

# TOP 2

# European Joint Programme for the Integration of Radiation Protection Research **CONCERT**

**Coordinator, Thomas Jung**

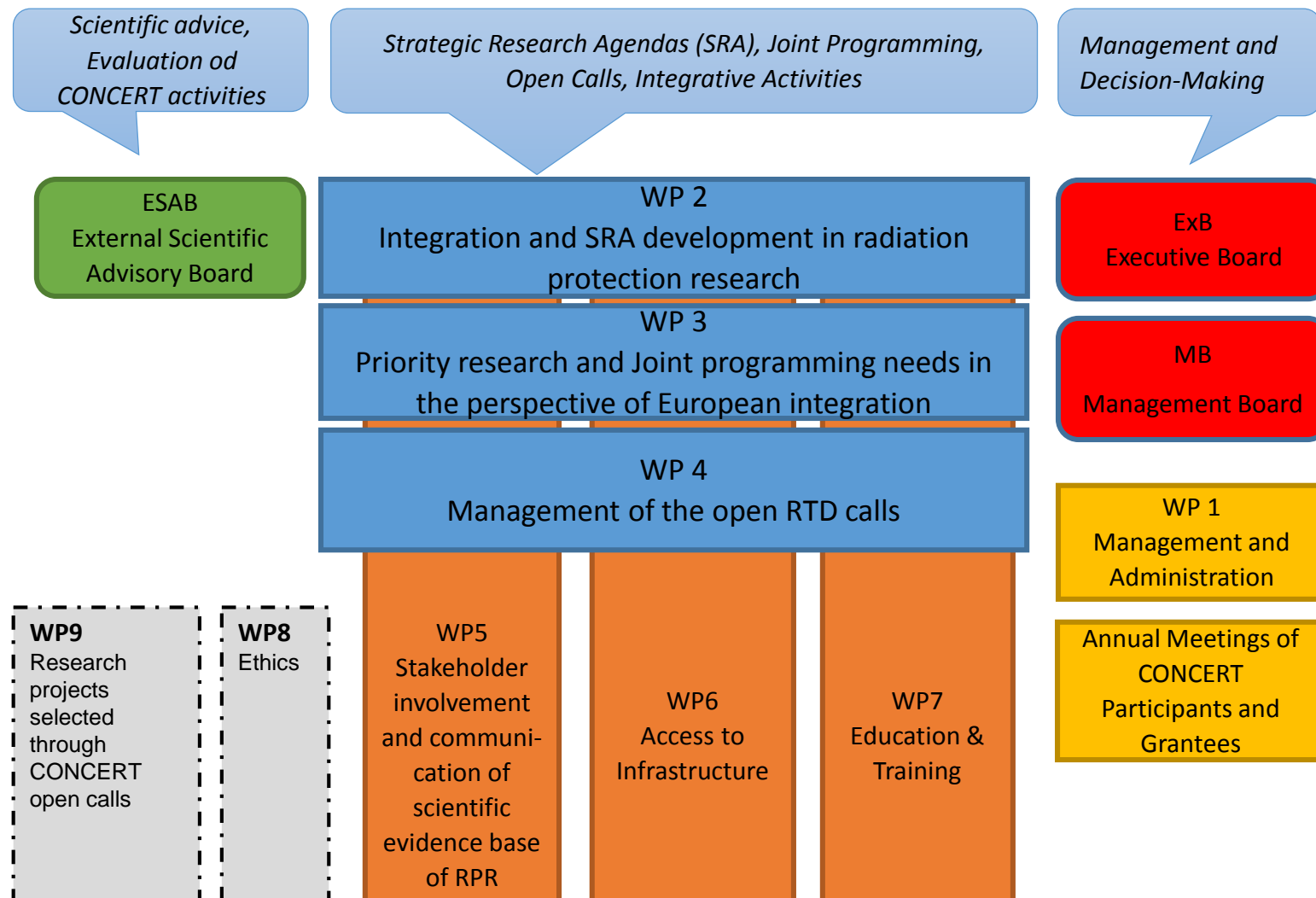
## CONCERT EJP:

- contributes to the **sustainable integration** of European and national research programmes
- achieves the attraction and pooling of national research efforts with EURATOM research programmes in order to make **better use of public R&D resources** and to tackle **common European challenges** more effectively by **joint research efforts**

## CONCERT EJP:

- The consortium exists of 36 National Programme Managers and Programme Owners from 23 European Member States plus Norway and Switzerland,
- and of 5 RPR Platforms being [MELODI](#), [ALLIANCE](#), [NERIS](#), [EURADOS](#) and [EURAMED](#).

# Components of CONCERT EJP



Thank you for your attention

# TOP 3

# European Radiation Protection Research Platforms: Objectives, Aims and Vision for future RPR in Europe

**MELODI, Thomas Jung**



## Establishment of European Radiation Protection Research Platforms

- **HLEG** recommendation (2009)
- Set up of the platforms **MELODI**, **ALLIANCE** and **NERIS**
- Integration of **EURADOS**
- Initiative for to establish **EURAMED**
- Support for a SRA in **Social Sciences and Humanities**

## ● Goal and Strategy

- Counteract the loss of scientific as well as professional competence in radiation protection
- Establish networks of European RPR institutions
- Guide Research priorities for national and European RP Research programmes
- Foster multidisciplinary research

Strategic Research  
Agendas

Education and Training  
Programmes

Research Infrastructure  
Initiatives

## Vision for Radiation Protection Research in Europe

- **Joint Programming** on the basis of Strategic Research Agendas of the European RPR Platforms
- **Open science, open research calls** and **European context**-appropriate evaluation of research projects
- **Unbiased** and **fair funding scheme** and decrease of administrative burden
- **Permanent secretariat** for administration and management of a future European Joint Programme for RPR

Thank you for your attention

# Role of POM in the EJP CONCERT

**CIEMAT, Spain; Almudena Real**

The POM (Programme Owner and/or Programme Manager) has to:

- **Co-fund** the participation of (National) radiation protection research groups in the EJP-CONCERT.
- **Manage** research on Radiation Protection at National level (aligned with European priorities).
- **Inform** the national research groups on the Open Calls.

- **Co-funding-related:**

- Get financial support (in cash) from the Government or other National organizations with budgets for RP research (e.g. Spanish Regulatory Body).
- Alignments of European and National funding systems (**In Spain only marginal costs are paid**).
- Manage the co-fund (i.e. transfer the money to the TPs; make the financial statements of TPs and LTPs ).

PO  
MINECO  
(September 2016)

PM  
CIEMAT  
Mandate June 2014

- **Research priorities-related**
  - National Radiation Protection Research Programmes based on European Platforms SRAs and Roadmaps.
- **Communication-related:**
  - Explain the role of the PM and the PO in CONCERT.
  - Explain the benefits of not being LTP (difficult!).



- Greater involvement of the Spanish Government in radiation protection research issues than before EJP-CONCERT. Better knowledge of European priorities in RP.
- The “paper work” has significantly increased (at least for beneficiaries): e.g. yearly financial statements.
- Difficult to explain the advantages of being Third Party (TP) instead of Linked Third Party (LTP) to the researchers.
- In Spain, it was not possible to co-fund E&T activities for TPs (organization of courses) since the government has not a mechanism to do so.

Thank you for your attention

# TOP 4

# WP2

## Integration and SRA development in radiation protection research

**Lead: University of Eastern Finland, Finland**

**Sisko Salomaa**

- To bring together the European research community in order to enhance radiation protection knowledge
- Engage RP research platforms
  - Support the open and participatory SRA process
  - Explore joint interests
- Integrate national POMs
  - Become members of the platforms or participate in open scientific meetings
  - European Radiation Protection Research Weeks
  - Open consultations on SRAs and research priorities
- Exploring agendas for research and innovation supporting the implementation of the revised European Basic Safety Standards

- The SRAs of RP research platforms (MELODI, ALLIANCE, NERIS, EURADOS, EURAMED) are revised on a 5-year basis
- Annually, short-term research priorities are elaborated and discussed by open consultation.
- The platforms develop a long-term roadmaps for research
- Providing input to Joint Programming (WP3)
- Developing a research agendas for social sciences and humanities
- Exploring research and innovation supporting the implementation of the revised European BSS

## Description of the WP Tasks

- Task 2.1** - Development of Strategic Research Agenda, roadmap and priorities for research on low dose risk (**MELODI**)
- Task 2.2** - Development of Strategic Research Agenda, roadmap and priorities for research on radioecology (**ALLIANCE**)
- Task 2.3** - Development of Strategic Research Agenda, roadmap and priorities for research on emergency preparedness and response (**NERIS**)
- Task 2.4** - Development of Strategic Research Agenda, roadmap and priorities for research on dosimetry (**EURADOS**)
- Task 2.5** - Development of Strategic Research Agenda, roadmap and priorities for research with the **medical** scientific community (**EURAMED**)
- Task 2.6** - Creating Strategic Research Agenda on **social sciences and safety culture** in radiation protection (**SHARE**)
- Task 2.7** - Research and innovation supporting the implementation of the revised European **Basic Safety Standards**

# Short and long term research agendas





# Integration of European radiation protection research



## SHARE

HLEG Report (2009):  
concern on decline of resources  
and fragmented research



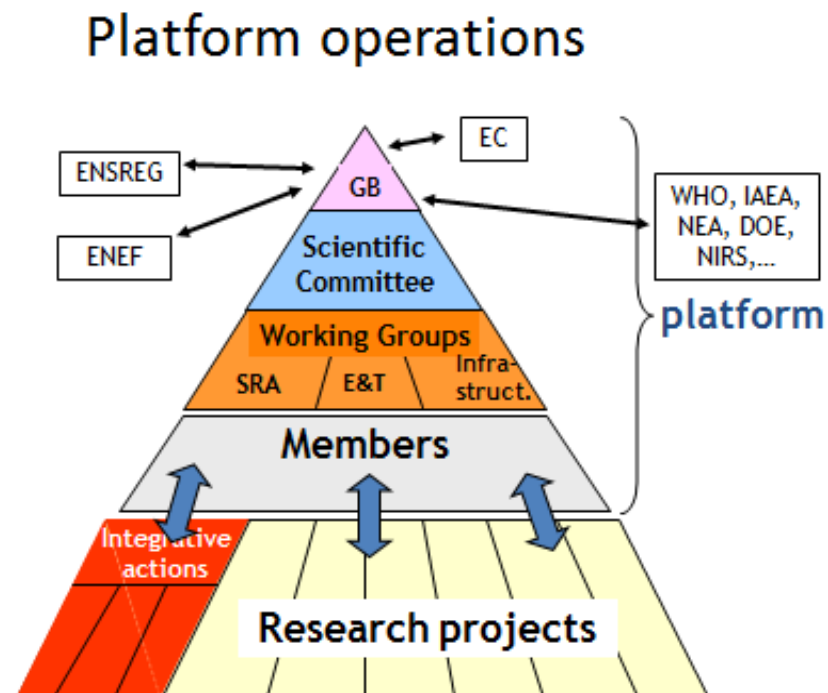
- Letter of Intent for MELODI (2009)
- Association with 15 founding members (2010)
- Strategic Research Agenda, SRA (2011)
- NERIS established (2011)
- ALLIANCE (2012)
- EURADOS SRA (2014)
- EURAMED SRA (2016), association 2017
- SRA on SSH (2018), SHARE Association (2019?)

