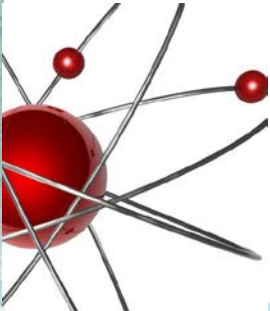


MELODI

Multi-disciplinary European Low Dose Initiative: Approach for Radiation Protection

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**EURATOM in Horizon 2020
Giornata Informativa Nazionale EURATOM
ENEA - Roma, 09/02/2018**

Summary

- Damaging knowledge gaps
- 4 key challenges for research
- The EURATOM response
- Cooperation with the medical scientific community
- Cooperation with Japan
- Conclusion

Knowledge gaps affect the RP system

- In the EU, radiation protection is mostly based on ICRP 103 recommendation, implemented through a EURATOM Directive and ensuing national legislation
- This system generally provides an effective protection of people and the environment
- However at very low doses /dose rates, the implementation of the three guiding principles of justification, optimization and limitation of exposures can be distorted by the poor understanding of uncertainties which affects the knowledge of exposure/effects relationship, and related mechanisms
- This leads to doubts about the robustness of the European radiation protection system at low dose exposures

Damaging consequences

- Confusion in public opinion between a precaution-based regulatory system and the existence of measurable health risks at low dose/dose rate exposures (LNT "syndrome")
- Poor judgment outside the RP professional sphere about the hierarchy, prevalence and prevention of radiological risks that can lead to inadequate risk management decisions
- Unresolved issues of radiation protection optimization, mainly in the medical field (individual sensitivity, damage to healthy tissues associated to radiotherapy, advanced protocols such as proton therapy)

4 key challenges

Closing such knowledge gaps is an ambitious target for RP research which requires to:

- Enhance multidisciplinary
- Develop a holistic medium term research strategy
- Secure stable funding
- Include societal aspects in the R&D scope

The EURATOM response: European integration of radiation protection R&D

Why?

- Improve the radiation protection system for low dose / dose rate exposures (MELODI)
- Better understand the behaviour and effects of radionuclides in the environment and on ecosystems (ALLIANCE)
- Improve radiological preparedness and response for large scale pollutions (NERIS)
- Provide excellence in radiation measurements techniques and related dose estimations (EURADOS)
- **Optimize the use of radiations for medical applications**
- **Help society in its interaction with radiation risk**



The EURATOM response

How?

1. Formalize *overarching questions* to science from society with a holistic perspective: **done with HLEG Report for the low dose issues**
2. Develop concerted *thematic Strategic Research Agendas*: **done by MELODI and other platforms**
3. Open periodic *thematic RTD calls* (EC+National funding) based on elements of *questions* and relevant elements of *thematic SRAs*: **experimented with OPERRA, COMET, DoReMi and CONCERT projects**
4. Create, select and fund *multidisciplinary consortia* to operate R&D: **7 OPERRA and 2 COMET funded consortia approved, CONCERT Call Jan 2016**
5. Involve *medical research teams*: **OPERRA, CONCERT actions**
6. Analyse feed back from *results* and assess *impact*, train and educate: **OPERRA and CONCERT actions and dedicated calls**

