is of utmost importance in order to improve our national emergency and post-accidental response.

\* These projects were or are supported by the European Commission.

## The SHAMISEN project: from LESSONS learned from the past nuclear accidents to improvement of preparedness of post-accident response on medical and health issue (recommendations)

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### Abstract

**Background:** The SHAMISEN (Nuclear Emergency Situations: Improvement of Medical And Health Surveillance) project aimed to review lessons learned from past nuclear accidents to develop evidence-based recommendations for dosimetry, evacuation, health surveillance and epidemiology that respond to the needs of populations affected by nuclear accidents.

**Methods:** An analysis of past experiences was conducted by review of the scientific literature, existing guidelines, case-studies, reports and through communication with experts and stakeholders in Europe, Belarus, Russia, Ukraine, the US and Japan.

**Results:** The lessons learned suggest ways to improve the preparedness and follow-up of affected populations, regarding dose assessment, evacuation, medical, health and epidemiological surveillance, in a way that addresses their concerns and well-being. SHAMISEN's final output is a set of recommendations, divided into three main phases: Preparedness, Early/Intermediate and Long-term/Recovery within six categories: General recommendations; Evacuation; Dosimetry, Health surveillance, Epidemiology, and Training and Communication. These recommendations contain both broad and specific points that can be taken as guidelines and adapted, as necessary, at a local level, depending on each country's socio-economic and technical capacities.

The recommendations emphasize the importance of ethical issues and promote a health surveillance strategy that targets the overall well-being of populations, addressing not only radiation effects, but also aiming to identify and alleviate psychosocial impacts and considering the economic efficiency and sustainability of health surveillance. The development of communication strategies and the strengthening of stakeholder and public engagement in health surveillance are among key issues highlighted by the recommendations.

**Conclusions:** The SHAMISEN recommendations should contribute to the improvement of dosimetric, health and epidemiologic surveillance after a nuclear accident, including both its direct and indirect impacts. These are the first step towards an integrative approach to health and well-being of affected

populations whereby technical, medical and radiation protection measures are considered together with psychological, ethical and economic impacts.

### Acknowledgments

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**Key words:** nuclear accidents; recommendations; medical and health surveillance; dosimetry; evacuation; epidemiology; economic evaluation; training and communication



**Figure 1.** Tasks and scope of the SHAMISEN project

## The closely-watched case of litate Village: the need for global communication of local problems

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### Abstract

Following the Fukushima Daiichi Nuclear Powerplant Accident in 2011, the case of litate Village in Fukushima Prefecture has been closely watched. The village was evacuated late, residents face some of the highest potential radiation exposures, and it has been the focus of some of the most organized opposition to the Japanese Government's plans for decontamination and resettlement. The ethical issues often discussed at RICOMET are very acute in litate. In particular, what is the right course of action when it can be demonstrated that most residents will receive low additional radiation exposures, but unless care is taken, in the worst cases some might exceed recommended limits? How should informed consent and stakeholder engagement work in such a case, particularly when trust in government remains seriously damaged? For all of these reasons, litate has been an extreme case both socially and radiologically, and issues of appropriate monitoring and communication are more acute here than in most other affected communities. Local government is at present utilizing both official and third-party monitoring data for information, and seems to focus almost entirely on communicating with its own citizens, an appropriate priority. But litate is the subject of international attention, most of it critical. A prominent international environmental group has published at least two very critical reports about litate, arguing that the exposures residents will face are a violation of human-rights principles. International social scientists have also studied the community and its attitudes and actions. This paper will present a case study of the litate situation, touching on these themes. It will look more closely at monitoring and communication efforts, changing priorities, and citizen attitudes, as well as how citizens are involved in decisions. Finally, it will examine and how the official perception of good communication might differ from that of critical citizens as well as the international audience.

## Building trust in the scientific basis for long-term nuclear waste management through quantitative story telling

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### Abstract

Despite recent efforts in the decision-making approaches to waste disposition, continuing social concerns over nuclear energy technologies still limit the application of long-term solutions to nuclear waste management (NWM) in most countries. To address this issue, an innovative approach called quantitative story telling (QST) is proposed. Maintaining the public's trust in science calls for responsible use of quantitative information. For this reason, QST involves a participative and deliberative analysis of the quality of policies and narratives on governance. It can address social concerns based on a careful use of quantitative information for addressing technical issues.