OPERRA - Open Project for European Radiation Research Area  
CONCERT - European Joint Program

- All deliverables and milestones have been achieved
- Delays were sometimes encountered:
  - Mainly because of coordinating activities with other events (e.g. WP3, ERPW) to ensure participation of relevant actors and to allow economic use of resources
  - As for the research supporting the implementation of BSS (Task 2.7), the regulators to be consulted were busy with the legal aspects of the process and did not have much time to think about the role of RTD
    - Basic research addressing the science underpinning the system of protection (health effects, mechanisms of radiation action)
    - Technological research addressing standards (metrology, dosimetry) and innovation
    - Applied research addressing radiation practices (exposure scenarios, support to decision making)

The European RP research platforms are now well established and operational:

- Maintaining and updating their SRAs
- Preparing short-term statements on research priorities
- Developing long-term research roadmaps for Europe and beyond
- Engaging with international scientific community and stakeholders (WP5)
- Coordinating infrastructures (WP6)
- Supporting Education & Training (WP7)
- Conducting Reviews on the state of science to support the updating of their SRAs
- Providing input to Joint Programming (WP3)



- RICOMET 2019 - Social Science and Humanities in Ionising Radiation Research, Barcelona 1-3 July
  - Addressing the human aspects of RP: Ethical questions, risk perception and communication, safety culture
  - Founding Assembly for the SHARE platform
- D2.13 Updating SRAs of MELODI, ALLIANCE, NERIS and EURADOS – expected by month 54 (Nov 2019)
  - EURAMED will also join the activity

# Thank you for your attention



# SHARE

# TOP 5

# WP 3

## Priority research and joint programming needs in the perspective of European Integration

**Lead: SCK•CEN, Belgium**

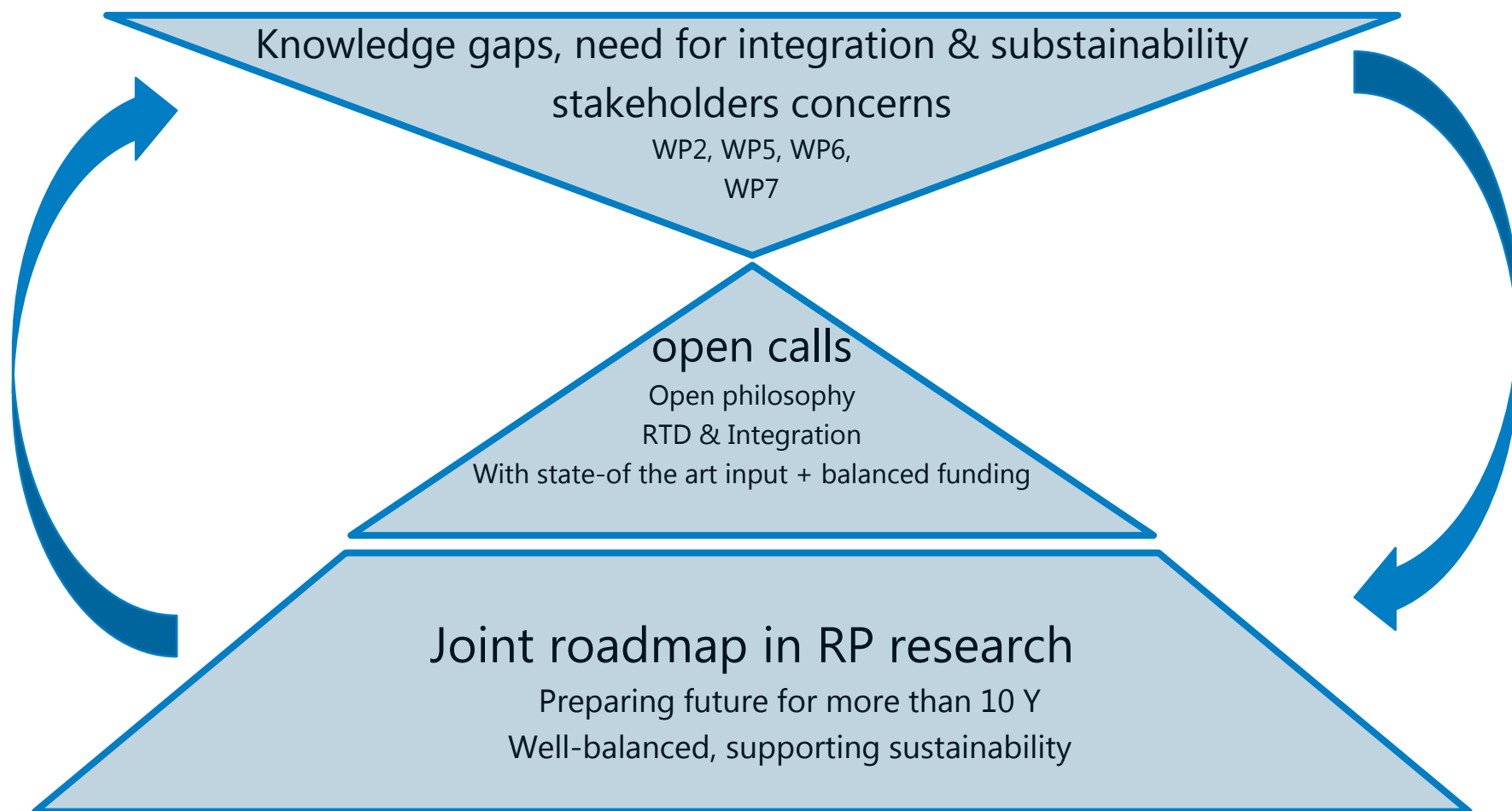
**Nathalie Impens**

- Joint priority setting for radiation protection research in Europe for optimal deployment of EU and national resources in radiation protection research, to
  - prepare documentation to support the development of open research calls, and other scientific and technical integration initiatives within CONCERT
  - develop a joint roadmap for radiation protection research
- Including input from RPR platforms, POMs/LTPs, stakeholders and running and finished projects.

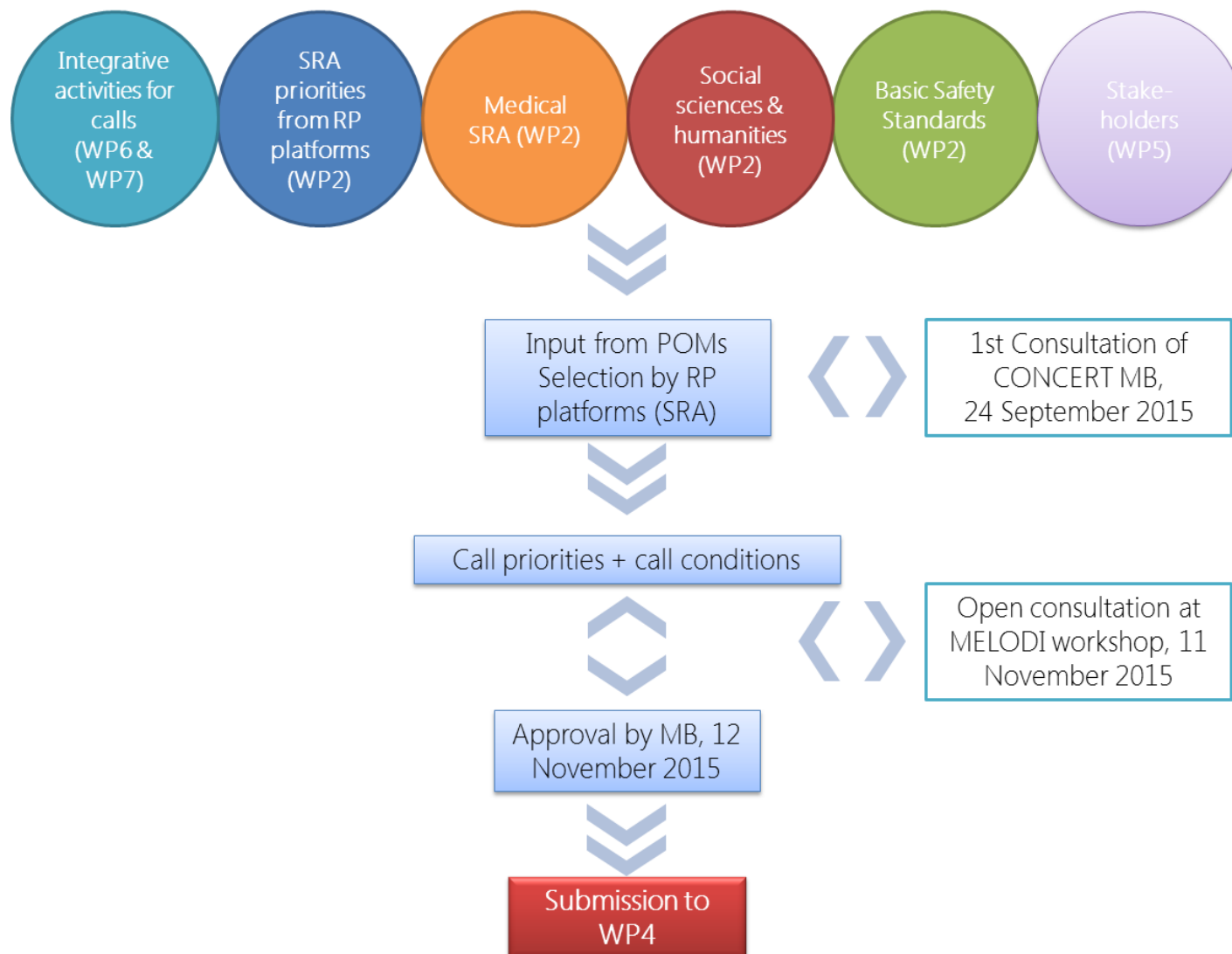


- T3.1** Integration of SRAs and research priorities from research platforms and national programmes (Lead: BfS)  
→input mostly from WP2 + platforms
- T3.2** Joint priority setting (Lead: SCK•CEN)  
→including input from all WPs + broad research community  
→ mainly to prepare input for annual calls
- T3.3** Joint roadmap development for a long term strategy of radiation protection research in Europe (Lead MELODI)  
→society based long-term research challenges, E&T and infrastructure needs in a long-term perspective alongside the individual roadmaps from research platforms (WP2)

# Feed-back loop for priority setting



# Consultation flow for priority lists: example



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D 3.1, D 3.2: annual priority lists to inform 2 CONCERT Calls. (M9 and M21)

D 3.3: 3<sup>rd</sup> annual priority list as gap analysis to inform project proposals for Euratom Call of 2018 (M33)

D 3.4: 1<sup>st</sup> joint roadmap draft (M30: = 6 months delay to include POMs advices and allow platforms to assemble info adequately)

D3.5: 4<sup>th</sup> annual priority list (M45); no new info available as Euratom call outcome was not known yet.

