

Recent actions taken by European platforms to better coordinate and integrate research activities in radiation protection at the European level

Six European Platforms for a Multidisciplinary Research



Emergency Preparedness & Response

Radioecology

SHINE



Social Sciences

Radiation Protection

Medical Applications



MEDIRAD

EURADOS

Low-Dose Risk

Dosimetry



EUROSAFE | 2017

The Radiation Protection Platforms

- Validity and improvement of the radiation protection system for low-dose & low-dose-rate exposures



- Behaviour of radionuclides in the environment, effects to wildlife and impact/risk assessments of radiation to man and environment



- Preparedness for nuclear and radiological emergency response and recovery



- Radiation dosimetry



- Medical applications of ionizing radiation



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

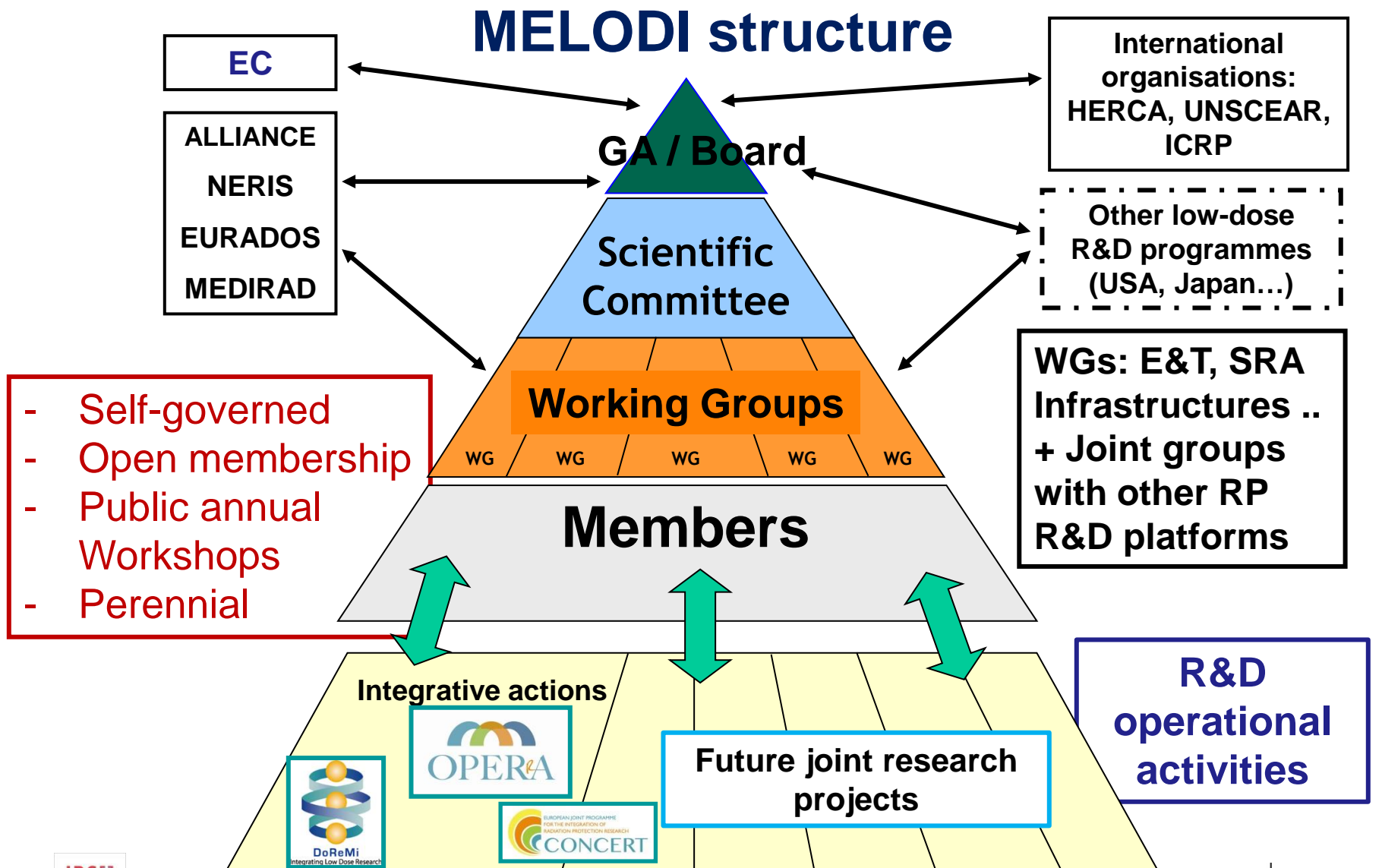
Enhancing multidisciplinary: The European “medical MoU”