The application of the QST approach to NWM issues will be the focus of a new project called "*Building trust in nuclear waste management through participatory quantitative story telling*" (ENTRUST), coordinated by AMPHOS21 (Barcelona, Spain) and Stanford University's Center for International Security and Cooperation (CISAC).<sup>1</sup> The ENTRUST decision-making process consists in three steps which iteratively check the quality of the scientific output generated (Figure 1). It allows the stepwise implementation of national NWM programs supported by dialogue and analysis, which is essential under irreducible technical and social uncertainties. For this reason, it is important that such a process focuses primarily on building trust rather than on finding the most technically suitable solution under current knowledge.

The ENTRUST approach results in an original methodology able to address technical and social issues with the aim of building trust in the scientific basis used for long-term NWM. Moreover, the approach is inherently open, transparent, and broadly participatory, which are essential attributes for democratic decision-making. To add to its relevance and potential impact, the ENTRUST approach will be embedded into a collaborative science-policy context by contributing to CISAC's "*Reset of U.S. Nuclear Waste Management Policy*" initiative<sup>2</sup> involving a broad range of scholars and stakeholder groups.

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<sup>1</sup> [http://cordis.europa.eu/project/rcn/208322\\_en.html](http://cordis.europa.eu/project/rcn/208322_en.html)

<sup>2</sup> <http://cisac.fsi.stanford.edu/research/nuclear-waste-reset-initiative>

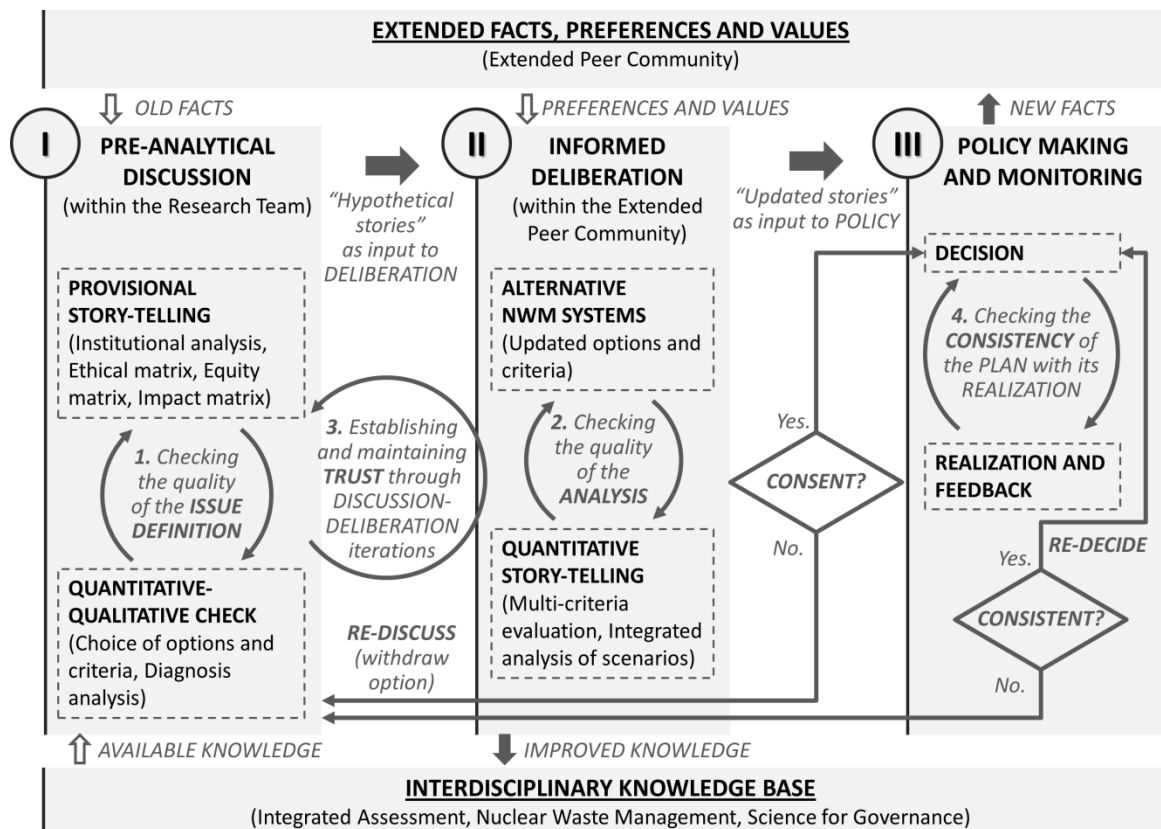


Figure 1: Proposed ENTRUST approach for the integrated assessment of NWM systems and policies

#### Acknowledgement:

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## Making radioecological knowledge

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### Abstract

The social study of science has, for decades now, explored the processes of making scientific knowledge within disciplinary communities. Insight to how science and society relations can be understood more broadly has also been developed. Within the context of long term exposure situations, technical knowledge, societal expectations and political need, indeed coalesce in interesting ways.