- Up till now, WP3 has enabled to bring together the platforms, POMs, running projects and stakeholders for priority setting
- Priority lists were delivered for 2 CONCERT calls and 1 gap analysis for platforms from Euratom call 2018
- First draft joint roadmap was assembled and is being under investigation by stakeholders.

## D3.6 priority list if extra EC funding available (M57)

## D3.7 first final joint roadmap for radiation protection research (M48→M55):

- Strong collaboration with **WP2** to align individual and joint roadmaps:
  - workshop planned in May 2019
- Guidance by **WP5** for stakeholder input into joint roadmap
  - various video conferences planned till September 2019 (M52) on different research challenges with dedicated stakeholders
- Consolidation of information in final JRM in M55

Thank you for your attention

[nimpens@sckcen.be](mailto:nimpens@sckcen.be)

# TOP 6



# WP 4

## Organization and management of CONCERT open RTD Calls

**Lead: The French National Research Agency (ANR), France**

**Monika Frenzel**

The objective of this work package is to organize and manage two CONCERT open research calls.

## Goal:

- funding the most excellent research projects for radiation protection research in Europe,
- integration of universities, research centres and radiation protection institutions,
- integration of partners from new and less well represented member states,
- integration of E&T as well as optimal use of research infrastructure.

**Funding scheme:** 70% contribution by the EURATOM grant (CONCERT) and 30% in-kind contribution from CONCERT members (Beneficiaries and Linked Third Parties) and Cash-funding for Third Parties

The objective of this work package is to organize and manage two CONCERT open research calls.

Development and integration of WP4 to allow the highest level of trust by all parties involved in the open call for proposals, including external stakeholders, by:

- Ensuring transparency, whilst maintaining confidentiality of processed information where and when appropriate,
- Preventing the occurrence of conflicts of interest,
- Ensuring equal treatment of the applications,
- Implementing call procedures allowing funding of research proposals based on scientific quality and expected implementation performance and impact with respect to overall CONCERT objectives.

➔ WP4 consists of independent funding organisations experienced to manage open calls

## Task 4.1: Setting up a Joint Call Secretariat

Establishment of the Call Steering Committee (CSC, all WP4 members, 3-4 funding organisations) and the Joint Call Secretariat (JCS) at ANR (France).

## Task 4.2: Preparation of the Open Call documents and launch of the call

The scope of both open calls for proposals was developed and provided by WP2 and WP3 and focused on the priorities established in WP3 on the basis of research priority specific SRAs and priorities updated in WP2. Funding regulations were based on a set of documents provided by the CONCERT coordination (WP1).

The further **call documents** were developed in WP4:

- The call text ➔ **Validated by the EC**,
- The document for the Governance of the Call and Evaluation procedures,
- The Guidelines for applicants,
- The proposal submission template,
- The declaration of commitment and confidentiality of information, and declaration of interest form provided to reviewers.

Preparation of the electronic online submission tool.

## Task 4.3: Implementation of the open call

Management of the submission, eligibility analysis and evaluation procedure of both open calls for research proposals.

Conditions for evaluation:

- at least 3 experts per proposal,
- 3 evaluation criteria of equal importance: (1) **scientific excellence**; (2) expected **impact** towards CONCERT's scientific and integration objectives; (3) **quality and efficiency of the implementation**,
- remote evaluation, consensus peer review panel meeting (development of ranking list(s) of eligible proposals),
- preparation of Evaluation Summary Reports, sent to project coordinators,
- contribution of WP4 to the negotiation while contracting projects selected for funding.

## **Task 4.4: Monitoring of the calls and the funded projects**

### Task 4.4.1 Assessment of the calls for proposals.

- Development of a set of indicators
- Development of lessons-learnt

### Task 4.4.2 Monitoring of funded projects.

- Follow up on research projects funded in both CONCERT calls
- Development of templates for mid-term and final-reporting
- Communication of results of both calls by different means, e.g. the CONCERT newsletter (AIR2)

## Call 2016:

- Deliverables : Call documents (**D4.1**), final ranking list (**D4.2**),
- Milestones: **MS20 (call launch)**, **MS22 (Midterm evaluation)**.

Merging of D4.2 with D4.7 (Lessons Learnt).

Delay of the first call due to long administrative procedures regarding the first amendment to the GA and approval of the call text by the commission: 6 months later

## Call 2017:

- Deliverables : Call documents (**D4.4**), final ranking list (**D4.5**),
- Milestones: **MS21 (call launch)**, **MS23 (Midterm evaluation)**.

➔ In time.

D4.2, D4.5, D4.9 each 2 versions:  
Confidential (EC) version and public version.

**New Deliverable D4.9\*: Researches funded under the two CONCERT calls (M34)**

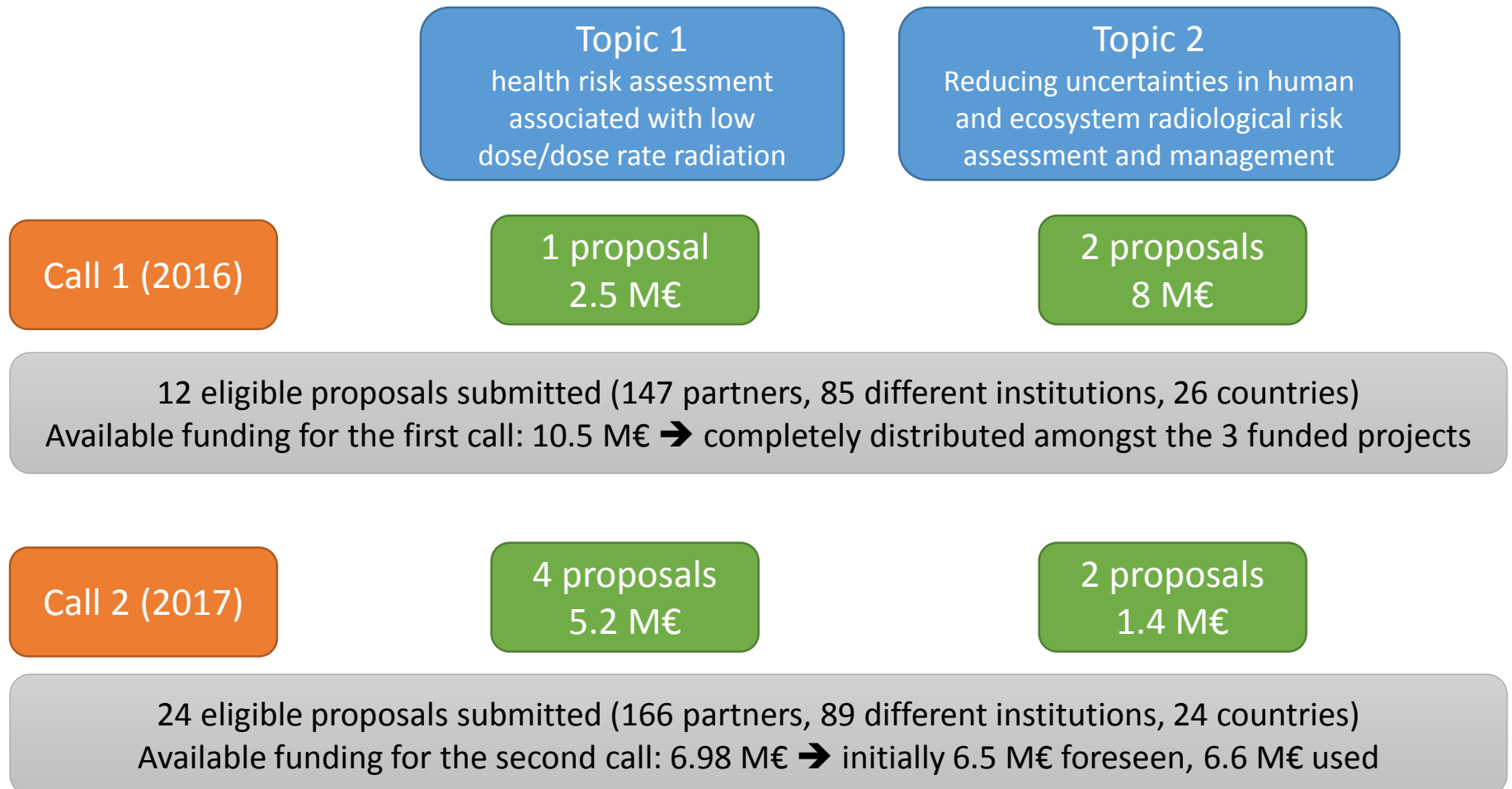
request by the EC

## Other deliverables

- **D4.8 List of Indicators**

Still open: The assessment reports on the follow-up (**D4.3** and **D4.6**, both due M60 = MS24) still open

Both open CONCERT calls have been successfully completed:





WP4 successfully managed both open CONCERT calls

## Challenges connected to the open calls:

- Ensuring confidentiality and the same time transparency (involvement of CONCERT partners in the preparation of the calls and decision on funding as well as being potential applicants)
- High level evaluations
  - Avoiding conflict of interests in including mainly experts from outside of Europe
  - Challenging taking into account the close and well connected community
- Integration and funding (Cash-funding) of Third Parties
- Harmonisation of funding within the different topics
- Request on open publication of CONCERT deliverables vs. confidentiality rules in open calls

## Contribution of the calls to the overall goals of CONCERT

- ✓ Strengthen integrative activities
- ✓ Stimulate, foster and promote scientific excellence and the involvement of the wider scientific community in the scientific challenges of radiation protection, based on the priorities identified by CONCERT (WP3).
- ✓ Encouraging integration initiatives
  - ✓ European integration, fostering the exchange of radiation protection institutions across Europe,
  - ✓ and integrative scientific activities beyond borders,
  - ✓ foster multidisciplinary research, to integrate universities, research centres and radiation protection institutions, and to integrate partners from new or less represented member states,
  - ✓ integration of E&T in research proposals and access to existing research infrastructure and the use of the best available infrastructure
- ✓ Repartition of the funding resources available for specific calls to the different fields of radiation protection research, i.e. low dose effects and risks, radioecology, nuclear emergency preparedness and dosimetry

## Tasks 4.1 - 4.3 already completed

### Still open task:

### Task 4.4: Monitoring of the calls and the funded projects

#### Task 4.4.2 Monitoring of funded projects.

- Follow up on the 9 research projects funded in both CONCERT calls
  - Preparation of the two assessment reports on the follow-up (**D4.3** and **D4.6**, both due M60 = MS24) of call 1 and call 2, respectively
- ✓ The collection of all Midterm Reports was successfully completed this month.

Evaluation of the 9 progress and outcome of funded projects by a panel of around 4 experts that participated in the evaluation process of Call 1 and Call 2.  
Participation of reviewers in the final CONCERT meeting organised by WP4.  
Deliverables D4.3 and D4.6 will contain the written feedback given by the evaluation panel.

Thank you for your attention

# TOP 7

# WP9 - Research projects selected through CONCERT open calls

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The objective of WP9 is to bring together RTD activities selected through two open calls for research projects organised along the CONCERT project.