- Signed in 2014 between MELODI, EURADOS, ESR (radiology), EANM (nuclear medicine), EFRS (radiography), ESTRO (radiotherapy), EFOMP (medical physics), and notified to the European Commission
- Signatories commit to cooperate on promoting integration and efficiency of European radiation protection research, to maintain and use common infrastructures and to promote scientific E&T
- Signatories set up a Joint Committee and WGs to address this cooperation, and agree to develop mutual information

Enhancing cooperation with other European platforms

- In the frame of the OPERRA project, contacts were established with SNETP and IGDTP representatives
- MELODI, ALLIANCE, EURADOS and NERIS signed a MoU with NUGENIA on 10 October 2017

MELODI: an example of a European R&D associative platform



MELODI Membership

1- AUSTRIA

MUW



2- BELGIUM

SCK-CEN, WIV



3- BULGARIA

NCRRP

4- CROATIA

IMROH

5- CZECH REPUBLIC UNIVERSITY OF SOUTH BOHEMIA

6- FINLAND

STUK

7- FRANCE

CEA, IRSN

8- GERMANY

BFS, HMGU, KIT, KVSF, UNIVERSITY OF ROSTOCK,

9- GREECE

DUTH, EEAE

10- HUNGARY

HUNGARIA ACADEMY OF SCIENCES, NRIRR

11- ITALY

ENEA, INFN, ISS, UNIVERSITY OF PAVIA, UNIVERSITY OF NAPLES

12- NETHERLANDS

RIVM

13- NORWAY

NIPH, NRPA

14- PORTUGAL

IST

15- SPAIN

CREAL, UAM, URV, UAB, SERGAS

16- SWEDEN

SSM, SU

17- SWITZERLAND

IRA

18- UK

PHE, UNIVERSITY OF BELFAST

ASSOCIATIONS

EANM, EFOMP, EFRS, ESR, ESTRO



MELODI Activities

- A major activity of MELODI is the establishment and updating of a long-term **Strategic Research Agenda** (SRA) for research on low-dose risk for radiation protection in Europe (>20 years)
- The SRA is intended to **guide the priorities** for national and European research programmes, and serve the **preparation of European competitive calls**
- MELODI WG SRA annually updates the SRA, prepares a statement on the top priorities (prior to calls) and a long-term roadmap

MELODI Activities

- MELODI **annual workshops** since 2009 (8th MELODI workshop in Oxford, UK on 20-22 September 2016; 9th MELODI workshop in Paris, France on 10-12 October 2017 in conjunction with the 4th ICRP Symposium; 10th MELODI workshop in Rovinj, Croatia on 1-5 October 2018)
- MELODI **prize rewards a young scientist** since 2012
- **Scientific opinions** (e.g. Chernobyl-related research priorities, childhood leukaemia in the vicinity of NPPs, cancer risk in workers exposed to doses below 100 mSv)
- Organisation of **open R&D calls** in the frame of the OPERRA and CONCERT EC-supported projects
- **Education and training** strategy and coordination
- **Infrastructures** strategy and coordination

The European Radioecology Alliance

- Founded in 2009 to develop a vision on long-term research needs in radioecology, to foster cooperation and to assure sustainability of radioecology .
- Members of the ALLIANCE
 - 8 founding members in 2009
 - 25 members in January 2017



EURADOS

- **Voting Member Status (July 2016)**

67 Voting Members from 30 countries

Form the General Assembly

Elects Chair, Vice-Chair, Council

- **EURADOS Board of Officers**

Chair: W. Rühm (Helmholtz Munich, Germany)