The field of radioecology, for example, is working within this complex techno-political environment, needing to attend to the demands of international standards for safety as part of its knowledge-making regime. Concurrently, at the level of everyday knowledge production, radioecology communities must deal with the challenges posed by the accessibility of field sites, disparities between field and lab conditions and projecting results beyond specific experiments. The radioecology field, perhaps more than some others, must occupy multiple spaces to perform its collective work and successfully inform wider debates.

The practice of radioecology is largely invisible to most people and the infrastructure of environmental protection is hidden from everyday view. Thus we need to ask the question: how can wider society make sense of these worlds.

Drawing on ethnographic engagements with scientific and policy arenas, this paper will outline a sociological analysis of the state of the art of knowledge making in the radioecology community. The paper will address some of the issues and challenges faced by the scientists and their dealings with some of the huge uncertainties associated with environmental radiation protection.

## **Establishing a European platform for social sciences and humanities research relating to ionizing radiation**

Despite the recognized need for strong multidisciplinary approaches to research and innovation including social sciences and humanities (European Commission, 2014), ionising radiation research is still, to a large extent, characterised by a strong divide between technical and social perspectives and knowledge domains. To address that challenge, and to strengthen further the competence and excellence in the fields of Social Sciences and Humanities related to ionizing radiation, a structured scientific exchange as well as a coordinated research approach is essential.

Representatives from several SSH disciplines have started the process of promoting this more coordinated approach by submitting a COST Action proposal titled SHINE. The overarching aim of SHINE is to strengthen the role of SSH in the field of ionising radiation research and management. In this session at RICOMET 2017, the purposes, goals and expectations of the platform will be presented and opened up to enable discussion towards the detailed planning of next steps.

We welcome critical reflection, ideas and constructive discussion.

## On the way to our SSH platform

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*on behalf of the Platform founding members*

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### Abstract

While SSH research on multiple aspects of ionising radiation has been conducted for many years, there is widespread acceptance that this research is fragmented and is often circumscribed by input from actors beyond the SSH community. This situation means that vital knowledge from SSH work can go unrecognised and the opportunity for sharing insight, providing added-value across the ERA, and promoting impact, is limited. It is only by enabling SSH research to play a fuller and stronger role through a platform mechanism that societal perspectives on research relating to IR will be realised.

The mission of the SSH IR Platform in establishment will be to stimulate the integration of social sciences and humanities (SSH) in research, practice and policy related to ionizing radiation, exposure situations including, for example: (e.g. low dose risk, radioecology, emergency preparedness and response, dosimetry, medical applications, radioactive waste management, nuclear energy production, safety, NORM, radon, site remediation etc.) and the interaction of relevant actors in order to reach a shared vision. To this end, the platform will structure and enhance dialogue at the European level among the different stakeholders, fostering the sharing of knowledge and information among various disciplines related to working on aspects of ionizing radiation.

The SSH IR platform will elaborate a strategic perspective for research needs, including those topics that needs require to be integrated in to the Strategic Research Agenda (SRA) of the existing other European Platforms, directly or indirectly related to ionizing radiation, based on the principles of transdisciplinarity and inclusiveness, defining research directions and priorities and for the integration of SSH with natural sciences and technology for better policy and practice related to ionizing radiation exposure situations. These SSH platform SSH IR strategic perspectives for research needs agenda will be developed in coordination with the existing technical platforms in the field. Therefore, the strategic perspectives for research needs for SSH research related to ionizing radiation and will be open to the integration incorporation of related relevant topics in response to the demands at different levels: citizen's, policy makers' and implementers. Multiple modes of collaboration are available and can be deployed as relevant.

Interaction with the technical platforms is foreseen at several levels:

1. The SSH IR Platform will **promote and organise dialogues** with members of all relevant platforms and other stakeholders (e.g. technical professionals, governmental authorities, regulatory bodies, etc.);
2. The SSH IR Platform will **develop mechanisms for feedback** on the SRAs of technical platforms at regular intervals;
3. The SSH IR Platform will **support establishment of reciprocal arrangements** for members of the SSH and the technical platforms to engage in the events and activity of platforms.

