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Radiation protection research in Europe: Reaching out to IGD-TP

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Radiation Protection: context and organisation

Radiation Protection context

Exposure scenarios

- Planned
 - Nuclear fuel cycle including waste disposal
 - Medical applications of ionising radiation
 - NORM industry, phosphate industry...
- Existing
 - Post emergency
 - Legacy sites
 - High background, Radon in dwellings and workplaces
- Emergency
 - Nuclear accidents

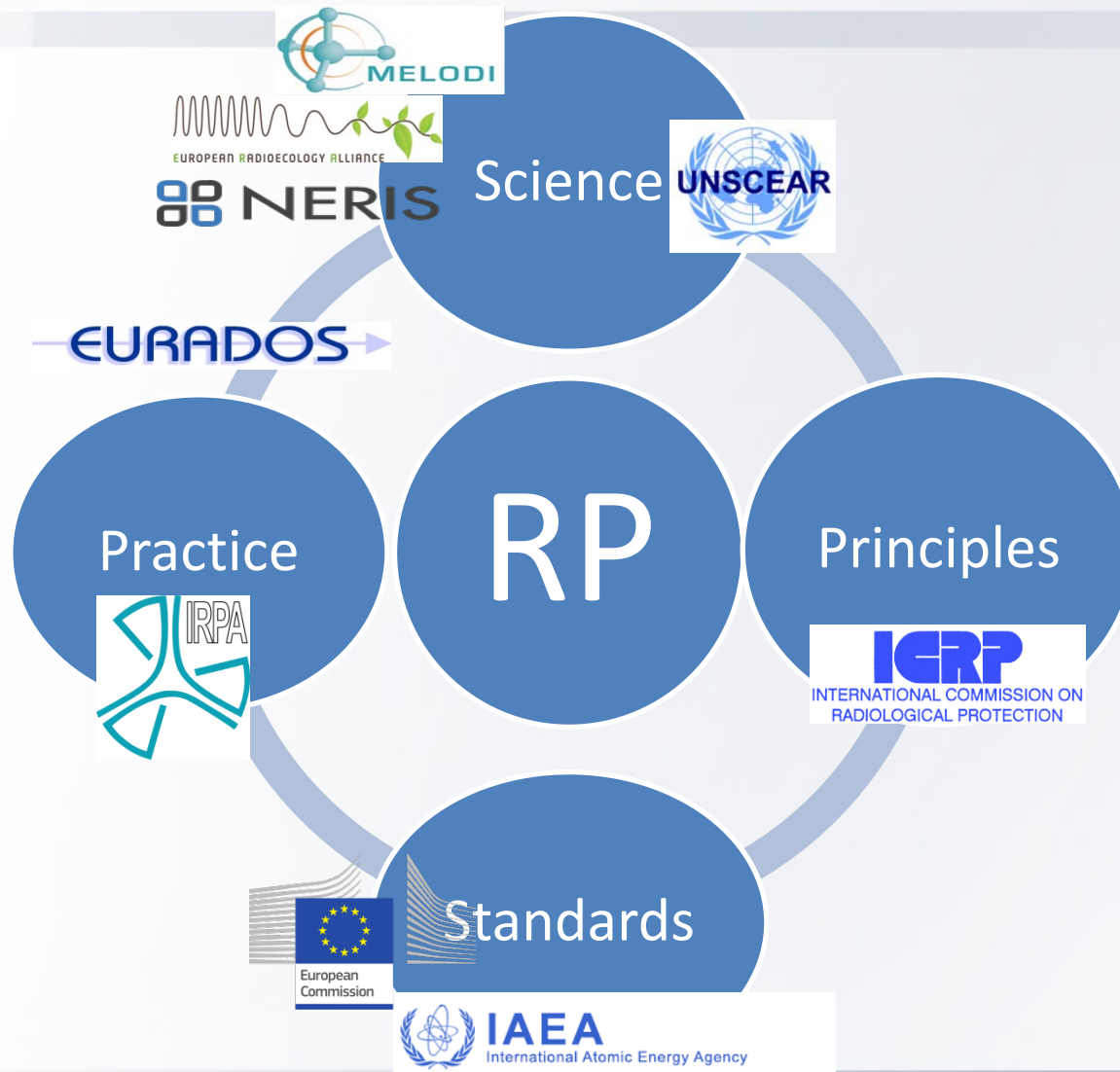
Radiation protection: based on 3 fundamental principles: justification, optimization and *dose* limitation, which guides decision making in RP and risk management