This work package includes the nine different research tasks corresponding to the nine funded projects

## Call 2016

Task 9.1 CONFIDENCE

Task 9.2 LDLensRad

Task 9.3 TERRITORIES

## Call 2017

Task 9.4 ENGAGE

Task 9.5 LEU-TRACK

Task 9.6 PODIUM

Task 9.7 SEPARATE

Task 9.8 SHAMISEN-SINGS

Task 9.9 VERIDIC

# Topic 1 - health risk assessment associated with low dose/dose rate radiation

## LDLensRad

L Ainsbury ; PHE UK

- 8 partners: PHE, ENEA, HMGU with support from Oxford Brookes (OBU) and Durham Universities (DU) in the UK and CRIEPI (Japan), MSKCC, IU School of Medicine (USA), SUBI(Russia)



Towards a full mechanistic understanding of radiation cataract

## LEU-TRACK

K Lumniczky, OSSKI, HUNGARY

- 4 partners: OKI, PHE, HMGU, GUF

The role of extracellular vesicles in modulating the risk of low dose radiation induced leukemia



## PODIUM

F Vanhavre, SCK-CEN, BELGIUM

- 7 partners: SCK-CEN, UPC, HMGU, LU, PHE, EEAE, SJH



Systemic Effects of Partial-body Exposure to Low Radiation Doses



## SEPARATE

M Mancuso, ENEA, ITALY

- 4 partners: ENEA, HMGU, OBU, DIT

## VERIDIC

J Dabin, SCK-CEN, BELGIUM

- 10 partner: SCK-CEN, APHP, CAATS, CEA, HUG, GAEC, VINCE, IOV, UHL, RBI



# Topic 2 - Reducing uncertainties in human and ecosystem radiological risk assessment and management



## CONFIDENCE

W Raskob; KIT; GERMANY

- **31 partners:** KIT, BfS, CEH, CEPN, CIEMAT, EPA, EEAE, HMGU, IRSN, MUTADIS, NMBU, NRPA, University of Zurich, PHE, DTU, RIVM, SCKCEN, STUK, UMIL, VUJE, KNMI, APA, DIALOGIK, University of Warwick, IST, REC, RIKILT, EXTREMADURA, UK Met Office, Norwegian Met. Institute

## TERRITORIES

M. Simon-Cornu, IRSN, FRANCE

- **11 partners:** IRSN, BfS, CEPN, CIEMAT, NMBU, NRPA, PHE, SCK.CEN, STUK, University of Tartu, Mutadis

## SHAMISEN-SINGS

E CARDIS; ISGlobal; SPAIN

- **8 partners:** ISGlobal ISS FMU IRSN WIV-ISP CEPN NMBU UAB

## ENGAGE

C Turcanu, SCK-CEN, BELGIUM

- **13 partners:** SCK•CEN, CEPN, JSI, ISGlobal, IRSN, UFC, EEAE, UMIL, FOPH, VUJE, Inc., BfS, IFIN-HH, ULG



# CONFIDENCE

## COping with uNcertainties For Improved modelling and DEcision making in Nuclear emergenCiEs



**W. Raskob (KIT)**

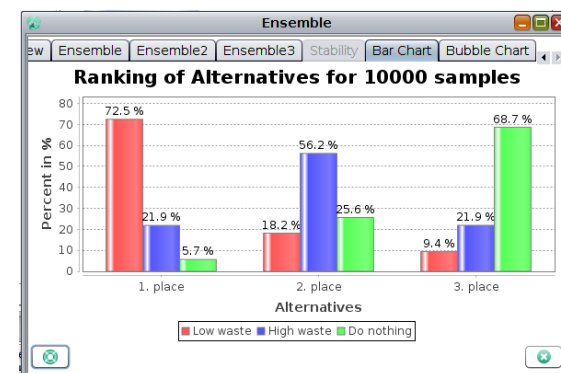
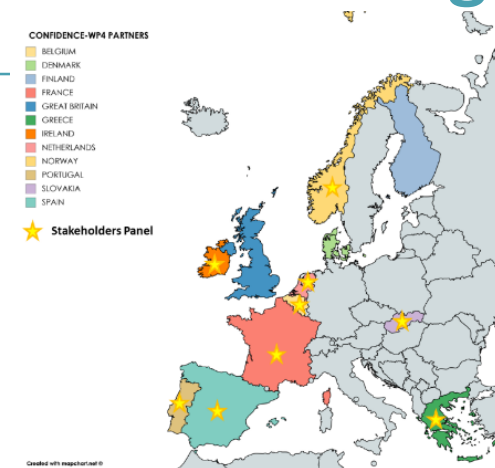
- In emergency management and long-term rehabilitation uncertainty information on the current situation, or its predicted evolution, is an intrinsic problem of decision making
- To protect the population, conservative assumptions are often taken which may result in more overall harm than good due to secondary causalities as observed following the Chernobyl and Fukushima accidents
- Therefore, the reduction of uncertainty where practicable, and developing approaches to deal with uncertainty information, are crucial to improve decision making for the protection of the affected population

# Research Question(s)

- Can atmospheric dispersion simulations and dose estimations be improved in the pre-and release phase with uncertainty analysis and an ensemble approach?
- How to reduce uncertainty in dose assessment for improving situation awareness and risk estimation?
- Are radioecological models fit for purpose?
- How to best involve stakeholders in decision-making processes in the transition phase?
- What are the social, ethical and communicational aspects of uncertainty management?
- How to improve decision making under uncertainties?
- How to share lessons learned through training and dissemination?

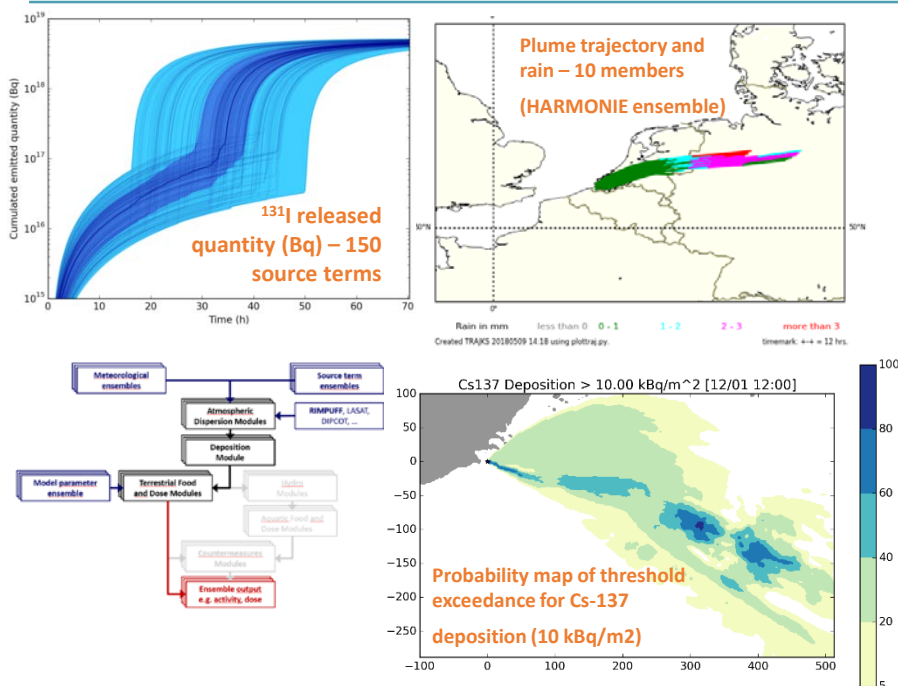


- Stakeholder preferences
  - Decision-oriented scenario-analysis allowing to identify, evaluate and optimise countermeasure strategies by involving stakeholders
  - Perform Delphi studies for preference elicitation
- Social, ethical and communicational aspects
  - Analyse social uncertainties from past events, studies on expected behaviour and information needs, and observation of emergency exercises
  - Develop mental models to understand processing of uncertainties
  - Communicate uncertainties
- Decision making process
  - Use formal decision aiding tools such as MCDA
  - Develop agent based models to investigate the decision making process in more detail



- The ensemble approach seems to be appropriate to represent uncertainties in the early phase
- Operational picture can be improved with data assimilation
- Progress made in developing process based radioecological models
- Stakeholder engagement improves selection of strategies and planning for recovery
- Social, ethical and communicational aspects have to be part of decision making
- Formal decision aiding tools improve uncertainty handling
- Visualisation and communication of uncertainties to decision makers is challenging

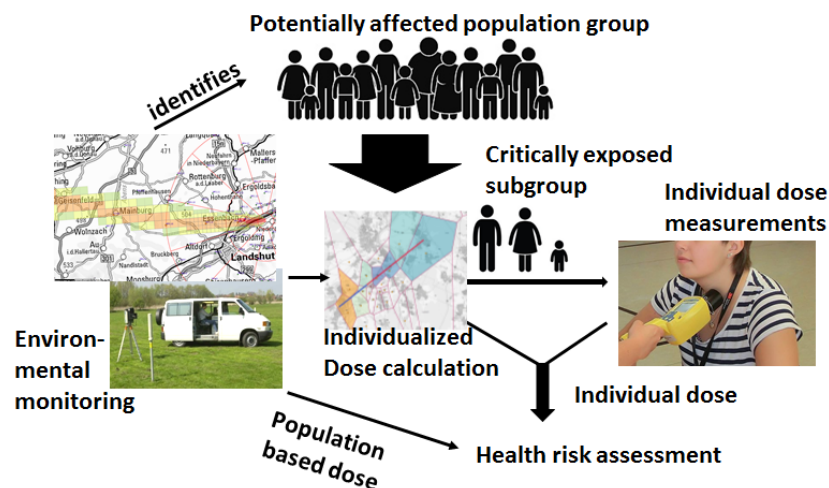
# Result(s) detailed



Key driver for uncertainties: wind direction, atmospheric stability, source term, start of release (D9.1)

Ensemble approach was used to describe uncertainties from meteorology and source term and propagate them through ADMs to dose and food chain models

Improved handling of monitoring and risk estimation improves the operational picture D9.8, D9.9, D9.11



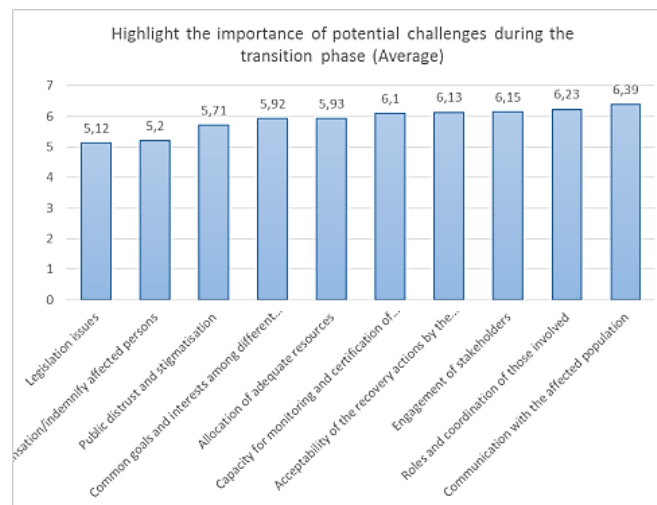
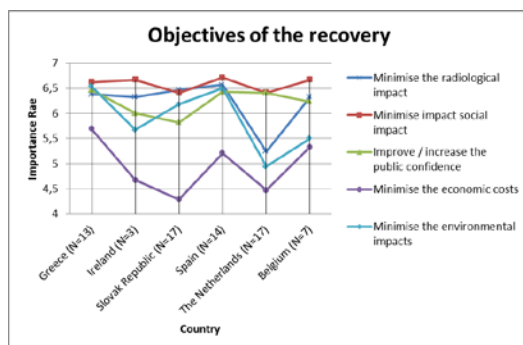