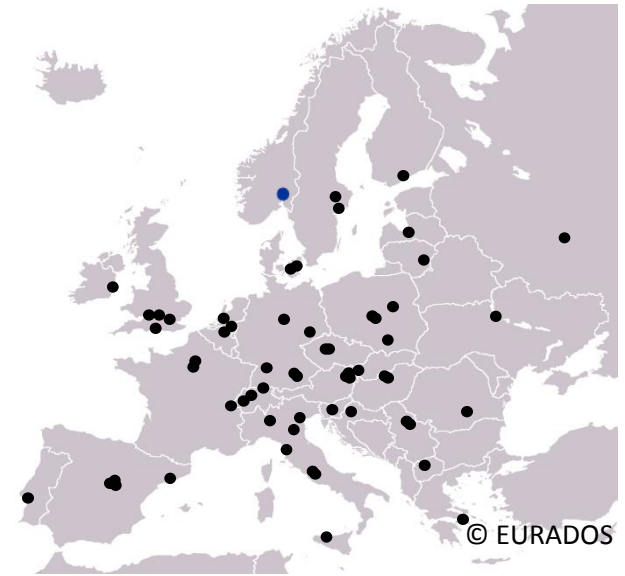
Vice-Chair: F. Vanhavere (SCK-CEN, Belgium)

Secretary: JF. Bottollier (IRSN, France)

Treasurer: H. Schumacher (PTB, Germany)

- **EURADOS Council**

J. Alves, J.F. Bottollier, E. Fantuzzi, P. Fattibene,
M.A. Lopez, S. Mayer, S. Miljanic, P. Olko, W. Rühm,
H. Schuhmacher, H. Stadtmann, F. Vanhavere



NERIS

Emergency preparedness, mitigation, post-accident management

- Created in 2010
- Financial support from the European Commission to structure the Platform
- Adoption of legal statutes in May 2012 in Glasgow
- Self-sustainable since 2014
- Currently:
 - 59 organisations from 28 different countries
 - 28 supporting organisations
 - CEPN in charge of the scientific and technical secretariat

EURAMED

Vision:

- Leading European research activities in medical radiation protection and harmonising clinical practice to advance the European radiation protection safety culture in medicine

Mission:

- Improving medical care through sustainable research efforts in medical radiation protection
- Identifying common research areas
- Serving as a platform for medical radiation protection research
- Developing aligned approaches and responses to European research calls

A Major Tool: the Strategic Research Agenda

- Within the objectives of a platform:
 - Develop a **long-term vision** on the needs and implementation of activities related to the scope of the platform (**decades**)
 - **Sustainable** after FP7 projects
- Appropriate **processes** for defining short-term priorities and long-term needs are vital
- An **adequate Strategic Research Agenda** is:
 - **NOT:** as **extensive** as possible
 - **BETTER:** as **relevant** as possible
 - **Usefulness** for science and society
 - **Shared** by stakeholders and researchers
 - **Realistic** from an operational and scientific point of view

Development of SRAs First Version

Platform	Nbr. of SRA WG Members	Nbr. of Organisations	First Version Released
MELODI	3 (Chair: D. Averbeck, FR)	3	11 October 2010
ALLIANCE	27 (Chair: T. Hinton, FR)	9	10 August 2012
NERIS	10 (plus members of R&D Committee) (Chair of MB : T. Schneider, FR) (Chair of R&D Committee: F. Hardeman, BE)	10	30 March 2012
EURADOS	17 (Chair: W. Rühm, DE)	14	2 June 2014
EURAMED	27 (Chair: C. Hoeschen, DE)	5	14 April 2015

Current Status of SRAs

Platform	Nbr. of SRA WG Members	Nbr. of Organisations	Latest Update
MELODI	11 (plus 2 external experts/observers) (Chair: S. Bouffler, UK)	13	6 October 2017 (8 th Version)
ALLIANCE	27 (Chair: J. Garnier-Laplace, FR)	9	5 September 2013 (2 nd Version)
NERIS	20 (Chair of MB : T. Schneider, FR) (Chair of R&D Committee: J. Camps, BE)	14	8 April 2014 (2 nd Version)
EURADOS	17 (Chair: W. Rühm, DE)	14	2 June 2014 (1 st Version)
EURAMED	27 (Chair: C. Hoeschen, DE)	5	15 February 2017 (1 st Version)

Current Shape of SRAs

Platform	Backbone	First-level Division	Second-level Division
MELODI	Three Key Research Questions	Subsections (3 in total)	Research Priorities (38 in total)
ALLIANCE	Three Important Scientific Challenges	Associated Research Lines (15 in total)	
NERIS	Three Research Areas	Key Topics (7 in total)	Subtopics (38 in total)
EURADOS	Five Visions	Challenges (17 in total)	
EURAMED	Five Main Topics	Key Research Questions (19 in total)	