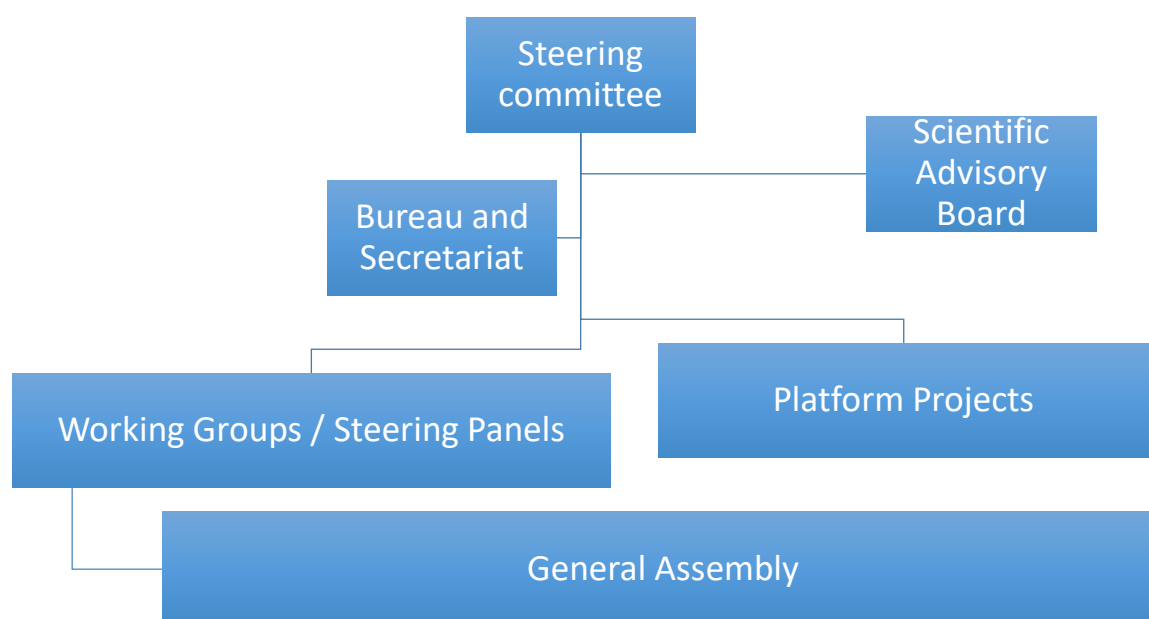
4. The organizational structure (see below) will **foster inclusive governance** and comprise membership from technical platforms and other relevant stakeholders (NGOs, public sector).

In addition, the SSH IR Platform will address **SSH-focussed topics** in a set of Working Groups, some of which will align with technical concerns and enable direct interaction between participants in diverse platforms. Working Groups are envisaged to include topics on the social dimensions of: radioactive waste management and disposal; nuclear energy production; decommissioning processes; medical, industrial and research applications; natural radioactivity; etc.

The SSH platform will adopt a structure to ensure transparent and efficient operation and be designed to support the platform goals and ethos. The structure will facilitate membership from those with a strong social science and humanities research background and an interdisciplinary outlook, regardless of disciplinary training, as well as the inclusion of relevant stakeholders and non-SSH disciplines.

The platform will engage representatives from academia and the main European R&D organizations active across multiple disciplines and domains, as well the existing platforms concerned with topics relating to ionizing radiation (e.g. MELODI, EURADOS, NERIS, ALLIANCE, EURAMED, SNE-TP, IGD-TP and EUTERP). Additional stakeholders will be integrated over time to ensure a sustainable structure for SSH research.

Figure 1: Structure of the SSH platform



**You can express your interest in taking an active role in the platform or being a member of the platform at the RICOMET 2017.**

Acknowledgement:

The ex- FP7 EAGLE project partners from the following research institutions and organisations supported the use of the remaining of the EAGLE unspent budget for establishment of the platform: SCK•CEN, Belgium; IRSN, France; SYMLOG, France, ICN, Romania; IJS, Slovenia; ARAO, Slovenia; REC, Hungary/Slovenia; UPB, Romania and INCT, Poland.

## Absent, yet Present? Tracing “Responsible Research and Innovation” in Radiation Protection Research

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### Abstract

In this paper, I argue that although the notion of responsible research and innovation (RRI) is manifestly absent in research programs for radiation protection and nuclear research and training, RRI is increasingly recognized, and mobilized, by various actors in the field; is an essentially contested concept; and facilitates the development of a sizeable network comprising actors with a variety of roles, expectations and stakes, including researchers in the social sciences and humanities (SSH). To sustain these points, I draw on my experiences as an embedded social scientist in nuclear research, singling out sites and instances (e.g. the crafting and dissemination of the 2015 Ricomet Public Declaration, SSH research within the EU-Concert framework, conversations with radiation protection researchers) where RRI is explicitly discussed, propagated, negated, or transformed. This exploration highlights recurring challenges in embedding RRI in radiation protection research, which pertain to the strong evaluative connotation of RRI and its top-down character; the lack of industry involvement in RRI processes; the tight connection between RRI and new and emerging technologies; and the hybridization of SSH through inter- and transdisciplinary research. I discuss each of these challenges in turn, with the aims of reflexively considering how RRI is enacted through the formation of relationships with radiation protection stakeholders and the interplay of practices and artifacts; and what the potential implications of such processes and mechanisms are for SSH engagement in the field.