Key parameters of operational radioecological models have been identified, process based models developed and in-effect no root uptake of  $^{131}\text{I}$  after deposition demonstrated (D9.13)



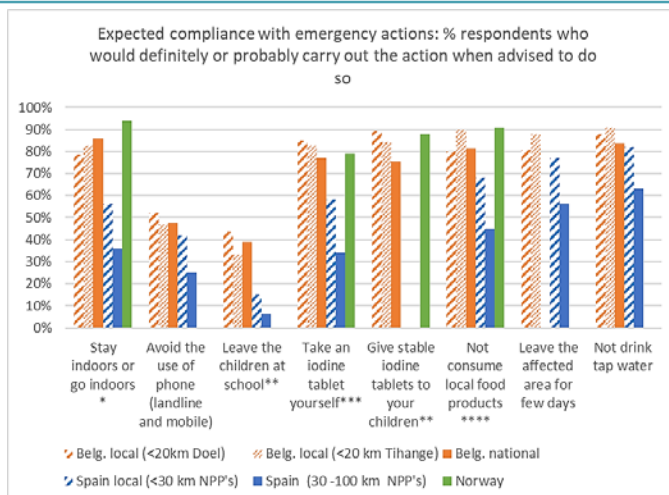
Improving the underlying database with experimental data

The national workshops demonstrated that uncertainties were so far mostly ignored but require consideration (D9.22)

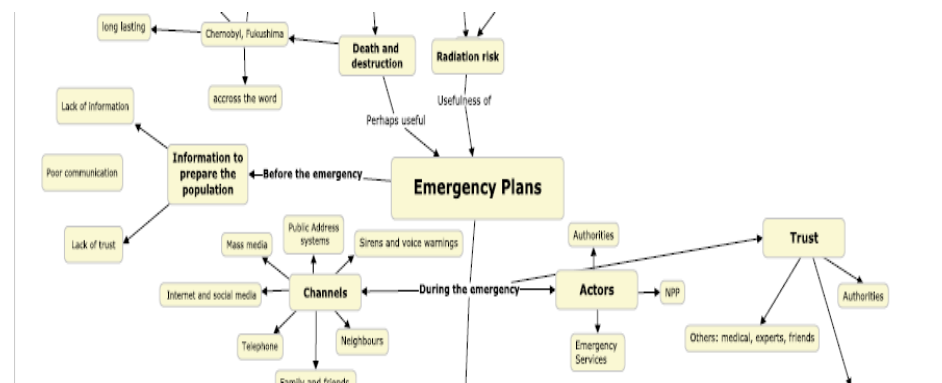


The workshops and the Delphi study resulted in a set of preference values that can be used by the MCDA and ABM (D9.20, D9.21)

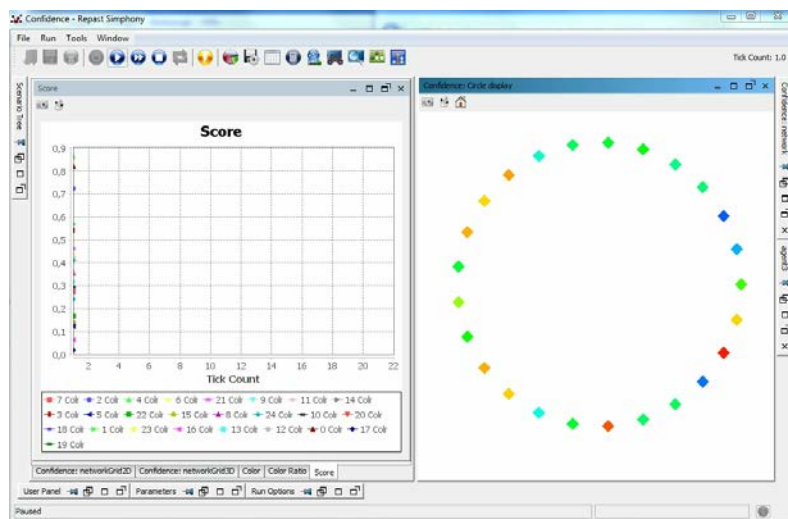




Surveys in Spain and Belgium (D9.26)



Mental models demonstrated gaps in reasoning about emergency planning between lay people and experts (D9.27)



Preferences and strategies, generated in other work packages were applied to the MCDA and agent based simulation model (ABM) to better understand the importance of the negotiation process (D9.33, D9.34, D9.35,)

- The CONFIDENCE project was a first attempt to deal with uncertainty handling in nuclear and radiological emergency management
- It brought together participants from ALLIANCE, NERIS, EURADOS, MELODI and SSH, thus fostering the integration of radiation protection research
- Key areas in the decision making process were addressed and methods identified that can improve that process
- Some of the methods were successfully implemented in simulation models and will become operational
- Identifying uncertainties was clearly achieved, reducing of uncertainties requires additional efforts

- The ensemble approach on source term and meteorology will be implemented in national operational simulation models as well as into the European DSS JRODOS with more than 20 users in Europe and worldwide
- Findings will be disseminated via the various Platforms and reflected in the research needs identified there as well as feeding into the CONCERT SRA and common roadmap
- As uncertainty handling has been largely neglected before CONFIDENCE, we see a need to continue working in this area, including in a CONCERT-2 – if funded

## *Coping with uncertainties for improved modelling and decision making in nuclear emergencies*

**2-5 December 2019, Lindner Hotel Gallery Central  
Metodova 4, Bratislava, Slovak Republic**

<https://www.eu-neris.net/home/newsletters/190-confidence-dissemination-workshop-first-announcement-2.html>



**Thank you and any questions?**

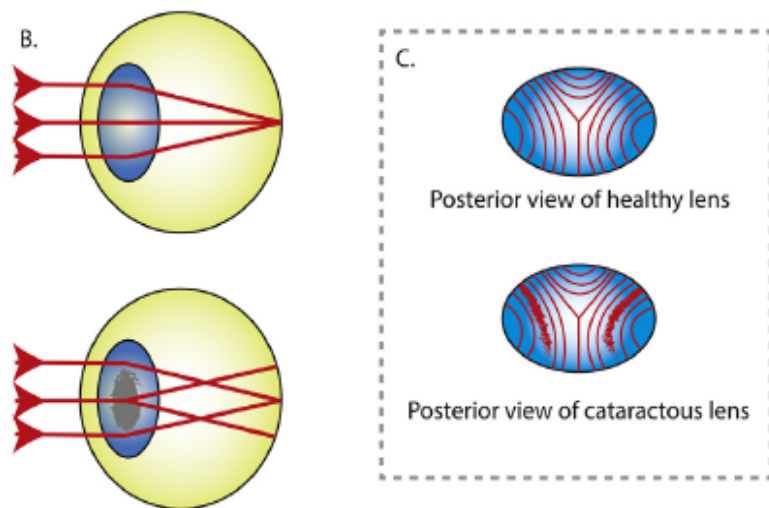
# LDLensRad:

## Towards a full mechanistic understanding of low dose radiation induced cataracts

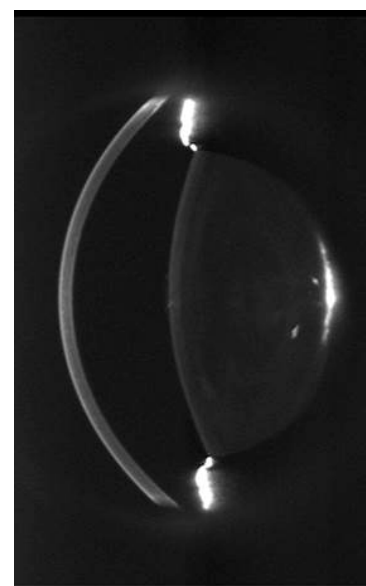


**Liz Ainsbury, PHE**

## Cataracts are the most frequent cause of blindness worldwide



This and other images without references throughout: Ainsbury *et al.*, 2017



Courtesy of N. Kleiman



<http://vision.ucsf.edu/hortonlab/ResearchProgram%20Pics/kid%20with%20cataract.jpg>



<https://webeye.ophtb.uiowa.edu/eyeforum/atlas/pages/Posterior-subcapsular-cataract-2.html>

## Recent epidemiological (re)analyses: The lens is more radiosensitive than previously thought



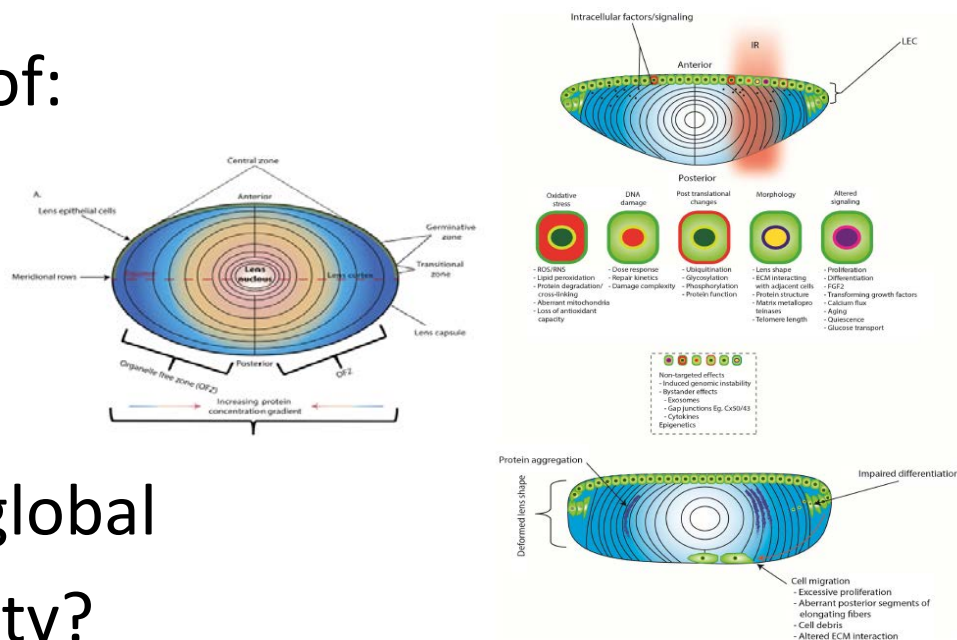
Current radiation protection (ICRP, 2012; EU BSS, 2014)  
based on epidemiological data...

## HOW does (low dose/low dose rate) radiation initiate/promote development of cataract?

And what is the influence of:

- Dose and dose rate
- Genetic background
- Age and Sex

Can the lens be used as a global  
biomarker of radiosensitivity?