The EURATOM integration concept: platforms + projects

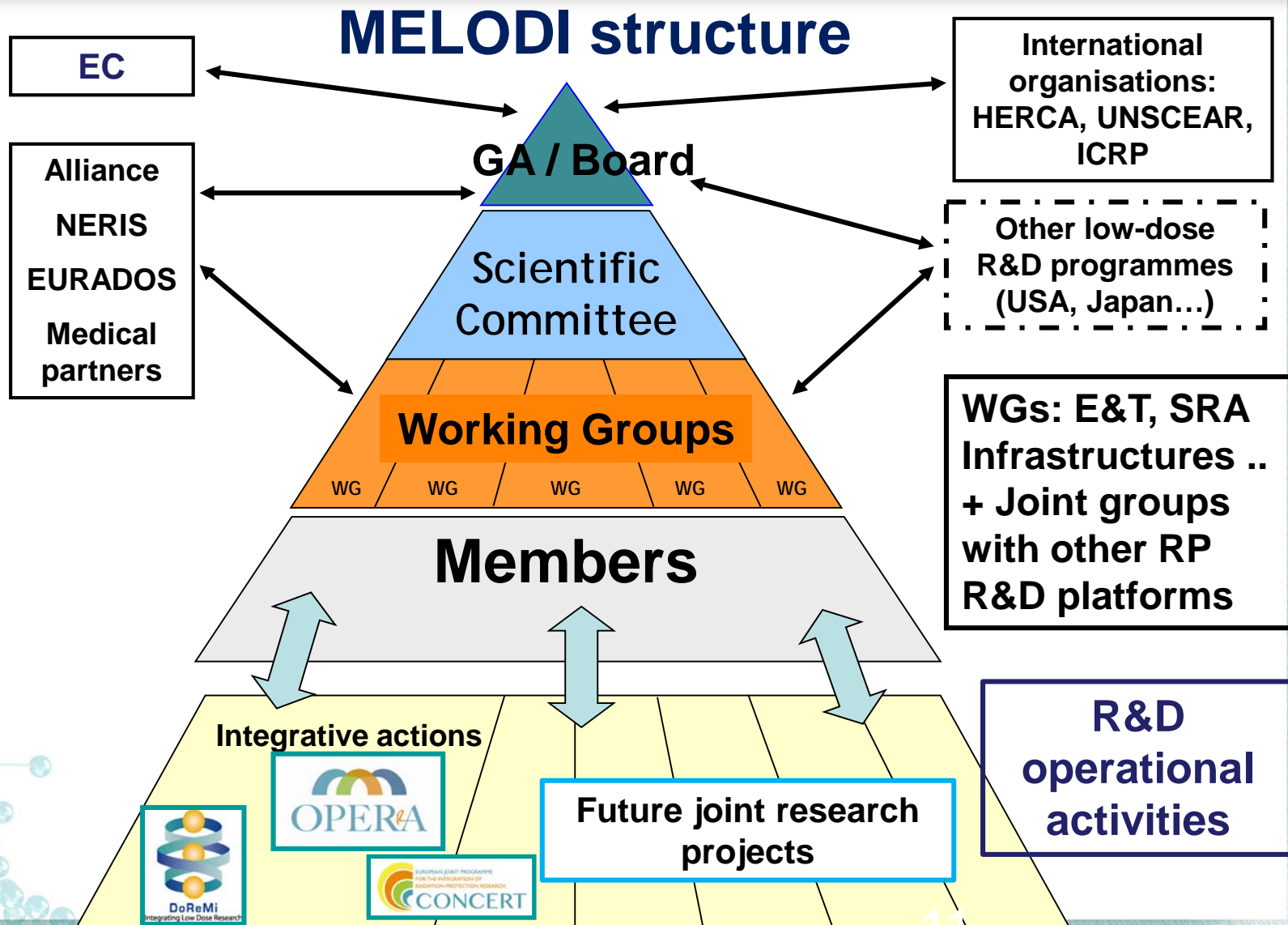
Platforms Projects	MELODI	Alliance	Neris	Eurados [Euramet]	Medical [Health]
DoReMi	—————				—————
Comet		—————			
Prepare			—————		
OPERRA	—————	—————	—————	—————	—————
Concert EJP	—————	—————	—————	—————	—————
EURATOM 2016/2017	—————			—————	—————

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

<http://www.melodi-online.eu/>

MELODI Association: Status, membership

- Legal entity: non profit Association under French law
- Statutory mission: art II: « *The purpose of the MELODI Association is to **constitute a European Research Platform in the field of low-dose exposure to ionizing radiation and of radiation protection** from such exposure aiming for a progressive integration of related national and European activities.../... **MELODI defines priority scientific goals and implements research.** »*
- Membership rules: *Founding members, with national role for RP R&D, committed to R&D integration, Ordinary members, contributing to MELODI work*



1- AUSTRIA	MUW						
2- BELGIUM	SCK-CEN, WIV						
3- BULGARIA	NCRRP						
4- CROATIA	IMROH						
5- CZECH REPUBLIC	UNIV. of SOUTH BOHEMIA						
6- FINLAND	STUK, UEF						
7- FRANCE	CEA, IRSN						
8- GERMANY	BFS, HMGU, KIT, KVSF, UNIV. of ROSTOCK,						
9- GREECE	EEAE						
10- HUNGARY	OSSKI, MTA EK						
11- ITALY	ENEA, INFN, ISS, UNIV. of PAVIA, UNIV. of NAPLES, IOV						
12- NETHERLANDS	RIVM						
13- NORWAY	NIPH, NRPA						
14- PORTUGAL	IST, ULISBOA						
15- SPAIN	IS GLOBAL, UAM, URV, UAB, SERGAS						
16- SWEDEN	SSM, SU						
17- SWITZERLAND	IRA						
18- UK	PHE, UNIV. OF BELFAST						
ASSOCIATIONS	EANM, EFOMP, ESR, ESTRO						