The example of the MELODI SRA

Backbone	Question 1	Question 2	Question 3
Three Key Research Questions	Dose/dose-rate dependence of cancer risk?	Non-cancer effects?	Individual radiation sensitivity?
Subsections (for each key research question)	Basic Mechanisms Health risk evaluation Impact of radiation exposure characteristics		
Research Priorities (here the 5 short-term priorities identified in 2015 from a list of 38 priorities)	<ol style="list-style-type: none"> 1. To explore the shape of the dose-response relationship for radiation induced health effects at low doses/dose-rates based on key informative epidemiological studies (including where appropriate, molecular or other biomarkers) for internal and/or external emitters, incorporating detailed dosimetric assessment. 2. To explore and define the role of epigenetic modifications in radiation-induced health effects following exposure to low doses/low dose rates. 3. To identify, develop and validate biomarkers for exposure, early and late effects for cancer or/and non-cancer diseases in relation to low doses/low-dose rates and to integrate them in molecular epidemiological studies. 4. To explore the roles of specific target cells for low dose/dose-rate radiation-induced late developing health effects such as cancers, circulatory diseases and cataract. 5. To understand the potential impact of individual susceptibility on radiation risk using cohorts and/or systems models with variations in sensitivity to low doses of radiation, so that differences in the response pathways can be detected and biomarkers validated. 		

Education & Training, Infrastructures

- MELODI (three priorities), EURADOS (two activities) and EURAMED (two activities) SRAs include priorities/activities related to **E&T issues**, while this section is being developed in ALLIANCE
- MELODI (two priorities) and EURAMED SRAs comprise a dedicated section on **infrastructures** (“for quality assurance” in EURAMED), even though the NERIS SRA makes reference twice to research infrastructures along the document, and some EURADOS challenges are undoubtedly related to dosimetry infrastructures