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Radiation protection landscape





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Radiation Protection Research in Europe

Approach and support from EC and Member States

European integrated R&D for Radiation Protection: Major question areas

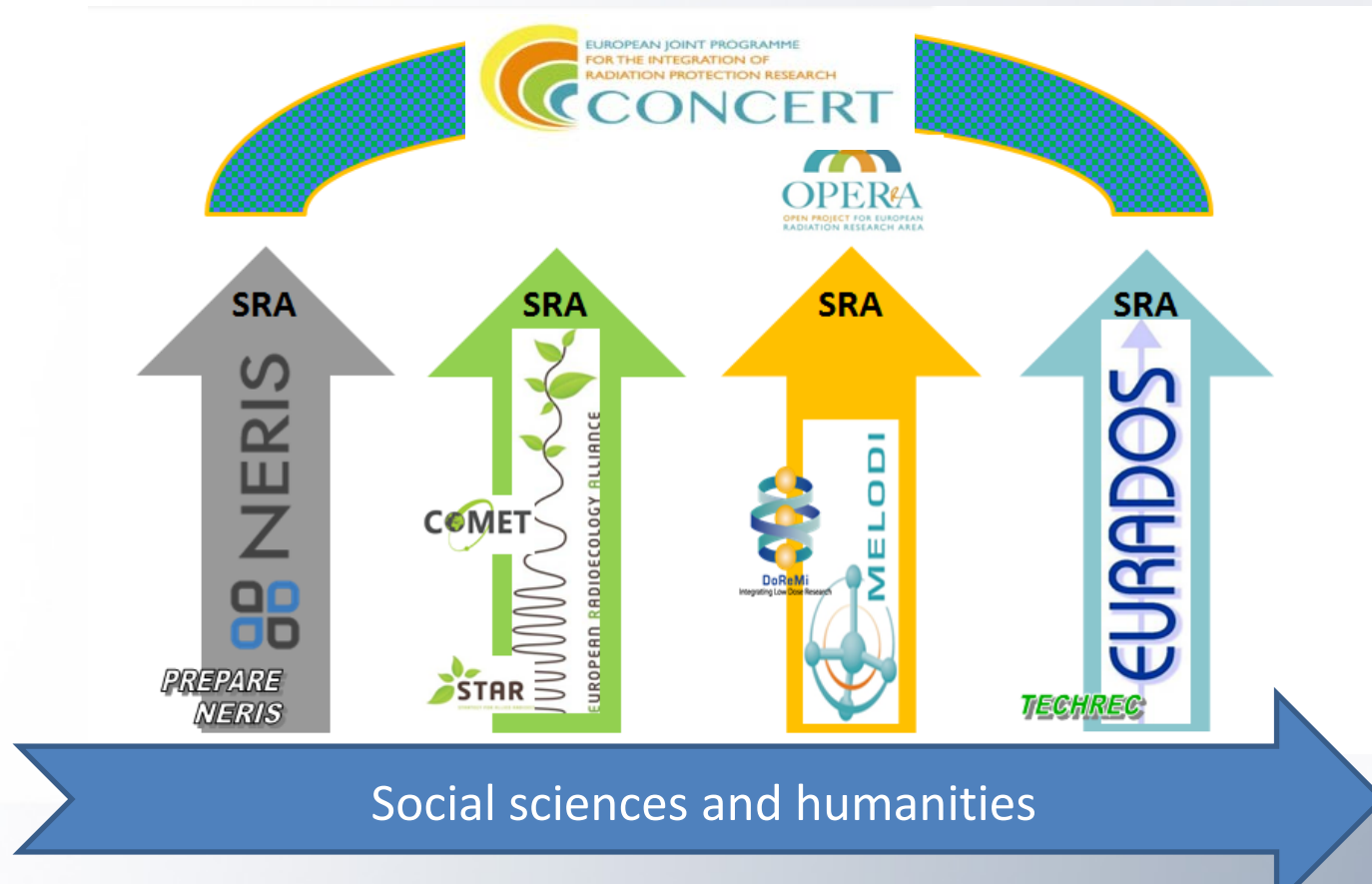
- Validity and improvement of the radiation protection system for low dose / dose rate exposures (MELODI)
- Behaviour of radionuclides in the environment, effects to wildlife and impact and risk assessment of radiation to man en environment (ALLIANCE)
- Preparedness and response for nuclear/radiological emergencies and recovery (NERIS)
- Quality of radiation measurements and related dose estimations and dose optimisation in medical applications (EURADOS)
- Social and ethical aspects linked to the governance of radiation risks