- 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 annual workshops** (8th MELODI workshop in Oxford on 20-22 September 2016; 9th MELODI workshop in Paris on 10-12 October 2017 in conjunction with the 4th ICRP Symposium)
- **MELODI prize rewards a young scientist**
- **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

MELODI SRA frames a holistic strategy based on 3 key questions and 3 research paths (from the cell to the whole organism)

- Dose/dose rate dependence of cancer risk?
- Threshold exposures for protection from health risks other than cancer?
- Reliable methods for identifying individual radiation sensitivity, and addressing related ethical issues?

MELODI SRA frames a holistic strategy based on 3 key questions and 3 research paths
(from the cell to the whole organism)

- Radiobiology research to improve understanding of mechanisms contributing to radiation risk
- Epidemiology research to integrate biological indicators into radiation risk evaluation
- Radiation protection research to better understand the specificities of internal or inhomogeneous exposures, and of different radiation qualities

On 5 December 2013, in Brussels, **MELODI**, the European Radioecology Alliance (**ALLIANCE**), **NERIS** and **EURADOS** have signed a Memorandum of Understanding (MoU)

- *to promote joint research needs*
- *to establish strategic priorities*
- *to develop cooperation in the implementation of research, in particular through a better integration of national R&D programmes within a holistic European approach*

Cooperation with the medical scientific community

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 multidisciplinary with medical research: a win-win strategy

- Bringing together medical and radiation research communities on radiation epidemiology and radiobiology
- 5 major European medical associations have joined MELODI and are developing a SRA in coordination with MELODI
- EURATOM has published in September 2015 a new call for end 2016 to support this bridging strategy

Contribution from and benefits to the medical scientific community

- Controlled exposure of patients: R&D will benefit from the input of medical disciplines and from unique and high quality patients/dosimetry data
- Radiobiology and epidemiology: R&D will benefit to both medical research and radiation protection science
- Imaging and therapy protocols: R&D will accelerate the development and acceptability of advanced optimized protocols

Cooperation with Japan

MELODI cooperation with Japan

- Pr Ohtsura NIWA is member of MELODI Scientific Committee and DoReMi External Advisory Board
- University of Hiroshima, University of Nagasaki, FMU and NIRS are partners in the OPERRA-funded SHAMISEN project
- Other research institutions could be associated to new R&D projects?
- Japan R&D institutions and researchers could create a national Strategic Research Agenda and cooperate with MELODI on this basis?

MELODI in liaison with ICRP

- ICRP joined forces with the 2nd European Radiological Protection Research Week (ERPW2017), to collaborate closely with MELODI and other European Radiation Protection Research platforms
 - *1 of the 5 topical sessions on key issues in radiological protection → Effects, Risks, and Detriment at Low Dose and Low Dose-Rate (with MELODI)*
- 2017 MELODI issued its 8 version of SRA
 - in the EURATOM 2018 call the EC makes an explicit reference to the SRA in context of ongoing priority research on low-dose effects
 - Mechanisms of low-dose effects and dose-response models are also an important topic in the ICRP Areas of Research to Support the System of Radiological Protection
- MELODI and ALLIANCE, NERIS, EURADOS, EURAMED as well as social sciences and humanities researchers are engaged in the elaboration of a joint roadmap
 - the first steps and current ideas to build a joint roadmap for radiation protection research (document available as CONCERT deliverable: http://www.concert-h2020.eu/Document.aspx?dt=web&file=/Lists/Deliverables/Attachments/47/D23_CONCERT_D3_4_First%20Joint%20Roadmap_04012018_approved.pdf&guid=01b5ac77-b2ec-4cda-9c98-917dba396f0f)
 - The approach has a lot in common with that of ICRP since reference is made to the relevant research priorities as defined by [ICRP, Areas of Research to support the System of Radiological Protection, 2017. ICRP ref 4832-9526-9446.](#)

Conclusion

- Low dose radiation risk remains an important issue in today's society
- Traditional R&D approaches and funding modes are unlikely to provide adequate answers
- The general shift from population and worker exposures to the medical environment provides new opportunities for multidisciplinary research
- European integration of research is a step forward; enhanced international cooperation would be another step forward. Japan, USA and Europe could lead the way together

Thank you for your attention

Further information:
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*Presentation based on the talks of J. Repussard, and J.R.Jourdain
RERF/ICRP/IRSN Meeting
16 December 2015, Hiroshima, Japan*