**Keywords:** Absence; Presence; Radiation Protection; Responsible Research and Innovation; Social Sciences and Humanities.

### **SHINE project – Startup of the platform**

*T. Perko, et. all (37 project proposal partners)*

*coordinator, SCK•CEN & University of Antwerp, Belgium*

The SHINE project proposal for COST action is a response to the need for increased attention to the input of social science and humanities (SSH) to research and innovation in the field of ionising radiation applications and to maximize the capacity for society to act in effective and meaningful ways. In this session of RICOMET we will collectively address these challenges through discussion and through hearing a selection of the innovative research that SHINE seeks to promote. Participants in the session are expected to be willing to engage critically and constructively in the SHINE endeavor.

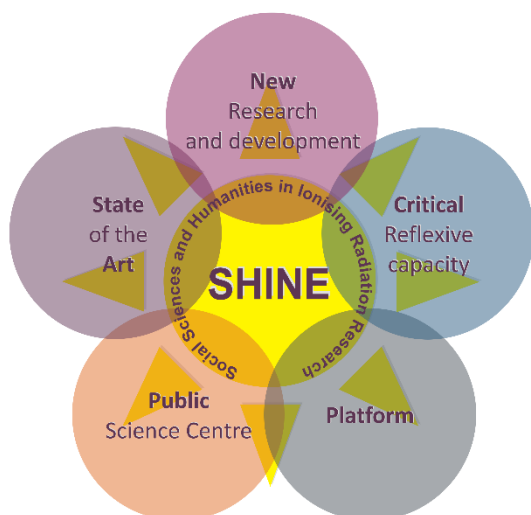
Ultimately, SHINE proposal aims to

1. To assess and disseminate the state-of-the-art in Social Sciences and Humanities research in the field of ionising radiation
2. To promote new research and development,
3. To support the development of critical and reflexive capacity,
4. To establish a sustainable platform "European Platform for Social Sciences and Humanities (SSH) research relating to Ionising Radiation (IR),
5. To develop a public science centre about ionising radiation in the field of SSH.

The proposed capacity-building objectives actions of SHINE are:

- To exchange findings, study designs, methodologies, statistical analysis from SSH research inside and outside the IR field;
- To establish an open source database of public opinion surveys conducted from the IR field;
- To stimulate multidisciplinary approaches in European research on IR;
- To ensure that the stakeholders will have access to the best SSH evidence and expertise;
- To share research findings within the broader research community in order to increase awareness of the SSH fields of research and their contribution;
- To develop and apply education and training programmes for a) SSH researchers to engage with IR topics and b) nuclear R&D community to integrate SSH research potential;
- To integrate relevant SSH research results in the education and training programmes;
- To attract young researchers in SSH research on IR applications;
- To provide advice and support to SSH scientists engaging with different publics and give advice for mass media appearance and communication.
- To ensure maximum visibility of the SSH community in public, scientific and political discourse;
- To continue the SHINE actions after the project duration.

There are five SHINE components, each of them developing and applying different innovative actions/procedures described below.