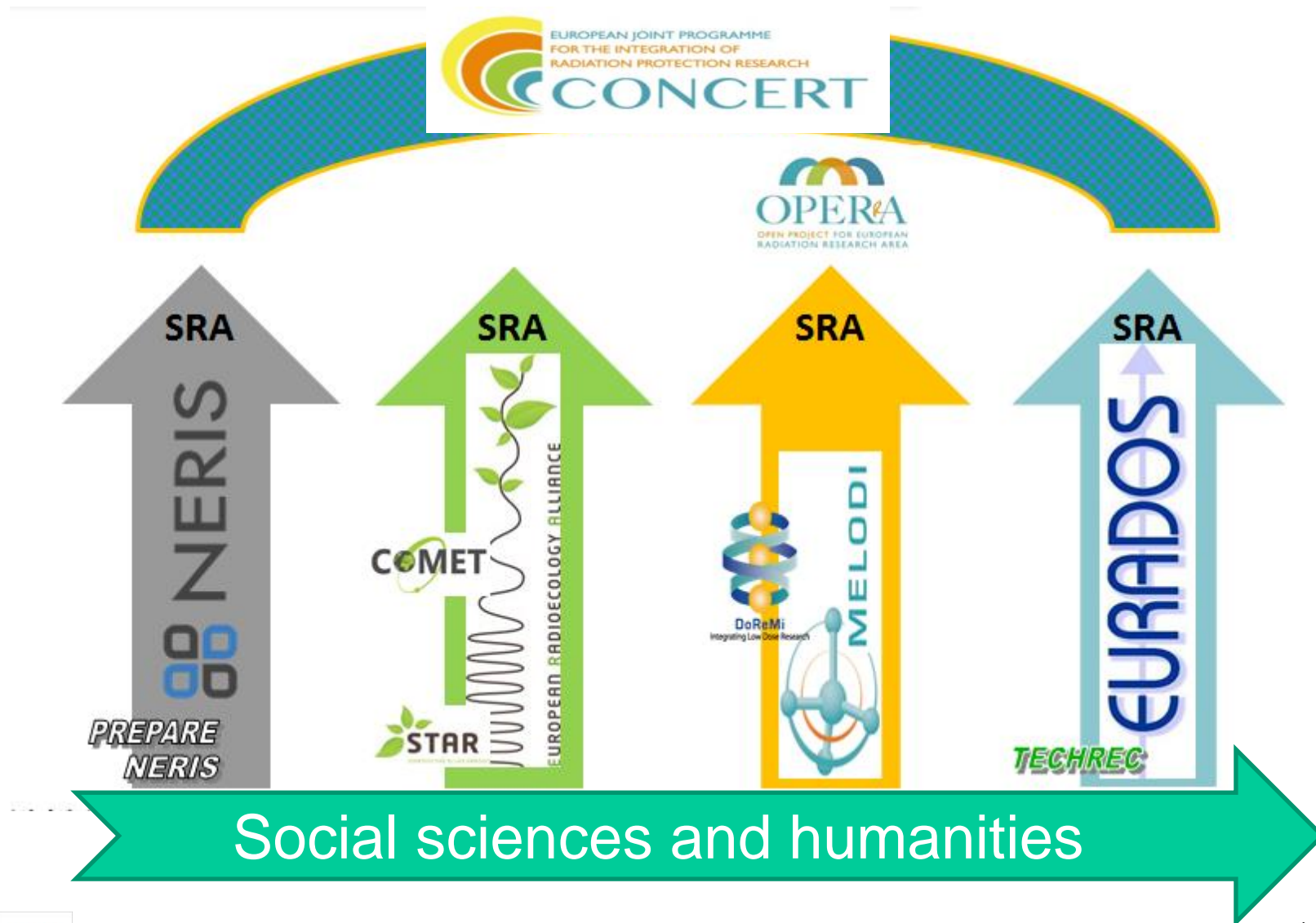
Some Specificities

- MELODI and NERIS identified **synergistic topics with other radiation protection platforms**
- MELODI (five) and NERIS (six) identified **short-term priorities or high-priority projects**, respectively
- ALLIANCE developed **a strategic vision** for the next twenty years following six research lines
- NERIS included a section on **cross-cutting issues** comprising two activities
- EURADOS added a section on **harmonisation and practice** including five activities

Consultation Prior Final Publication

- The five platforms have submitted their respective SRA to **a wide range of scientific communities and stakeholders** *via* questionnaires, e-surveys or workshops
- Comments that were received have been **analysed and considered** when relevant (**feedback provided**)
- **A transparent and open consultation is essential** to ensure the SRA is **usefulness** for science and society, **shared** by stakeholders and researchers, and **realistic** from an operational and scientific perspective

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



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 organization

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 cofund**
- Joint programming
- Open research calls
- Integrative activities

