

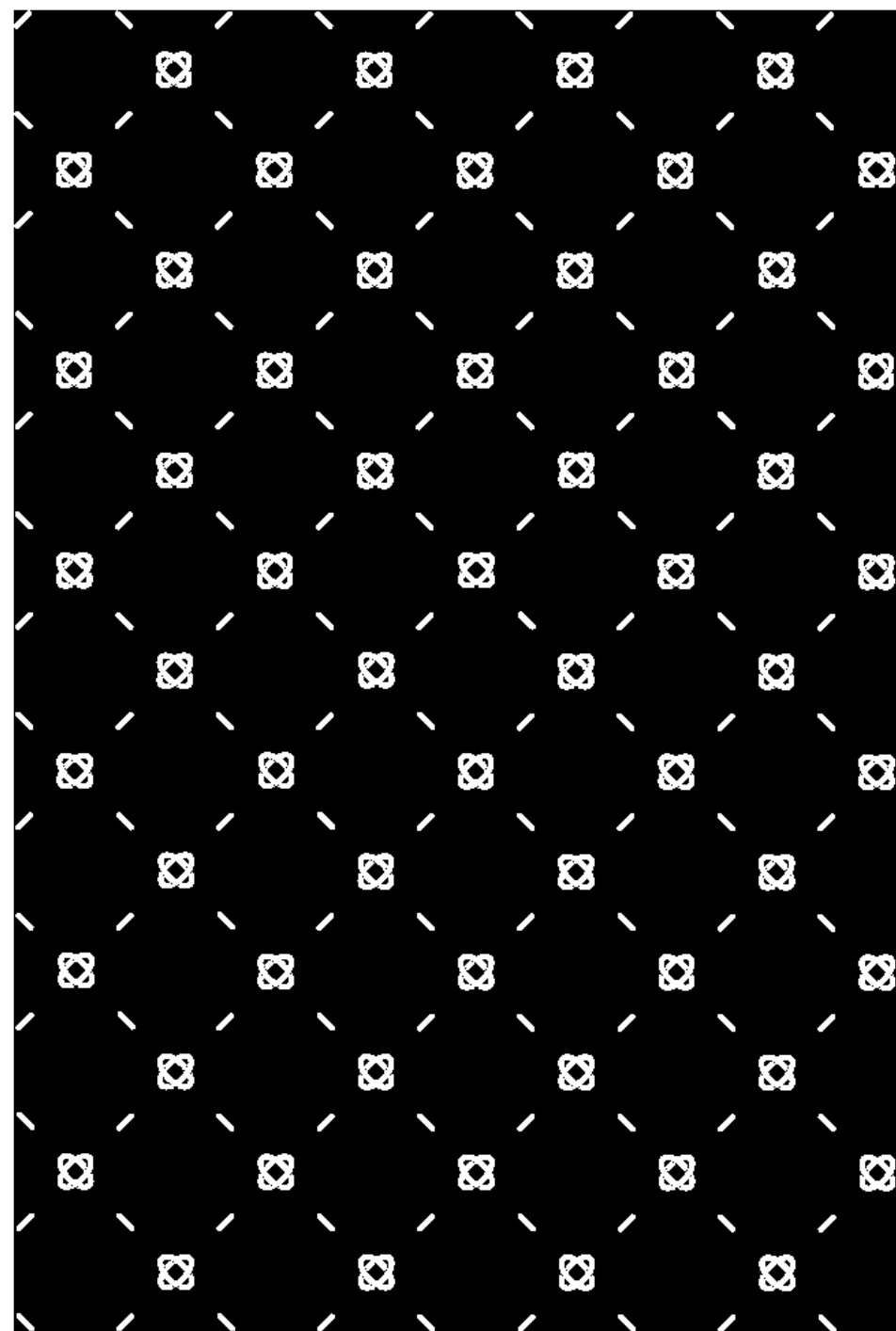


# **Overview of European radiation protection research activities**

Maarit Muikku, Sisko Salomaa, Teemu Siiskonen

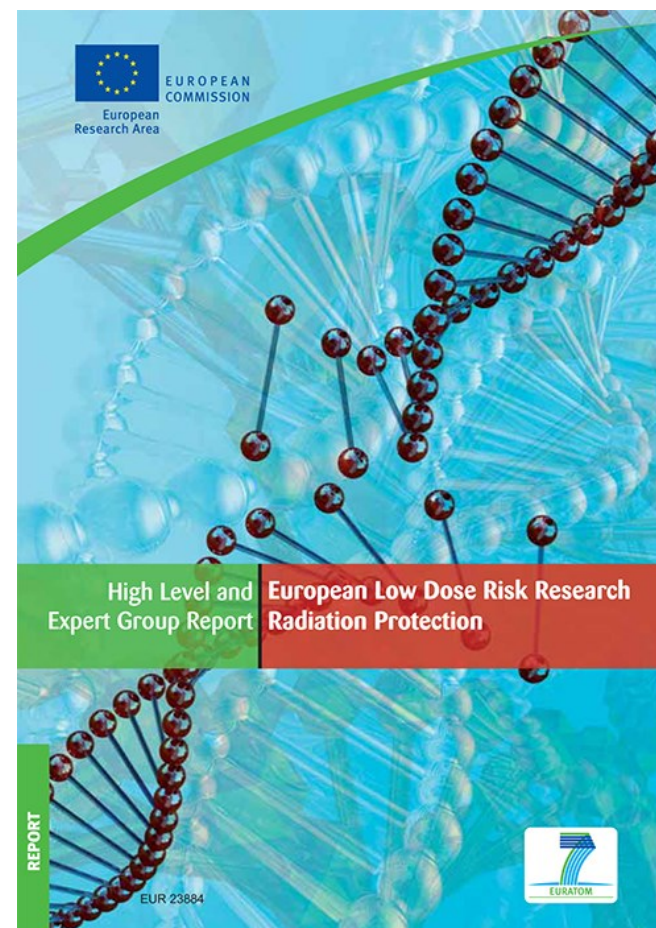
# Contents

- Evolution of European radiation protection research
- Research platforms
- Strategic research agendas (SRA)
- Remaining research gaps



# High Level Expert Group report 2009

- Identifies open gaps in low dose radiation risk and protection
- Recommended Strategic Research Agendas (SRA)
- Initiated MELODI (Multidisciplinary European Low Dose Research Initiative)



# Integration of European radiation protection research

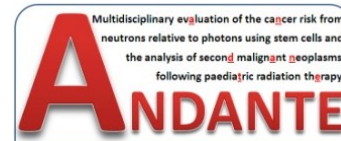
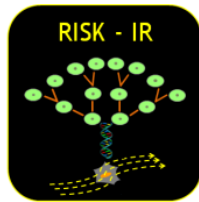


- HLEG Report (2009)
- Letter of Intent: BfS, IRSN, CEA, STUK, ISS (2009)
- MELODI: Association with 15 founding members (2010) & Strategic Research Agenda, SRA (2011)
- NERIS (emergency preparedness) established (2011)
- ALLIANCE (radioecology) (2012)
- EURADOS (dosimetry), SRA (2014)
- EURAMED (medical radiation protection) SRA (2016), association 2017
- OPERRA: Open Project for European Radiation Research Area (2013-2017)
- Horizon2020: European Joint Program CONCERT (2015-2020)

# Number of Euratom RTD projects grouped by field of research platforms from FP4 to FP7

Target Platform	FP 4	FP 5	FP 6	FP 7
ALLIANCE	31	11	5	2
E&T	1	3	7	3
EURADOS	21	16	2	3
MELODI	40	31	11	17
NERIS	8	14	2	3
Medical Applications	7	4	4	6
OTHER	3	4	0	0
SUM	111	83	31	34