Support from the EC towards concerted research in RP research

- ALLIANCE, NERIS and MELODI were founded (~2010), and apart from national funding received financial support through Networks of Excellence and preparatory phase projects towards European Joint Programming in H2020
- EURADOS was founded in 1981, received EC funding at the start, but became a self-sustaining eV in 2008
- In Dec 2013, the 4 associations signed a MoU to collaborate in radiation protection research



Gradual evolution of the Radiation Protection research community in research platforms with support from the EC and the Member States



Streamlining RP research

- MELODI, ALLIANCE, NERIS and EURADOS will maintain and update their SRAs
- A joint roadmap with a long term perspective will be prepared
- Annual statements on current research needs, priorities and roadmaps for joint programming will be prepared
- Research priorities including joint interests and synergetic topics will be identified
- Outreach to social sciences and humanities, support to implement basic safety standards
- Scientific knowledge from outside the radiation protection field will be integrated

Preparatory phase projects to support coordination of activities in RP research

Coordination of research through:

- Integration of national and EU research
- Reach out to new Member States
- Stakeholder involvement
- Identify key research areas
- Include expertise from non-RP research
- Research call organisation

OPERRA Task 4.5/ Reaching out to the other technical platforms within EURATOM,
e.g. SNE-TP & IDG-TP

COMET Task 2.1/ Evolving toward a pan-European Network

A European Strategy for Radiation Protection Research

CONCERT EJP

Umbrella structure for radiation
protection research in Europe

- Co-funding action **70/30 ratio of EC : MS co-fund**
- Joint programming
- Open research calls
- Integrative activities