ALLIANCE

EURADOS

MELODI

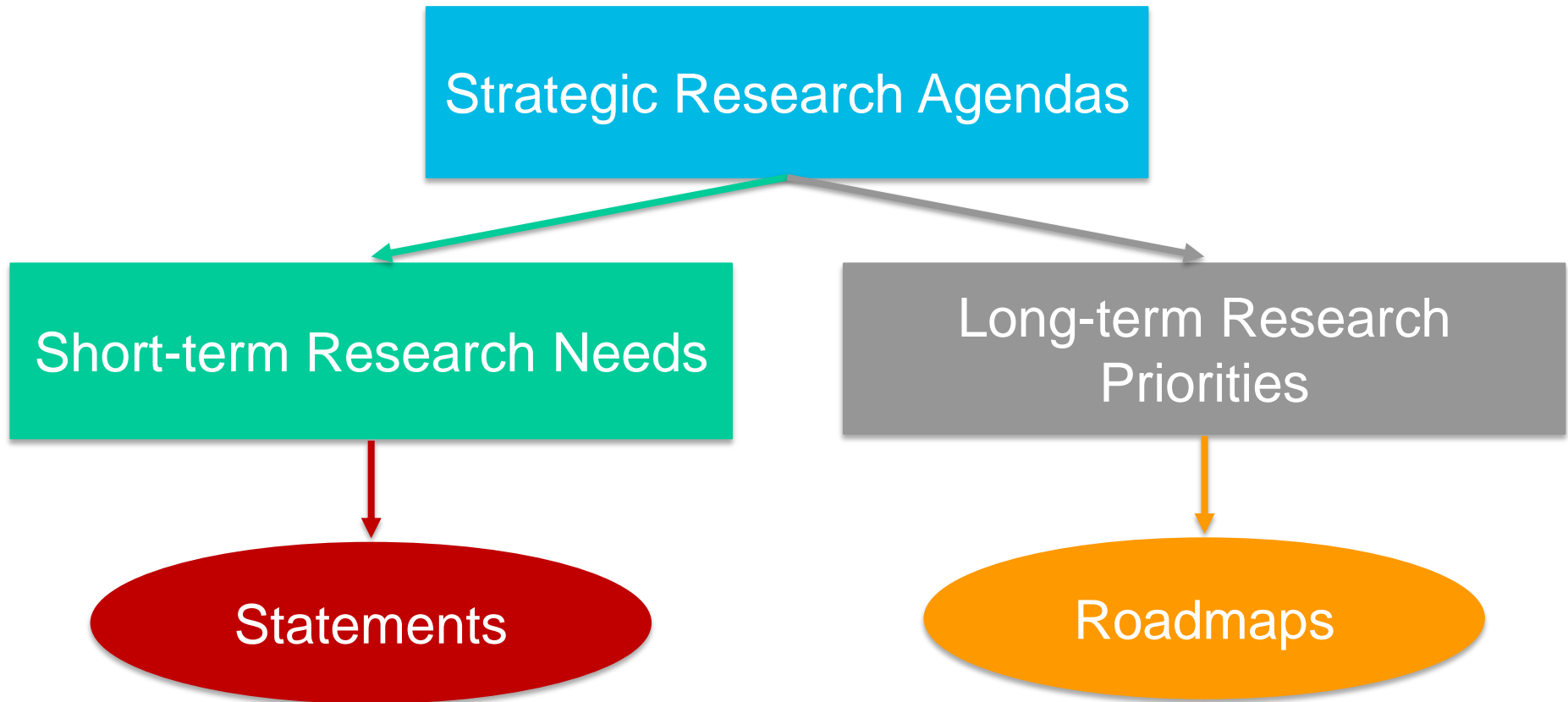
NERIS

EURAMED

The EURATOM integration concept: platforms + projects

Platforms Projects	MELODI	ALLIANCE	NERIS	EURADOS	EURAMED
DoReMi	—				—
COMET		—			
PREPARE			—		
OPERRA	—	—	—	—	— — —
CONCERT	—	—	—	—	— — —
MEDIRAD	—			—	—

The Way Forward



Development of a Joint Roadmap for Radiation Protection Research: CONCERT WP3 task

- 3.1 Integration of SRAs and research priorities from research platforms and national programmes
(Lead : BfS)

- 3.2 Joint priority setting (Lead : SCK•CEN)

- 3.3 **Joint** roadmap development for a long term strategy of radiations protection research in Europe
(Lead : MELODI)

Joint Roadmap research and tools

- RPR research includes :
 - Basic & applied science
 - Supported by state-of-the-art *related* research fields
 - Decision-making support
 - Dissemination & communication
 - Infrastructure, dosimetry & monitoring, E&T

