

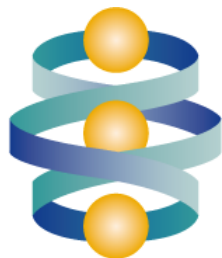
**DoReMi** Integrating Low Dose Research

# **Radiation quality in the DoReMi Transitional Research Agenda (TRA) and the MELODI Strategic Research Agenda (SRA)**

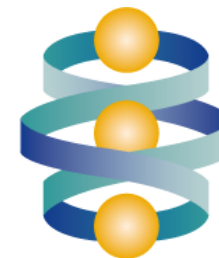
*Prioritization of research issues*

**Dietrich AVERBECK,**  
*IRSN/CEA, France*

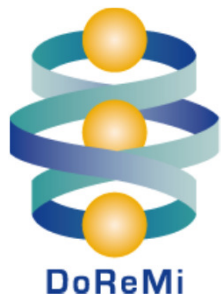
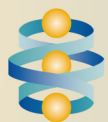
**DoReMi Radiation Quality Workshop**  
**SCK-CEN Headquarters, Brussels, 9-10 July 2013**  
**14h25- 14h40**



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## The DoReMi network of excellence

‘*Low Dose Research towards Multidisciplinary integration*’

(2010-2016, short term)

and

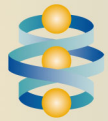
the MELODI association

‘**M**ultidisciplinary **E**uropean **L**ow **D**ose **I**nitiative’

(2010-2030, long term)

are both part of a new operational strategy on low dose risk research and radiation protection in Europe, and are based on the HLEG report (2009) ([www.hleg.de](http://www.hleg.de))

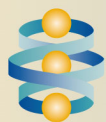
- *Both aim to promote research on low dose health risk and radiation protection in order to reduce the uncertainties in the system of protection.*



## DoReMi TRA and MELODI SRA

In European projects and research activities **strategic agendas** play an important role by indicating consensual **directions** and **Roadmaps** for future research and by formulating **research priorities guiding future internal and external calls** at the European level. The strategic agendas of DoReMi and the MELODI association have been designed to achieve these goals.

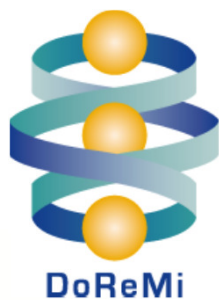
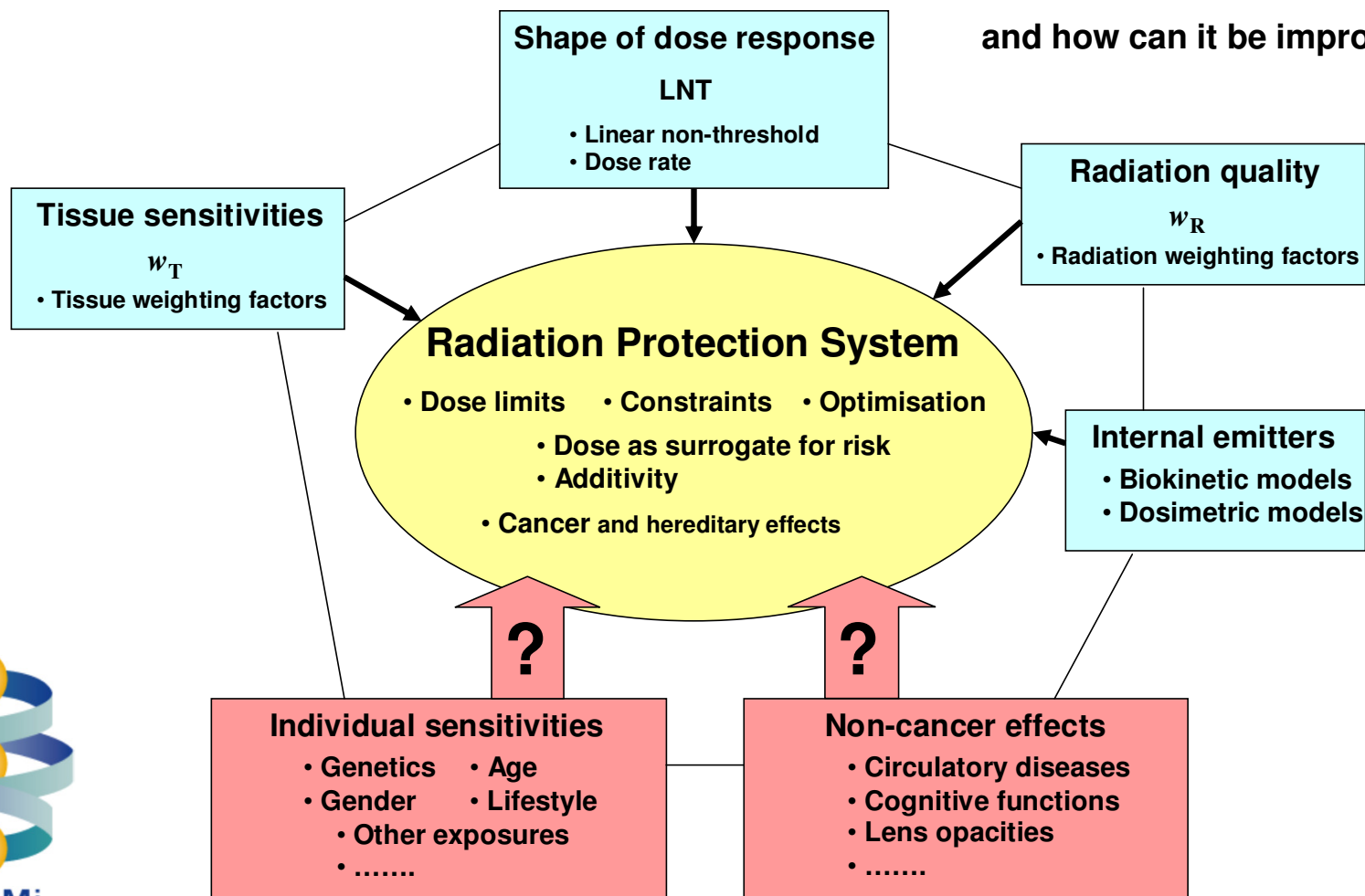
- The first DoReMi short term **Transitional Research Agenda (TRA)** has been worked out by DoReMi WP2 and the DoReMi consortium in accord with MELODI in 2010 ([www.doremi-noe.net](http://www.doremi-noe.net)) and received since then some updating (TRA statements).
- The MELODI long term **Strategic Research Agenda (SRA)** has been first established by a MELODI working group (Peter O'Neill, David Lloyd, UK and Dietrich Averbeck, France) in conjunction with yearly MELODI Workshops (<http://www.melodi-online.eu/sra.html>) and is regularly updated since 2010 together with short SRA statements.