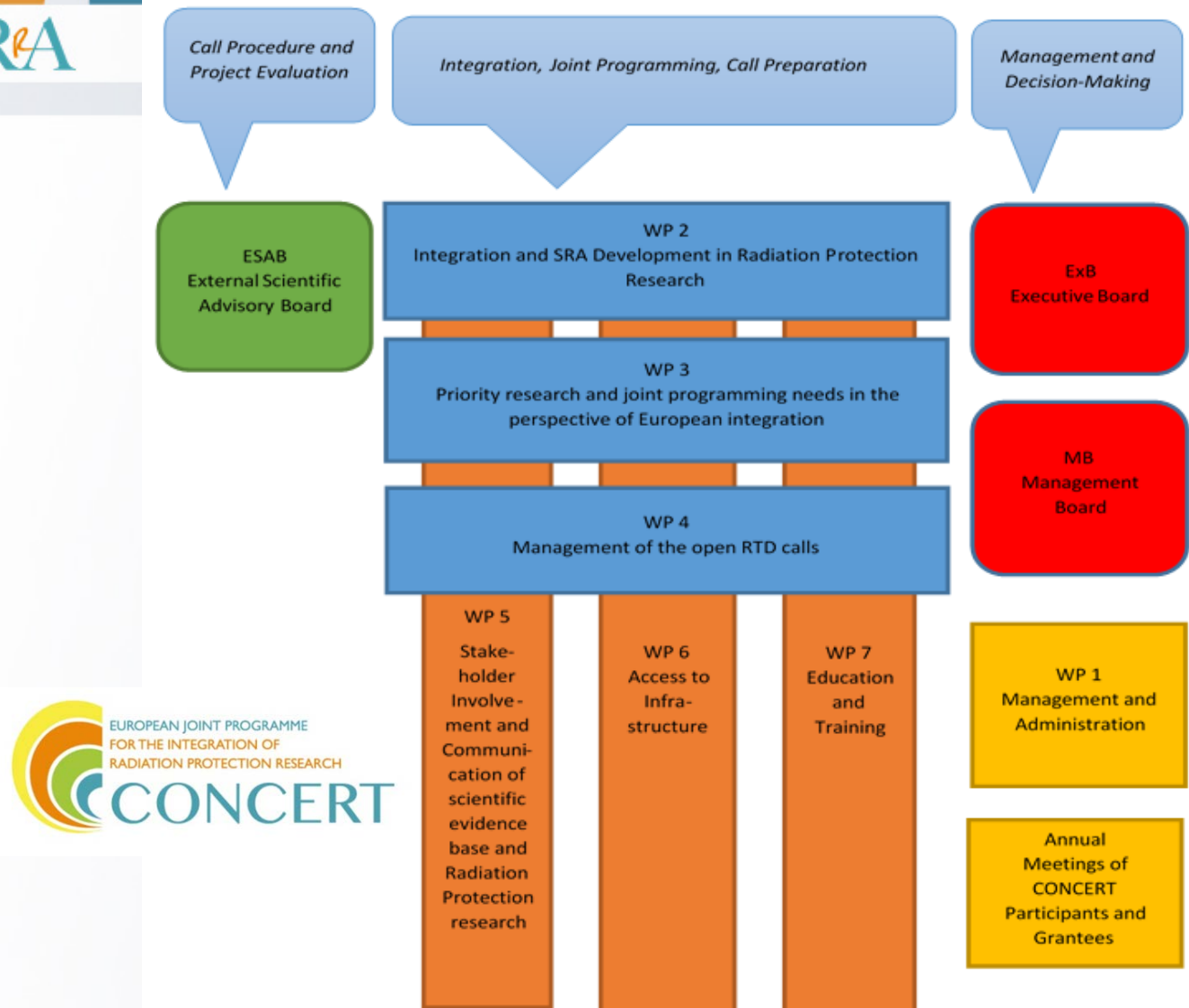
MELODI

ALLIANCE

NERIS

EURADOS

Medicine?



CONCERT EJP beneficiaries

- 27 National Programme Managers and Programme Owners from 21 Member States + Norway
- 4 radiation protection associations

CONCERT facts and funding principles

- Duration: 5 years, started on 1 June 2015
- Total EC funding: 19.8M€
- 60% for open research, 30% integrative activities, 10% management
- EC: National co-funding ratio is 70/30
- 2 open calls, for 2016 and 2017

Potential links between IGD-TP and the European radiation protection platforms

Topics from IGD-TP SRA & Deployment plan

Key Topic 1: Safety case

- 1.1 Increase confidence in, and testing and further refinement of the tools (concepts, definition of scenarios and computer codes) used in safety assessments. (2012-2020 H) → [ALLIANCE](#), [NERIS](#)
- 1.2 Improve safety case communication. This includes safety case communication on Short-term safety of construction and operations, the transient phase, long-term safety. (2012-2025 H) → [Social sciences](#)
- 1.3 Increase confidence in and further refinement of methods to make sensitivity and uncertainty analyses. (2015-2020 M) → [ALLIANCE](#), [EURADOS](#), [MELODI](#), [NERIS](#)

Key Topic 5: Safety of construction and operations

- 5.2 Strategies to evaluate the impact of operational safety issues on the disposal system (long-term safety, design, costs...). (2019-2025 M) → [EURADOS](#)

Topics from IGD-TP SRA & Deployment plan

Key Topic 6: Monitoring

- 6.1 Monitoring strategies and programmes for performance confirmation. (2011 2015 H) → [EURADOS](#)
- 6.2 Monitoring technologies and techniques. 2011 2015 H → [EURADOS](#)
- 6.3 Monitoring of the environmental reference state. 2011 2016 H → [ALLIANCE/EURADOS/NERIS](#)

Key Topic 7: Governance and stakeholder involvement

- 7.1 Governance of decision making processes: methods for the integration of technical, social and economic information. (2011 2014 H) → [Social Sciences/NERIS](#)
- 7.2 Use of research results for open and transparent dialogue with stakeholders (methods, tools, guidance). (2016 2025 M) → [Social Sciences](#)
- 7.3 Involvement of stakeholders, influence on the work of the researchers and the decision makers. (2016 2025 M) → [Social Sciences](#)

Cross cutting topics from IGD-TP SRA

- Competence maintenance, E&T
 - ANNETTE project
 - IGD-TP and MELODI among partners
 - H2020 -2016-2017 – NFRP 12: Support for careers in the nuclear field
 - Links should be established with the 'European Nuclear Education Network' (ENEN) and different Euratom fission science and technology platforms.
- Communication Management

MELODI -Multidisciplinary European Low Dose Initiative

- European platform dedicated to low dose or low dose rate ionising radiation risk research
- Three key research questions
 - Dose and dose rate dependence of cancer risk
 - Non-cancer effects
 - Individual radiation sensitivity

→ Limited link with IGD-TP

- All health risk related issues from low dose exposures should be of concern to MELODI and most exposures from nuclear waste will be very low dose exposures.