- **'Short-Term Scientific Missions'** - these will provide opportunities for SHINE members to collaborate, share skills and techniques and facilitate the addition of a multidisciplinary focus to their own research. The Missions are primarily focused on intra-SSH collaboration.
- **'Conference buddy' scheme** – whereby SSH researchers will accompany scientific researchers to their leading research conference, and vice versa, building trust relations and increasing understanding of alternative disciplinary frameworks.
- **'Small writing groups'** – to enable open exploration of ideas and joint working, SHINE members will be able to bid to host a writing retreat and generate outputs with impact.
- **'Industry interaction vouchers' /placements'** – a fund to enable an SSH researcher to spend time with a nuclear industry partner, sharing perspectives and co-creating research questions.
- **'Science meets policy events'** - where SHINE partners will present scientific results to decision-makers and policy makers and receive feedback on applicability of the results.
- **'Pool of SSH consultants'** - where appointed SHINE participants will attend meetings of the existing technical communities and utilize the existing infrastructure to give added-value to their work. They will build collaborations between natural and social sciences research.
- **'The SHINE explorers'** - will gather and cross-scan national and international openings of projects related to IR and generate opportunities for input from SSH to research and innovation in the fields of IR applications.
- **'Mobile SSH lecturers in the field of IR'** - will be a pool of SSH lectures giving short courses & lectures on SSH research in IR at different educational programmes/faculties around Europe.
- **'Science as an open house'** - will stimulate and ensure that SHINE databases and publications will be open for public and accessible to all interested stakeholders. Stakeholders will be able to interact and thus validate and improve the databases.
- **'Junior-Senior Partner Programme'** - whereby senior SHINE researchers work closely with young researchers (e.g. PhD student) in order to engage them with the SSH research related to IR. They will attend SHINE activities together with a view towards enhancing mutual learning.
- **'SSH Media Centre'** - will provide journalists with what they need in the timeframe they need it. It will provide interviews with leading experts to aid press releases and position statements. It will provide advice and support to scientists engaging with the media and give advice on mass media appearances (traditional and new). The Media Centre will ensure that the public will have access to the best social science and humanities evidence and expertise through the news when ionizing radiation issues and nuclear technology applications hit public attention.

## **The relevance of knowledge management and a shared knowledge base for supporting social science and humanities in ionising radiation research and protective measures**

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### **Abstract**

#### Background

The alignment of research and innovation related to ionising radiation with the values, needs and expectations of society has to be strengthened. This has been increasingly recognized in the past years. To achieve this, a multidisciplinary approach, integrating social sciences and humanities (SSH), is necessary.

#### Method

A network of researchers of social sciences and humanities has to be established to ensure systematic integration of SSH into research and policy related to ionising radiation topics. In order to create a strategic roadmap for the SSH community, the state of the art in social sciences and humanities research in the field of ionising radiation has to be assessed and disseminated. In particular, state of the art in different SSH disciplines and research areas already dealing with ionising radiation has to be exchanged. The main challenges and knowledge gaps of SSH related to ionising radiation have to be explored. Possibilities and limitations of transferring findings across disciplines and application fields and into the radiation field have to be discussed.

#### Results

The network formation with researchers in social sciences and humanities is in progress. Currently, a proposal to the European COST Association for funding the "European Network for Supporting Social Sciences and Humanities in Ionising Radiation Research – SHINE" is pending. If accepted, SHINE will treat the topic of a common knowledge base within working group 1 "Social Sciences and Humanities research State-of-the-art in the field of ionising radiation".

#### Conclusions

The presentation will provide an overview of the aspects related to the necessity of a shared knowledge base for SSH in the field of ionising radiation, as described in the COST proposal SHINE. In case SHINE will not be funded, other paths for sharing of scientific findings, knowledge and research methodologies will be discussed.

#### Acknowledgement

Main proposer for the COST Action SHINE is Dr. Tanja Perko, SCK-CEN, Belgium. The author of this abstract participated as secondary proposer in the application.



## Slovak partners in SHINE? The recent situation, and some explanations of what can be read in between the lines of PLATENSO project deliverables

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### Abstract

Since its establishment in 1993, Slovakia had one of the highest shares of electricity generation from nuclear in the world. In 2015, Slovakia ranked third, after France and Ukraine, with a ca. 56 % share. Despite this, Slovakia is quite often amongst the very few relevant countries that lack presence in European projects and publications providing overviews and/or comparisons; especially with regards to interdisciplinary topics involving social sciences and humanities (SSH). This rather paradoxical empiric evidence might implicitly suggest lacking interest of Slovak SSH researchers, which might have also been perceived in late 2016 in consequence that none of the Slovaks joined the SHINE COST proposal.

This presentation is a follow-up of the one from the RICOMET 2016 conference. It aims to explain which parts of the PLATENSO project deliverables can help interested stakeholders to understand the rather paradoxical empirical evidence outlined in the paragraph above. The presentation will cover some Slovak-specific factors that can most probably only be read in between the lines of the PLATENSO deliverables; and moreover only after recognition and proper understanding of some recent Slovak political decisions which will therefore also be briefly presented. In the concluding part, factors that influenced lack of Slovak partners in the SHINE COST proposal and more importantly the real interest to join the SHINE platform will be discussed. The presentation also aims to provide an impetus for a broader discussion about (a) the gaps in motivation to participate between SSH scholars and relevant experts from industry, and (b) potential similarities and differences in the other relevant "new EU" member states, as these might potentially be useful also for SHINE platform leaders with regards to ensuring a balanced participation from both the old and the new EU member states, should it be legally required or desired.