Broad beam, whole  
body irradiation  
 $^{60}\text{Co}$  - 0, 0.5, 1 & 2 Gy



*Ercc2*<sup>-/-</sup> & WT bred on (C57BL/6  
X C3HeB/FeJ) F1 (HMGU, 0.3 Gy/min)  
C57BL6/J, 129Sv (PHE, 0.3 & 0.063 Gy/min)  
*Ptch*<sup>-/-</sup> bred on CD1 & C57BL6/J  
background (ENE A, 0.3 & 0.063 Gy/min)

## Short term investigations

- DNA damage (PHE)
- Proliferation (PHE, DU)
- Biochemical effects (DU)
- Morphology (DU)
- Oxidative stress (OBU)
- Intracellular communication (OBU)
- Genetic pathway analysis (ENE A)
- miRNA (ENE A)
- NGS/qRT-PCR (ENE A)

## Lifetime studies

- Cataract development (HMGU, PHE, ENE A)
- Lens pathology (HMGU, PHE, ENE A)
- Organ pathology (HMGU, PHE, ENE A)
- Behavioural effects (HMGU)

*In vivo*

Broad beam  $^{60}\text{Co}$   
(0.063, 0.3 Gy/min)  
(MRC)



Doses  
0 Gy  
0.025 Gy  
0.1 Gy  
0.5 Gy  
0.001 Gy  
0.05 Gy  
0.25 Gy

Broad beam  $^{137}\text{Cs}$   
(0.1, 1, 10, 100 Gy/hr)  
(PHE)



Primary cell cultures established from WT/mutant mice  
Human lens epithelial cells including FHL124

Human lenses (Mayak PA)

## Endpoints

- DNA damage (PHE)
- Proliferation (PHE, DU)
- Morphology (DU)
- Oxidative stress (OBU)
- Intracellular communication (OBU)
- Biochemical effects (DU)

*In vitro*



**OUTPUTS**

- Mechanistic evidence of low dose lens effects
- Role of dose rate effects in radiation induced lens alterations
- Role of genetic background in radiation induced lens alterations
- Role of aging in radiation induced lens alterations
- Potential for use of lens tissue as a global indicator of radiosensitivity



# Summary of results to date

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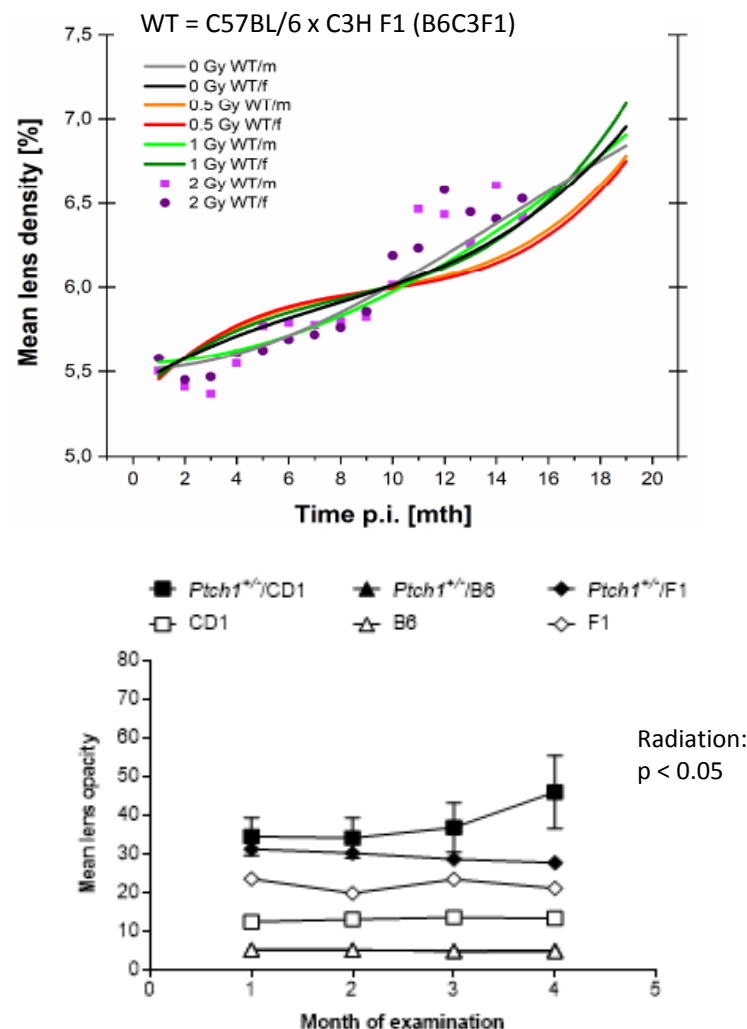
- Long term cataractogenesis studies: Age, genetic background and dose are key factors in cataractogenesis
- Short term mechanistic endpoints: e.g. DNA damage responses show a greater effect of  $0.063 \text{ Gy min}^{-1}$  than  $0.3 \text{ Gy min}^{-1}$  -> indicates reverse dose rate effect?
- Lens as a global biomarker: Genetic background impacts radiation effect on adult neurogenesis; Dose and dose rate affect behaviour

# Results: Long term cataractogenesis

Genetic background and age are key influencers of radiation cataract

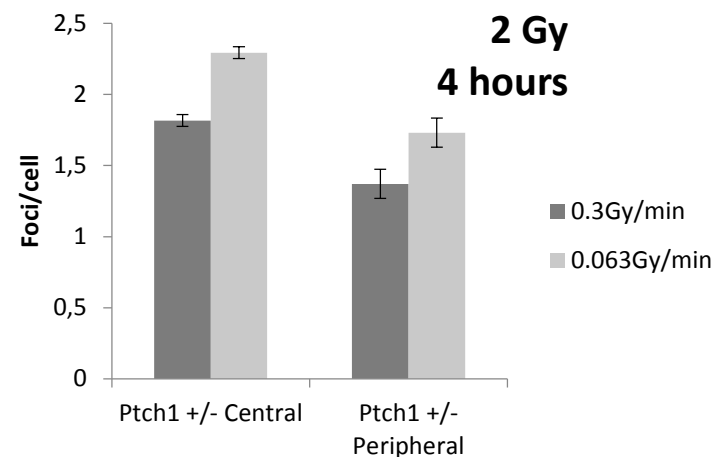
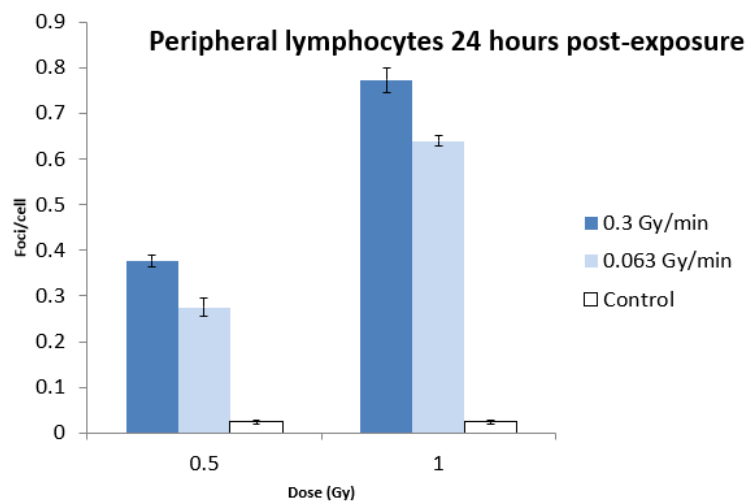
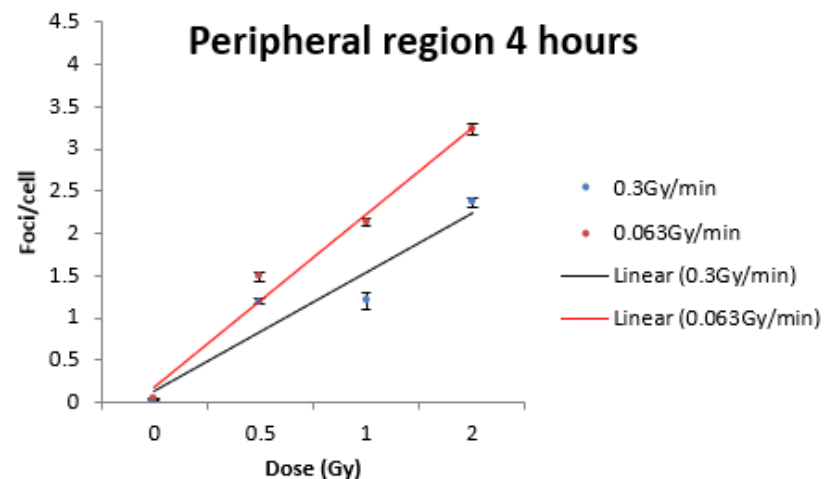
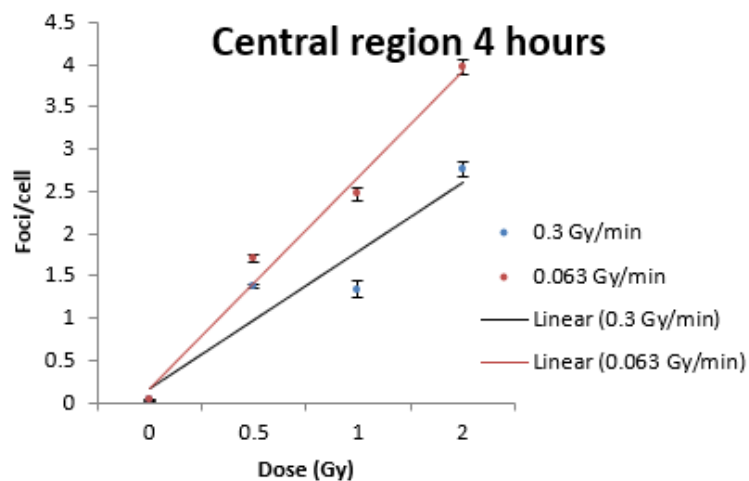
Regardless of genotype and dose rate, the max lens opacity significantly increases in mice irradiated with 0.5 - 2 Gy of x-rays compared with controls