European Platform on Preparedness for Nuclear & Radiological Emergency Response & Recovery

Improve effectiveness of current European, national and local approaches for preparedness concerning nuclear or radiological emergency response & recovery

NERIS deals with new challenges

1. In atmospheric & aquatic modelling
2. For better dose assessments and decision support based on improved knowledge: source term, scenarios, etc.
3. In stakeholder involvement and local preparedness and communication strategies

→ Limited link with IGD-TP

1. Potential cross-fertilization in stakeholder involvement
2. Management of waste from post-emergency decontamination with stakeholders and environmental issue

European Radiation Dosimetry Group

Promote European research, development & cooperation in dosimetry

EURADOS

- Network which includes experts, reference and research laboratories, industry and dosimetry services
- Coordination of working groups: to promote technical development and its implementation in routine work
- Organisation of scientific meetings, training activities, intercomparisons and benchmark studies
- Self sustained, registered e.V. , 64 member institutions

→ Links with IGD-TP SRA

- *Key topic 5: Safety of constructions and operations: protection of operators and members of the public*
- *Key topic 6: Monitoring: impact on public and environment*

Activities in environmental dosimetry

- Eight EURADOS Working Groups:
 - Harmonization, Environmental Dosimetry, Computational Dosimetry, Internal Dosimetry, Radiation Dosimetry in Radiotherapy, Retrospective Dosimetry, High-Energy Dosimetry, Dosimetry in Medical Imaging
- EURADOS SRA vision 5: Towards an Improved Radiation Protection of Workers and the Public
 - Among the different challenges: To include nuclide-specific information in environmental monitoring
- WG3: Environmental dosimetry
 - Metrological support for harmonisation process of early warning dosimetry network systems in Europe
 - Organisation of intercomparisons
 - Development of methods for environmental dosimetry
 - Investigation of use of gamma spectrometry systems for environmental radiation monitoring
 - Definition of standards, e.g., publication of technical recommendations

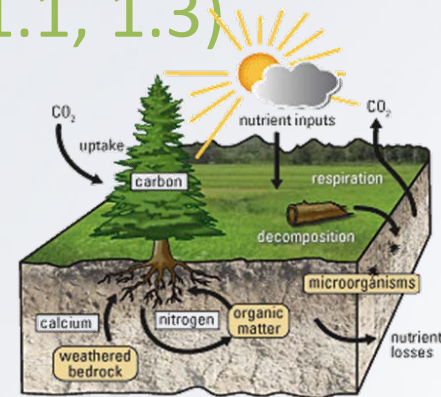
European Radioecology Alliance

SRA presents 3 challenges

- Challenge 1–Predict human and wildlife exposure in a robust way by quantifying key processes that influence radionuclide transfers and exposure
 1. Identify and mathematically represent key transfer processes
 2. Acquire data for parameterisation of the key processes
 3. Develop transfer and exposure models
 4. Represent transfer and exposure at landscape level
- Challenge 2 – Determine Ecological Consequences under Realistic Exposure Conditions
- Challenge 3-Improve human & environmental protection by integrating radioecology
 1. Integrate uncertainty/variability models to risk assessment
 2. Integrate human and environmental protection
 3. Integrate assessment for radiation and chemicals
 4. Provide a multi-criteria perspective for decision making
 5. Integrate ecosystem approaches within radioecology
 6. Integrate Decision Support Systems

Enhance confidence in long-term predictions of dose impact to humans (& environment) → (IGD-TP1.1, 1.3)

- Moving from empirical to **process-based models** (improve transferability)
 - Models to address transfer of 'special' RN (eg Cl-36, C-14, Se-79) and effect of climate change on their transport (coupling to biogeochemical cycling) → [Link to SRA C1.1 & 1.3 + BIOPROTA](#)
- Taking into account long-term **biosphere evolution** rising from **climate and landscape evolution** (future uncertainty)
 - Addressing environmental change in a sequential way (↔current non-sequential way) by developing landscape models for expected events and extreme events → [Link to SRA C1.4 + BIOPROTA + MODARIA](#)



Enhance confidence in long-term predictions of dose impact to humans (& environment) → (IGD-TP1.1, 1.3)

- Improving quality of input data (reduce uncertainty) → Link to SRA C1.2
 - Experimental studies on sensitive biosphere parameters/processes (e.g. interception) for which hardly any data exist
 - Enhance the use of parametric input parameters instead of single value parameters
- Developing approaches to deal with uncertainty in safety assessments
 - confidence building
 - Evaluate consistency between different parts of assessments (biosphere/near field) via geosphere/biosphere interface considerations → Link to SRA C1.1 & 1.3 + BIOPROTA
 - Value in considering/comparing alternative mathematical models/modelling approaches → Link to SRA C3.1 + MODARIA



Potential contributions to IGD-TP SRA

Topic 6 Monitoring

Monitoring of the **environmental reference state**.