## Non-Medical Medical Exposures? Dilemmas and Logic from Wonderland?

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### Abstract

Medical procedures are now the dominant source of the human exposure to man-made radiation. They benefit exposed persons, and are conducted by medical practitioners with specific authorisation to do so. A group of borderline situations exist where it is doubtful if all the requirements for *bona fide* medical exposures exist. These include: lifestyle radiology; unapproved screening programmes; inadvertent exposures in medical settings; and frankly non-medical exposures including those required for security; investigation/prevention of smuggling and crime; migration controls; and some arising from litigation etc.

This area was flagged when "Medico-legal procedures" were introduced in the European MED Directive (97/43/Euratom). These are "procedures performed for insurance or legal purposes without a medical indication". However, for radiation protection purposes, they are included as a sub-category of medical exposures. Difficulties with the associated legal requirements rapidly emerged. The recent revision/recasting of both the European and International BSS's, was used to partially address the problems involved.

With non-medical exposures, the absence of direct benefit to the subject is a game changer for justification. Further, benefit to the individual exposed is possibly the main consideration sustaining the exemption of medical examinations from dose limits. Medical justification is also differentiated by a requirement for consent, confidentiality, and a governance framework underwriting these. It is quite different to that prevailing in migration centres, customs investigation units and detention centres. It is not reasonable to assume that medical professionals will be familiar with the social issues/ risks involved. It is reasonable to ask who should be responsible for justification in such circumstances; would it be radiologists, judges, customs officials, social workers, or others? Medical professionals would be poorly qualified to determine justification in many of these situations, but could be relied on to conduct the procedure properly.

These areas will be reviewed using examples and scenarios to highlight issues. Many areas of importance to the social sciences, ethics and regulation will be highlighted.

## **Strategic research agenda for social sciences and humanities in radiation protection**

In this session, the current strategic research agenda for Social Sciences and Humanities will be presented and its further development will be discussed. The Strategic Research Agenda for SSH was initiated and developed throughout 2016 under the remit of the "CONCERT - European Joint Programme for the Integration of Radiation Protection Research" programme. The current version of the SRA reflects the outcome of the multiple discussions between SSH researchers throughout Europe and of a broader stakeholder discussion with representatives of various groups on several occasions. This process of exchange, knowledge sharing, discussion and further development of the SRA will be continued at RICOMET 2017 and we invite your participation also by using social media.

We are keen to learn from the projects, experiences and ideas of all participants to assure the SRA is representative of the priorities and targets of the SSH communities and their stakeholders. The SRA for radiation protection has been provided to the RICOMET 2017 participants, providing time for consideration prior to the conference.

Discussions will be structured to ensure they remain productive and additional sessions and other forms of interaction will be timetabled to enable non-participants in the stream to contribute to, and feedback on, the emerging document. Our aim is to ensure that the SRA acknowledges the current state of the art, represents the best available starting points for future research and moreover captures the appropriate range of relevant topics and foci. The collaboratively-produced and revised SRA will be the outcome of the RICOMET 2017 meeting.

## Strategic research agendas in European radiation protection research

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### Abstract

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, all 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 for social sciences and humanities in radiation protection, covering areas such as risk communication, ethics and safety culture, thus enabling the integration of science in societal context.

### Acknowledgements:

The Euratom program of European Commission has actively supported the European low dose research by funding projects supporting the integration of low dose risk research, in particular DoReMi (FP7 grant agreement 249689), OPERRA (FP7 grant agreement 604984) and CONCERT (H2020 grant agreement 662287).

## **Ethics and justification – On the need for reflection on the justification of radiological protection research itself.**

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### **Abstract**

Credible and effective stakeholder involvement in radiological protection (RP) research requires the RP community to reach out with arguments and questions that are meaningful for society. As a consequence, the presentation will reason, stakeholder involvement should principally be organised according to nuclear technology application contexts or contexts of occurrence of ionising radiation (nuclear energy, medical, industrial, NORM). The underlying motivation to do so is not only pragmatic but primarily ethical, as it opens up questions with regard to the very justification of radiological protection research itself. Although dealing with the question of justification in concrete policy is not the responsibility of the RP community, given that RP starts from the justification principle, the RP community should be prepared to join discussions in specific governance contexts if they would be organised as part of European or national policy. In conclusion, the presentation will claim that the RP community has an important role to play in highlighting the issue of justification towards policy in general and towards EURATOM and the European Commission in particular.