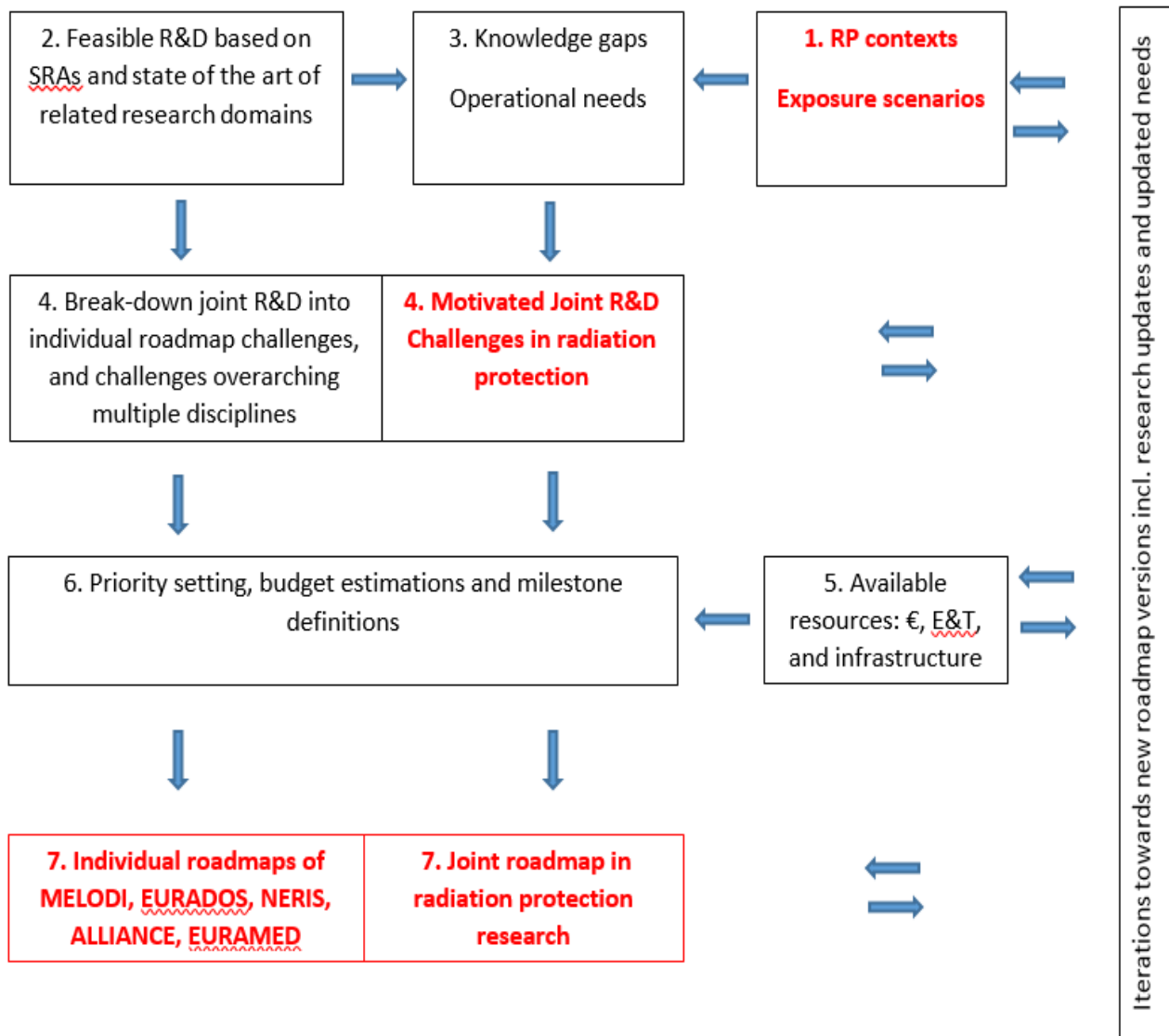
Joint roadmap based on (1) sources of exposure

- Human activities related to **medical therapy and diagnosis** using radionuclides and ionising radiation
- Human activities related to **nuclear energy applications and other applications of ionising radiation** not related to medical applications
- Human activities related to **natural resources**, containing naturally occurring radionuclides in which radionuclides are processed neither for their fissile nor their fertile properties
- **Natural radiation**: telluric and cosmogenic, and natural events leading to radionuclide emissions

Joint roadmap based on (2) realistic exposure scenarios

- Exposure of patients
- Exposure of general public & environment to non-medical anthropogenic sources of IR under normal operation
- Planned exposure of workers
- Exposure of general public & environment to legacy
- Exposure of general public & environment to natural radiation
- Exposure of general public, environment & workers to emergency scenarios
- Exposure of general public & environment & workers to malevolent use of IR

Strategy towards scenario-based Joint Roadmap



For each of these exposure scenarios we define in the following order:

1. Questions, e.g.

- What is my risk / benefit?
- What are the confounding factors or other individual sensitivities?
- How does radiation impact the environment and our food chain?
- Is extrapolation of cancer risks from high to low dose correct?
- Are we prepared for impact assessment for accidents scenarios?