Irradiation of *Ptch1*/CD1 neonates (P2) significantly increases lens opacity



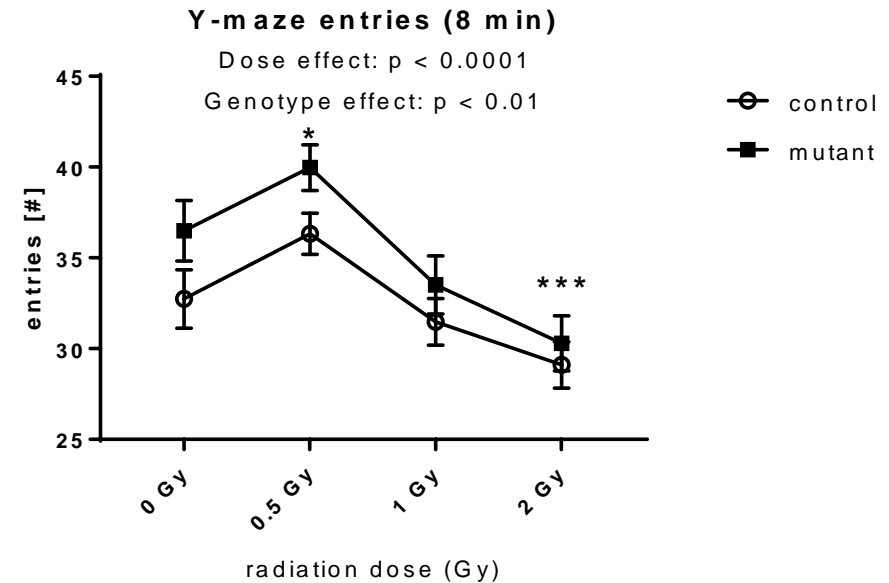
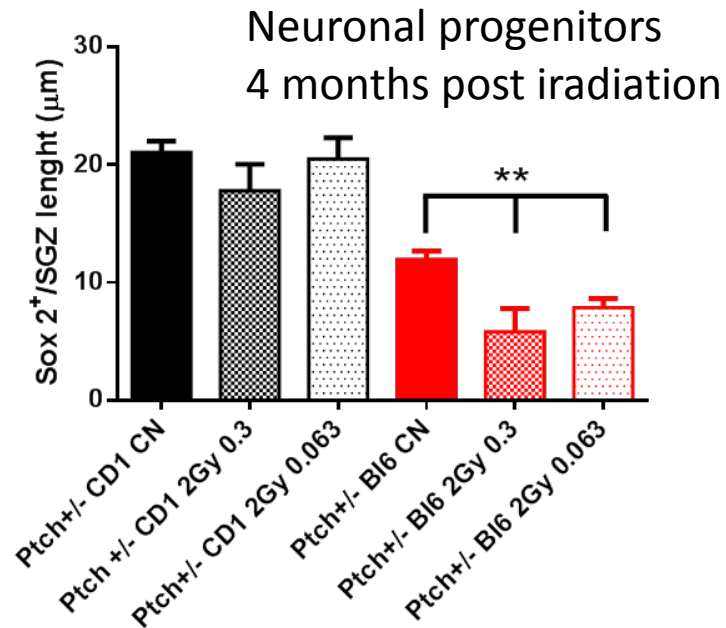
# Results: DNA damage dose rate effect

**C57 mice:**



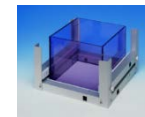
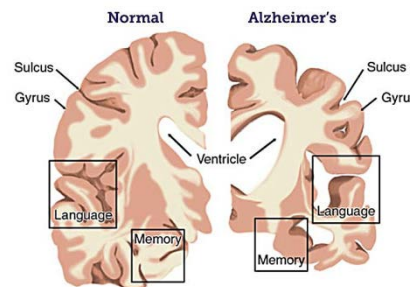
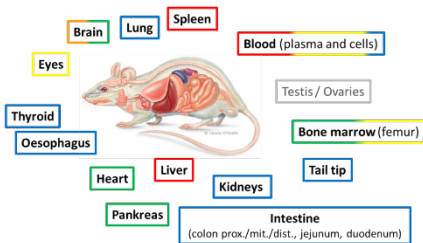
Barnard *et al.*, Submitted

## Hippocampal neurogenesis and behavioural testing



**INSTRAS\***

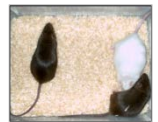
Dalke *et al.*, 2018



Open field



Prepulse inhibition



Social  
Discrimination

It is anticipated that LDLensRad will have key implications for radiation research and protection

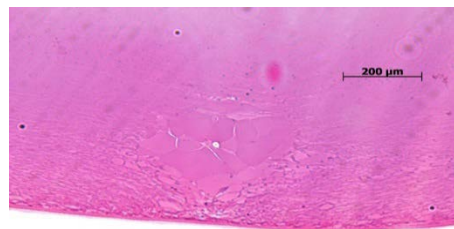
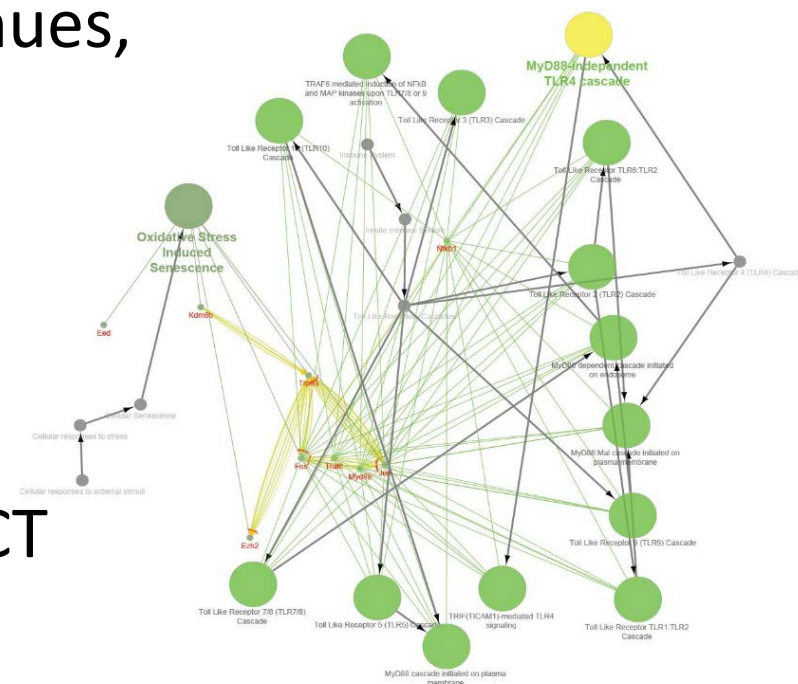
Concrete outcomes are anticipated to include definitive information regarding:

- The shape of the dose response
- Dose rate effects
- The influence of genetics, age, sex and other factors

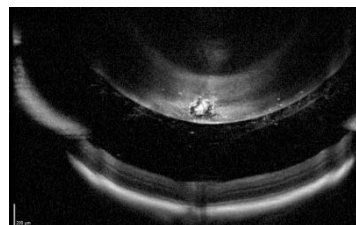
...thus advancing knowledge regarding the risk of radiation cataract at low doses.

Data collection and analysis continues,  
with further work now on:

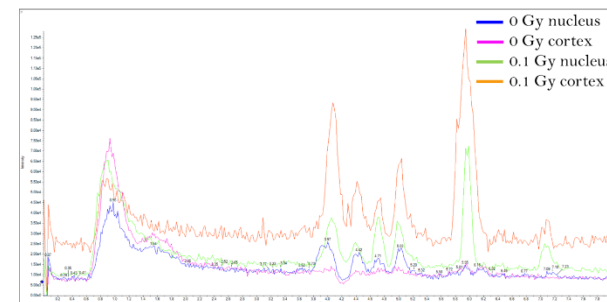
- miRNA and pathway analyses
- Lipidomics
- Mitigators of exposure
- Lens histology and pathology, OCT retinal monitoring
- *In vitro* studies to support *in vivo* data



0.5 Gy, 12 mth:  
Abnormal  
enlarged fibre  
cells at the  
posterior suture,  
beginning  
disintegration  
(WT, f)



0.5 Gy, 18 mth



# Project partners and AB members

Ainsbury E.<sup>1</sup>, Ahmadi, M.<sup>13</sup>, Azizova T.<sup>2</sup>, Babini G.<sup>3</sup>, Barnard S.<sup>1</sup>, Cecil A.<sup>4\*</sup>, Dalke C.<sup>4</sup>, Dauer L.<sup>5</sup>, De Stefano I.<sup>6,7</sup>, Dynlacht J.<sup>8</sup>, Ellender M.<sup>1</sup>, Garrett L.<sup>4</sup>, Hamada N.<sup>9</sup>, Hladik D.<sup>10\*</sup>, Hölder S.M.<sup>4</sup>, Hornhardt S.<sup>11\*</sup>, Jarrin M.<sup>12</sup>, Kadhim M.<sup>13</sup>, Kalligeraki A.<sup>12</sup>, Kondofersky I.<sup>4\*</sup>, Kunze S.<sup>4\*</sup>, Kulka U.<sup>11\*</sup>, Leonardi S.<sup>6</sup>, Mancuso M.<sup>6</sup>, McCarron R.<sup>1</sup>, Moquet J.<sup>1</sup>, Neff F.<sup>4\*</sup>, Ottaway C.<sup>1</sup>, Pawliczek D.<sup>4</sup>, Pazzaglia S.<sup>6</sup>, Quinlan R.<sup>12</sup>, Roessler U.<sup>11\*</sup>, Saran A.<sup>6</sup>, Tanner R.<sup>1</sup>, Tanno B.<sup>6</sup>, Tapio S.<sup>10\*</sup>, Ung M.-C.<sup>4\*</sup>, Unger K.<sup>4\*</sup>, Uwineza A.<sup>12</sup>, Whitehill K.<sup>1</sup>, Graw J.<sup>4</sup>

<sup>1</sup>Public Health England, Centre for Radiation, Chemical and Environmental Hazards, Oxford, United Kingdom; <sup>2</sup>Southern Urals Biophysics Institute, Clinical Department, Chelyabinsk, Russian Federation; <sup>3</sup>University of Pavia, Physics Department, Pavia, Italy; <sup>4</sup>Helmholtz Zentrum München, German Research Center for Environmental Health, Institute of Developmental Genetics, Neuherberg, Germany; <sup>5</sup>Memorial Sloan Kettering Cancer Center, Departments of Medical Physics and Radiology, New York, United States; <sup>6</sup>Agenzia Nazionale Per Le Nuove Tecnologie, L'energia e Lo Sviluppo Economico Sostenibile, Rome, Italy; <sup>7</sup>Guglielmo Marconi University, Department of Radiation Physics, Rome, Germany; <sup>8</sup>Indiana University School of Medicine, Department of Radiation Oncology, Indianapolis, United States; <sup>9</sup>Central Research Institute of Electric Power Industry, Nuclear Technology Research Laboratory, Tokyo, Japan; <sup>10</sup>Technical University, Munich, Germany; <sup>11</sup>Federal Office for Radiation Protection, Neuherberg, Germany; <sup>12</sup>Durham University, School of Biological and Biomedical Sciences, Durham, United Kingdom; <sup>13</sup>Oxford Brookes University, Department of Biological and Medical Sciences - Faculty of Health and Life Sciences, Oxford, United Kingdom.

# Thank you for listening!

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## Questions / comments?

Project PI: [Liz.Ainsbury@phe.gov.uk](mailto:Liz.Ainsbury@phe.gov.uk)

<https://www.researchgate.net/project/LDLensRad-the-European-CONCERT-project-starting-in-2017-Towards-a-full-mechanistic-understanding-of-low-dose-radiation-induced-cataracts>

\*The INSTRA consortium is supported by the German Federal Ministry of Education and Research (O2NUK045A, B and C).