# Examples of Euratom projects on low dose risk



# Research platforms 1/2

- ALLIANCE
  - The European Radioecology Alliance
  - Maintains and enhances radioecological competences and infrastructure
  - Scientific and educational challenges
- EURADOS
  - The European Radiation Dosimetry Group
  - Promotes research and development and European cooperation in dosimetry of ionizing radiation
- EURAMED
  - European Alliance for Medical Radiation Protection Research
  - Medical radiation protection and harmonising clinical practice to advance the European radiation protection safety culture in medicine

# Research platforms 2/2

- MELODI

- Multidisciplinary European Low Dose Research Initiative
- Propose R&T priorities for Europe
- Seek the views of stakeholders on the priorities for research, keep them informed on progress made, and contribute to the dissemination of knowledge.

- NERIS

- European Platform on Preparedness for Nuclear and Radiological Emergency response and Recovery
- Improving the effectiveness of approaches for preparedness concerning nuclear or radiological emergency response and recovery
- Promoting more coherent approaches in preparedness
- Identifying gaps and needs for further developments in preparedness
- Addressing new and emerging challenges in the field of preparedness



# Priority topics for research - ALLIANCE

1. To predict human and wildlife exposure in a robust way by quantifying key processes that influence radionuclide transfers and exposure
2. To determine ecological consequences under realistic exposure conditions
3. To improve human and environmental protection by integrating radioecology



# Priority topics for research - EURADOS

1. Updated dose concepts and quantities
2. Improved radiation risk estimates deduced from epidemiological cohorts
3. Efficient dose assessment in case of radiation emergencies
4. Integrated personalized dosimetry in medical applications
5. Improved radiation protection of workers and the public

EURADOS

# Priority topics for research - EURAMED

1. Measurement and quantification in the field of ionising radiation
2. Tissue reactions and biological radiation risk
3. Optimisation of radiation exposure and harmonisation of practices
4. Justification of the use of ionising radiation in medical practice
5. Infrastructure for quality assurance



# Priority topics for research - MELODI

1. To explore the shape of the dose-response relationship for radiation-induced health effects (*Shape*)
2. To understand the potential impact of individual susceptibility on radiation-induced health effects (*Susceptibility*)
3. To identify, develop and validate biomarkers for exposure, early and late effects for cancer or/and non-cancer diseases (*Biomarkers*)
4. To explore and define the role of epigenetic modifications in radiation-induced health effects (*Epigenetics*)
5. To explore the roles of specific target cells for radiation-induced late developing health effects (*Target cells*)
6. To understand the health effects of inhomogeneous dose distributions, radiation quality and internal emitters (*Inhomogeneity*)

# Priority topics for research - NERIS

1. Challenges in radiological impact assessment during all phases of nuclear and radiological events (modeling, monitoring, data assimilation etc. for human and environmental impact assessment)
2. Challenges in countermeasures and countermeasure strategies in emergency & recovery, decision support & disaster informatics
3. Challenges in setting-up a trans-disciplinary and inclusive framework for preparedness for emergency response and recovery (including non-radiological perspectives such as health, ethical and societal aspects)



# Joint gap analysis



European radiation protection research platforms prepared a joint gap analysis of research topics

Gap 1. Modelling of the biokinetic behaviour and risk for internal emitters .....	5
Gap 2. Improving environmental and health monitoring, particularly by lay people.....	5
Gap 3. Dose optimization in medical exposures .....	5
Gap 4. Radiation protection approaches based on individual radiosensitivity.....	6
GAP 5. Individualized dosimetry-based activity determination in radionuclide therapy .....	6
Gap 6. Biomarkers of exposure, disease and susceptibility .....	6
Gap 7. Radiation impact on the immune system .....	6
Gap 8. Epigenetic mechanisms of radiation disease/effect .....	7
Gap 9. Biological and ecological effects of low dose/ low dose rate exposure on humans and biota	7
GAP 10. Integration of environmental exposure assessment for ionising radiation and other stressors .....	7
Gap 11. Optimising emergency and recovery preparedness and response .....	8

**Thank you!**