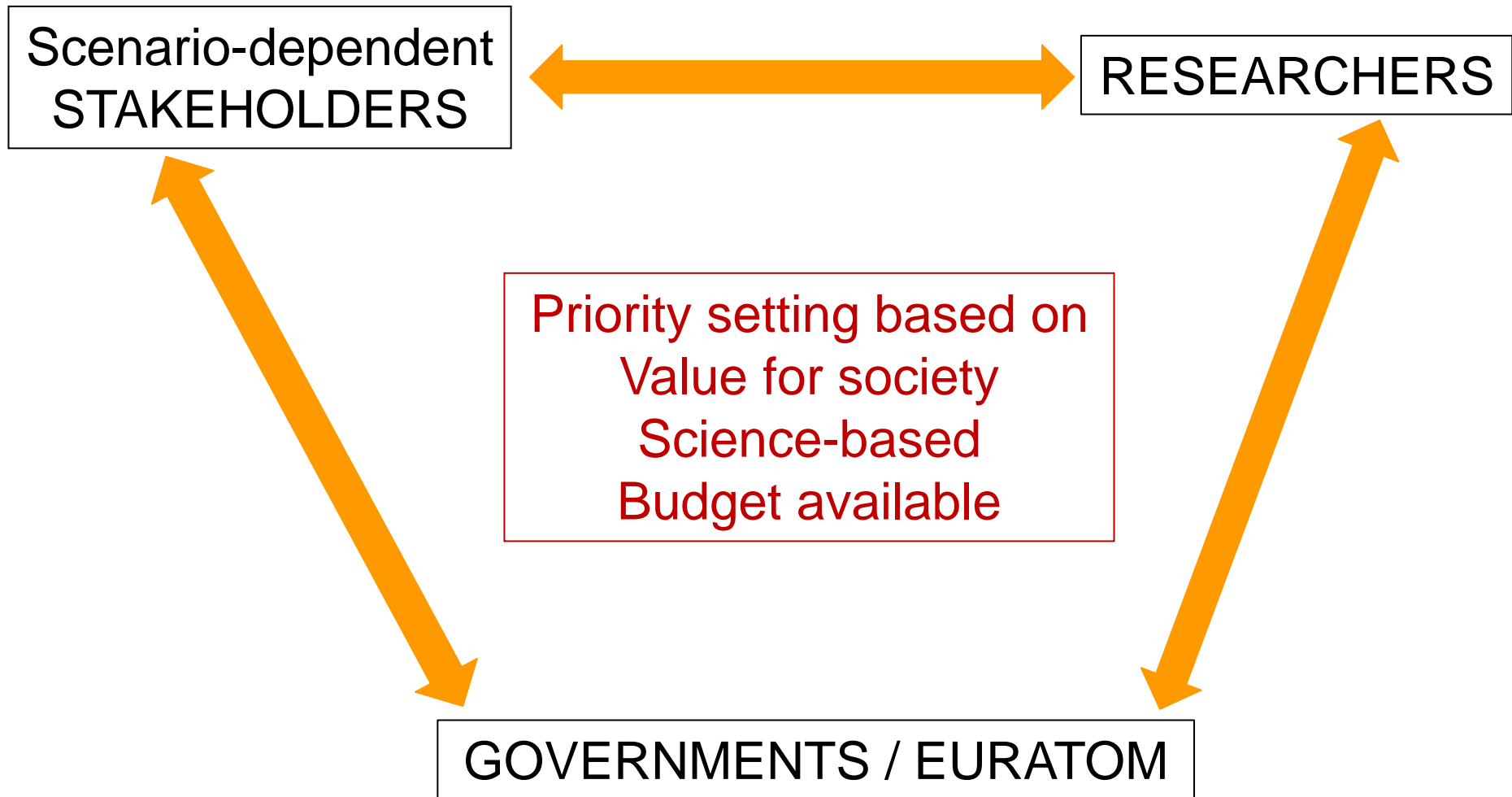
2. Needs, e.g.

- Harmonized dosimetry and data management
- Inclusion of IR in the exposome concept

3. R&D challenges, e.g.

- Molecular epidemiology on **updated** biomarkers linked to Adverse Outcome Pathways, taking into account impact of other stressors leading to similar adverse outcomes
- Radiobiology – systems biology to identify mechanisms and biomarkers
- Impact of IR on health (e.g. (pre)pathologic, immune system, microbiome, hereditary)
- Radioecology: Source-term, dynamic transport mechanisms in environment & modeling
- Ecosystem's biology (ecological interactions, biodiversity, food chain,...)

How to “weigh” priority criteria?



Timeline: roadmap preparation

- 1st joint roadmap version expected end November 2017
- Setup of methodology towards stakeholder consultation on first version (CONCERT WP3 – WP5)
- Updated version of roadmap expected in May 2019

Recent actions taken by European platforms to better coordinate and integrate research activities in radiation protection at the European level