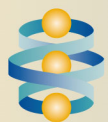


**H**igh  
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**G**roup

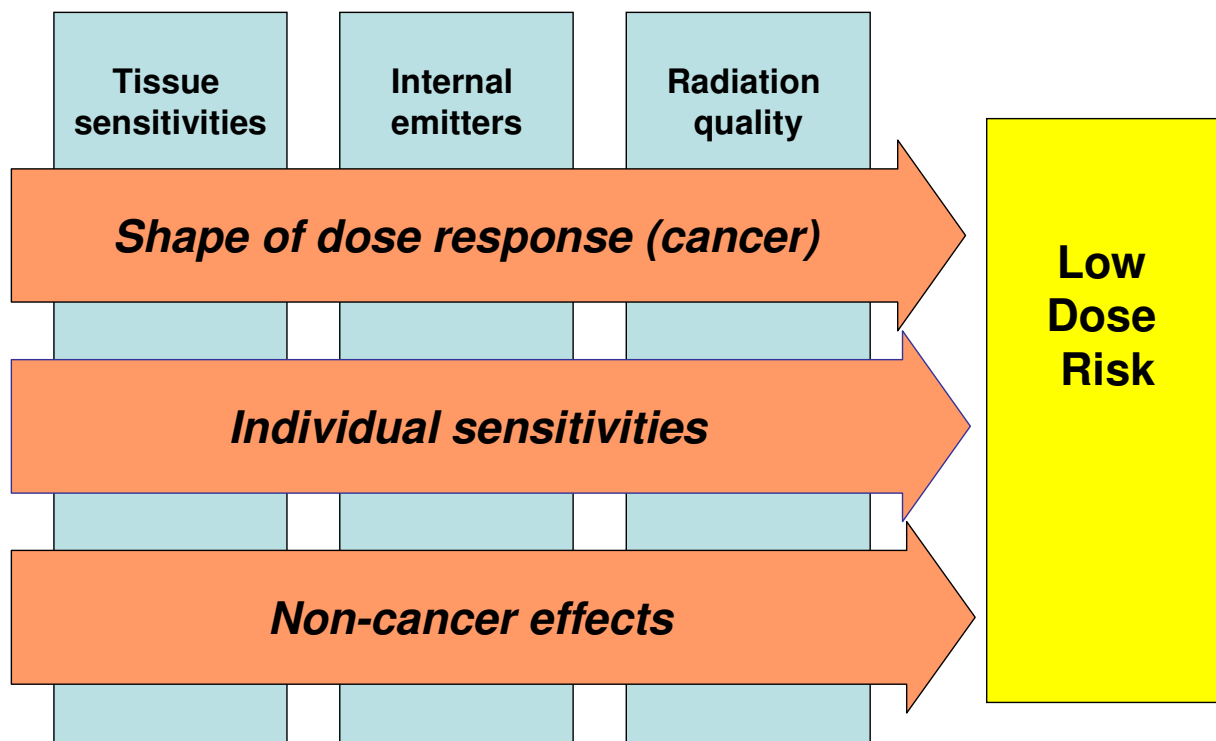
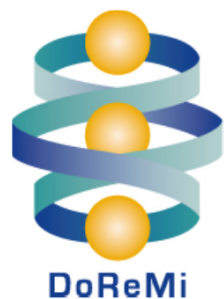
## How robust is the system of radiation protection and risk assessment?