Topic 5 Safety of construction and operations

Monitoring and **incident dose assessment**

Topic 1 Safety case

Human and environmental **impact assessment**

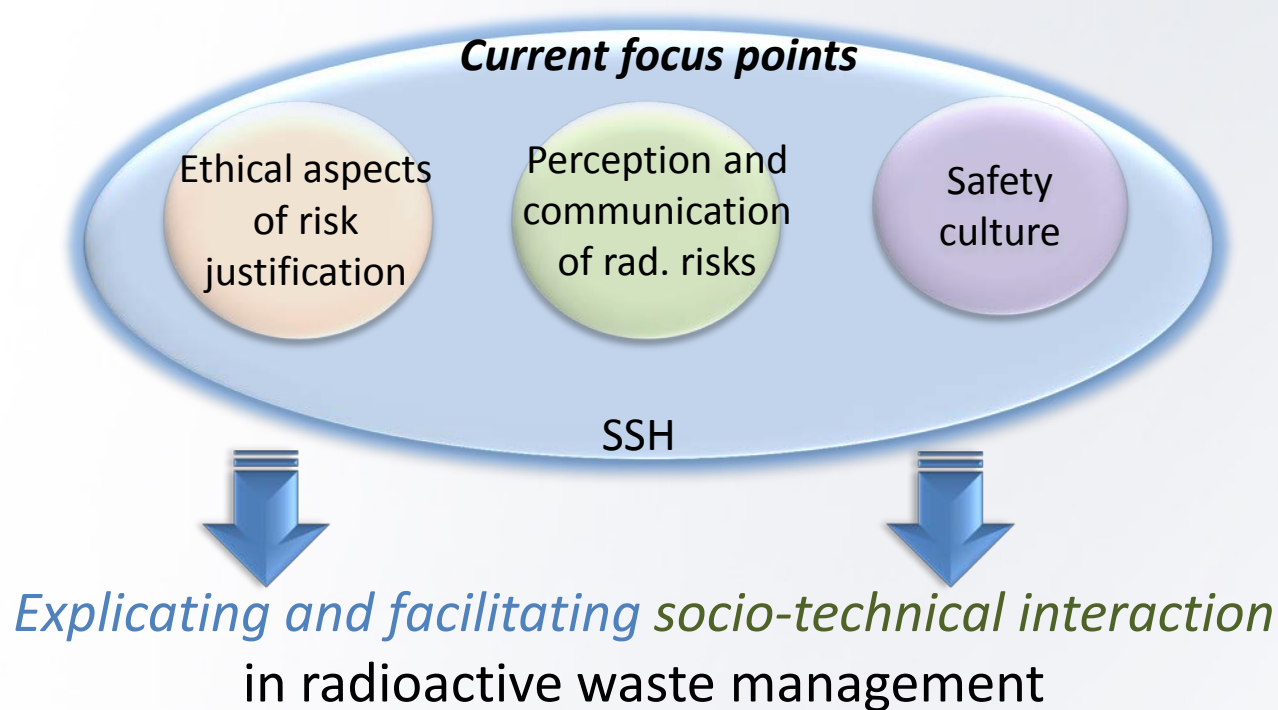
Clarify hypotheses & limitations of models

Improve the treatment of **sensitivities and uncertainties**

Develop and refine concepts and **models for improving long-term safety assessments**.

Develop **broad view on basis for long-term safety assessments** and thereby the scope and contents of relevant safety cases

Integration of Social Sciences and Humanities (SSH) in radwaste R&D



Mapping: Identify and address key socio-technical challenges of geological disposal

Broadening: Stakeholder participation in knowledge production and decision making

Synergies with IGD-TP SRA

Topic 7 Governance & Stakeholder involvement

Topic 6 Monitoring

Topic 5 Safety of construction and operations

Topic 1 Safety case



Invitation to discuss how the European
Radiation Protection platforms and IGD-TP
can (to some extent) integrate

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