## **Towards renewed forms of civil society engagement in radiation protection issues – lessons from European research**

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### **Abstract**

Since the 1990s, in the field of hazardous activities in general and in the nuclear field in particular, a general trend of evolution has developed in Europe towards reinforced information and participation of the public to decision-making processes and towards more inclusive governance frameworks. In the nuclear field, the relationships between expert organisations, in particular technical support organisations (TSOs), and civil society appears of key importance for developing access of the public to information and participation of the public to decision-making processes (as required by the Aarhus Convention).

Various processes of interaction between experts and civil society have thus developed in Europe since the mid-1990's, involving different types of experts: institutional experts (TSOs), civil society experts, independent experts (university, foreign experts not engaged in the national context...). Since the beginning of 2010's, different European research projects (SITEX 2, PREPARE, CATHyMARA, ECCSSafe, ...) have investigated the respective roles of experts and civil society in the nuclear field. The present communication presents a synthesis of their findings and draws possible perspectives for renewed forms of engagement of civil society in radiation protection issues at the European level. These forms of engagement differ from classical forms of stakeholder involvement and include cooperative production of information, knowledge and expertise, engagement of civil society in the governance of radiation protection research and co-evolution between civil society actors, TSOs and governance of radiation protection.

## Improving risk communication about low dose exposure – appropriately considered in the Strategic Research Agenda for Social Sciences and Humanities in Radiation protection?

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### Abstract

#### Background

Low dose risk research is currently an important topic in ionising radiation protection research and regulation. Several expert groups deal with the issue from the views of various radiation protection disciplines, and related to different exposure situations. Just as important as the research on biological impacts and health effects is the research on communication about low dose risks and the risk communication itself.

#### Status

The latest version of the Strategic Research Agenda for Social Sciences and Humanities in radiation protection contains also research recommendations relevant for handling low dose exposure situations. In detail, the SRA focusses on

- "Perception of radiological risks from low doses of radiation, accounting for cultural differences in routine, emergency and other exposure situations"
- "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" and
- „Needs and concerns of stakeholders regarding RP culture, with attention to the development of participatory tools and low dose exposure situations“

#### Aim of the presentation

On the basis of a radiation protection authority's perspective, the presentation will illustrate the importance of low dose radiation exposure in different radiation protection fields and exposure contexts. The requirements for an adequate risk management and especially risk communication driven by radiation protection authorities will be contrasted with the research needs specified in the SRA for SSH in radiation protection. Aim is to exchange views on the topic low dose radiation risk in different exposure situations, to stimulate the discussion between the conference participants and to ensure, that the SRA for SSH provides an appropriate basis for improving low dose risk communication.

#### Acknowledgement

The latest version of the SRA for SSH was designed as part of the deliverable "D 2.3 Part 2 Joint research needs and priorities addressing radiation protection research relevant for Social Sciences and Humanities (SSH)", Lead Author Tanja Perko, SCK-CEN, Belgium. The author of this abstract contributed among others to the SRA.

## Developing Research on Radiation Protection Culture

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### Abstract

Within the framework of CONCERT - European Joint Programme for the Integration of Radiation Protection Research -, a Strategic Research Agenda (SRA) in the field of social sciences and humanities is under development, including specific topics regarding radiation protection culture which have been elaborated within a dedicated task group. The following elements are summarizing the SRA on RP culture elaborated by this task group.

RP culture is a concept of a composite nature comprising knowledge, skills, experience, and practices related to radiation protection, as well as perceptions, values, attitudes, expectations related to radiation risk. The building of radiation protection culture relies on a dynamic process based on multi-stakeholders interactions.

RP culture aims at:

- favouring the understanding of radiation protection norms and standards;
- enabling 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 and to participate to the decision making process related to the management of exposure situations;
- enabling professionals in RP field and other stakeholders to dialogue, to share a common language, in a view to enhance the efficiency of the decision-making processes associated with the implementation of the radiation protection system and to answer the concerns of all concerned stakeholders.

The following research areas have been identified:

- Characterization of RP culture and identification of the specificities according to the exposure situations and the stakeholders involved;
- Development of methodologies and tools to evaluate the level of RP culture in a quantitative or qualitative way;
- Highlighting the role and benefits of RP culture in various exposure situations, building notably on the feed-back experience analysis from different situations;
- Development of tools, methods, processes to build, maintain and transmit RP culture.



## Strategic Research Agenda for Social Sciences and Humanities in radiation protection field – overview

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This presentation 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 document 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.

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;
- the research relating to radiation protection should be conceived as transdisciplinary and inclusive, integrating citizen, science and stakeholder input from the start.

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. 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.

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

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