and how can it be improved ?

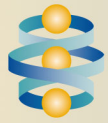




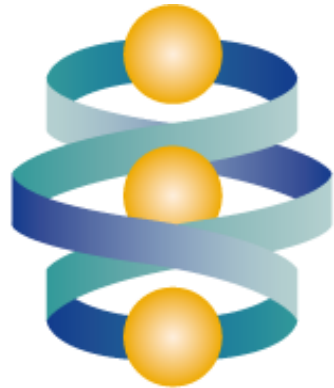
## Joint Programme of Research



- **Radiation Quality is an integrated part of the DoReMi Joint programme of Research (see WPs 5,6,7)**



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## **DoReMi - Low Dose Research towards Multidisciplinary Integration**

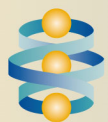
Deliverable

### **D2.2 First Version of TRA**

**Due date:** Month 4 (30 April 2010)

**Actual submission date:** month 7 (1 July 2010)

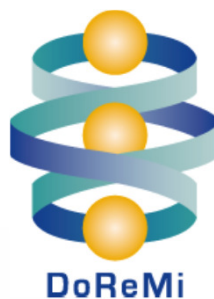
**Status:** Final

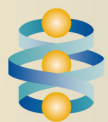


## DoReMi TRA

### Key issues for cancer and non-cancer effects

- **The dependence on energy deposition**
- **The dependence on dose-rate**
- Tissue sensitivities
- Modification of risk by genetic and epigenetic factors and gender
- Effect of age
- Effect of lifestyle
- Effect of physiological state and environmental exposures
- The role of non-targeted effects in low dose risk
- Possible radiation-induced hereditary contribution



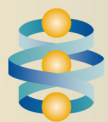


## **Radiation quality research in the DoReMi TRA (1)**

As a typical **cross-cutting issue**, **radation quality** has implications for all categories of radiation risk and therefore has to be addressed in a coordinated way across all DoReMi WPs.

There is a need for dedicated studies on the mechanism of the biological responses to radiation at low doses and dose rates (modelling different radiation qualities, inhomogenous distributions from internal emitters, different types of cells and tissues, etc.) to be integrated in experimental and epidemiological studies.



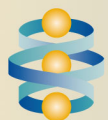


## Radiation quality research in the DoReMi TRA (2)

### Research priorities

The **radiation quality dependence** of relevant endpoints in IR induced cancers and non cancer effects has to be determined.

- In particular, effects of **initial damage** (DNA and non-DNA) and its evolution in time (considering faithful or misrepair), intra- and intercellular signalling and non targeted effects have to be considered.
- A deeper understanding is needed on the relevance of chromosome aberrations, mutation induction and carcinogenesis of **clustered damage induced by a single track**.
- Also, the role of **dose-rate effects and mixed field effects** (including synergistic or adaptive phenomena) should be better understood.



## Radiation quality research in the DoReMi TRA (3)

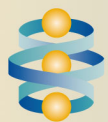
### Research priorities

Specific topics are addressed in the different DoReMi WPs

WP5 considers **specific DNA damages and cellular responses induced by radiations of different qualities, particular biophysical interactions of radiation with cellular targets, the induction and repair of damage involved at different dose levels and dose-rates in human cells of different origin** (see also WP6 and 7). **These tasks aim to improve cancer risk estimation in complex exposure situations.**

WP6 considers the **contribution of individual genetic variation including studies of different cell types and tissues, effects of age and of radiation quality (cancer and non cancer effects) and the modeling of individual radiosensitivity responses.**

WP7 addresses **influence of dose, dose rate and radiation quality on the inflammatory response** in an integrated approach from cells to mathematical modelling:



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