# TOP 8

# WP 5

## Stakeholder involvement and communication in radiation protection research

**Lead: Public Health England, United Kingdom**

**Simon Bouffler**

The objectives of this work package are:

- To establish mechanisms for public and societal stakeholders to have a say in developing research priorities.
- To establish routes to inform and educate public and societal stakeholders on the scientific basis of radiation protection, and the judgements made within the system of protection.
- To provide consistent and clear information on implementation of radiation protection standards in Europe with a view to encouraging consistent approaches among nations.

## Task 5.1 Strategy for public and societal stakeholder engagement

- Strategy developed and approved on time (D5.1, M8)
- Key elements:
  - Stakeholder identification and interaction
  - Development, implementation and analysis of a questionnaire
  - Organisation of meetings with stakeholders
  - Developing clear and credible website content
  - Gathering comments on key documents through website consultation

Ensuring clear communication of stakeholder views back to the wider CONCERT partnership

# Task 5.2 Stakeholder Group

## Created in 2017:

- Representatives from **19** organisations identified by the European Research Platforms & task 5.2 team
- Participation of Research Platform representatives and leaders of CONCERT Projects to the meetings

## Objectives:

- **Organise exchanges between the stakeholder group and researchers**
  - Share the progress of projects selected under CONCERT research calls
  - Collect points of view, comments and expectations regarding these research projects
- **Allow stakeholders to have a say in developing research priorities:**
  - CONCERT Joint Roadmap for European Research in Radiation Protection
- **Reflect on methodologies/processes to be used by European Research Platforms for a better involvement of stakeholders**

## Plenary meetings:

- 27-28 September 2017: Terms of Reference, CONCERT Projects (3) , CONCERT Joint Roadmap
- 15 June 2018: CONCERT Joint Roadmap
- 4-5 October 2018: CONCERT Projects (9)
- end 2019: TBD (*CONCERT Projects, future of SH Group,...*)

## Web Conference Meetings in 2019 *(New)*:

- To discuss challenges of CONCERT Joint Roadmap & Projects, by topic area
- 19 Feb, 16 Apr, 11 June, 17 Sept 2019

# CONCERT Stakeholder Group: Current membership

	Organisation	Recommended by	NAME	First Name	Country
International Organisation	ICRP Committee 1	MELODI	Laurier	Dominique	France
International Organisation	OECD/NEA	MELODI	Lazo	Edward	France
NGO	IUR - International Union of Radioecology	ALLIANCE	Brechignac	François	France
NGO	Öko-Institut - Institut for Applied Ecology	ALLIANCE	Ustohalova	Veronika	Germany
NGO	ENISS - European Nuclear Installations Safety Standards Initiative	EURADOS	Lorenz	Bernd	Germany
NGO	PTCOG - The Particle Therapy Co-Operative Group	EURADOS	Durante	Marco	Italy
NGO	ESTRO - European Society for Radiotherapy & Oncology	EURADOS	Schwarz	Marco	Italy
NGO	ANCCLI - National Association of Local Commission of Information	NERIS	Gerber	Mariette	France
NGO	NTW - Nuclear Transparency Watch	WP 5.2	Delory	Linda	Belgium
			Haverkamp	Jan	Netherlands
			Zeleznic	Nadia	Slovenia
Operator	EDF	ALLIANCE	Ciffroy	Philippe	France
Regulatory Body	SEPA - Scottish Environment Protection Agency	ALLIANCE	Dale	Paul	United-Kingdom
Regulatory Body	BMU - German Ministry for the Environment	MELODI	Böttger	Axel	Germany
Regulatory Body	OFSP - Federal Office of Public Health	NERIS	Palacios	Martha	Switzerland
Regulatory Body	ASN	WP 5.2	Tchillian	Nathalie	France
University	Helsinki University	ALLIANCE	Lehto	Jukka	Finland
University	Medical University of Vienna	EURAMED	Dörr	Wolfgang	Austria
University	UMCG - University Medical Center Groningen	EURAMED	Langendijk	Hans	The Netherlands
University	University of Madrid	NERIS	Gallejo	Eduardo	Spain
University	University of Exeter	SSH	Molyneux-hodgson	Susan	United-Kingdom

## Task 5.3 Interaction with civil society: CONCERT Survey

- Online survey developed and launched May 2017 following extensive consultation (D5.2, M12)
- Versions in 15 languages were available, closed Dec 2017
- Included general information sections
- 1966 responses, much variation by country
- Unlikely to be truly representative of whole population
- Providing useful feedback on concerns relating to radiation, experiences with information sources and suggestions for the future

# Task 5.3 Interaction with civil society: CONCERT Survey

- Online survey developed and launched May 2017 following extensive consultation (D5.2, M12)

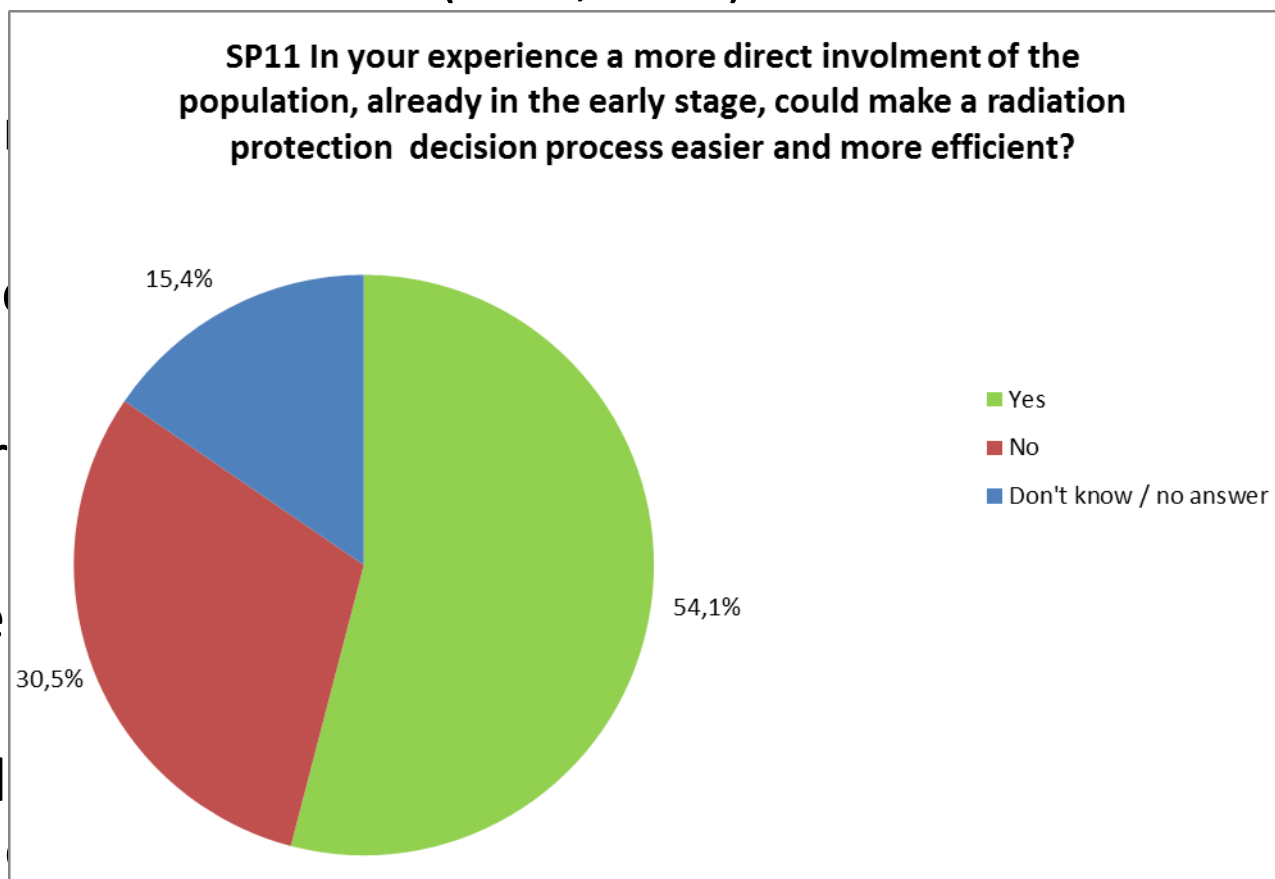
- Version

- Included

- 1966 r

- Unlike

- Provide  
experi  
future



on,  
or the



## Task 5.4 Information for the CONCERT website

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- Information posted on CONCERT website (D5.3, M18) and revised following internal consultation (D5.4, M36)
- Includes information on:
  - Background on radiation
  - Natural sources
  - Artificial sources
  - Health effects
  - Risks and context
- Draws on sources already available, eg UNEP booklet

# Task 5.4 Information for the CONCERT website

CONCERT | Stakeholders | Radiation risks

## • Information and

## • Incidence

### Radiation risks in context

The health impacts of ionising radiation have been extensively studied, but it is helpful to place the health risks from radiation in the context of other risks to health. The figures below are taken from the [University of Oxford Martin School Restatement of the Health Effects of low level ionising radiation](#)

*Average number of years of life lost by specific exposures:*

- Survivor of the Japanese atomic bombings, very heavily exposed (>1Gray) – 2.6 years
- 35 year old white severely obese male – 4-10 years
- Lifetime smoking male doctor – 10 years

*Annual attributable deaths worldwide from specific exposures:*

- Residential exposure to radioactive radon gas – 99,000
- Exposure to ambient particule air pollution (PM2.5) – 3.2 million
- Tobacco smoking – 6.3 million

## • Drawings

According to the American Association for Cancer Research (AACR) tobacco and obesity are the **top** two factors causing cancer. Exposures to ionising radiation, along with solar ultraviolet (UV) radiation is estimated to account for only 2% of the cases the factor to cause cancer.

**Estimated % of cancer cases caused by identifiable and/or**

- Good progress has been made, and CONCERT has made significant efforts to engage widely using a range of channels/approaches
- In future would adopt different sampling strategies for surveys and other outreach activities

- Website will be kept under review, and any suggestions considered
- Finalisation of Survey report remains important and should provide useful feedback to the project and similar future activities

Thank you for your attention

[Simon.Bouffler@phe.gov.uk](mailto:Simon.Bouffler@phe.gov.uk)

[http://www.concert-h2020.eu/en/Concert info/Stakeholder involvement](http://www.concert-h2020.eu/en/Concert_info/Stakeholder_involvement)

# TOP 9

# WP 6

## Access to infrastructures

**Lead: CEA, France**

**Laure Sabatier**

The objectives of this work package are:

- To increase the visibility of recommended infrastructures to the research radiation protection community for different types of research infrastructures,
- To define quality criteria for radiation protection research infrastructures and apply them to compile those in a list of “recommended infrastructures”,
- To develop harmonized practices and protocols to strengthen and expand databases,
- To develop strategies for facilitating their access.



The programmed activities are divided in 3 tasks:

- **Task 6.1 Promote the visibility of selected research infrastructures**
- **Task 6.2 Harmonize practices and protocols**
- **Task 6.3 Strategy for facilitating access to infrastructures**

10 meetings  
2 to come  
+ virtual  
exchanges

These three tasks converge to give scientists tools for better use of existing infrastructures through an increasing visibility **making them known by the radiation protection community.**

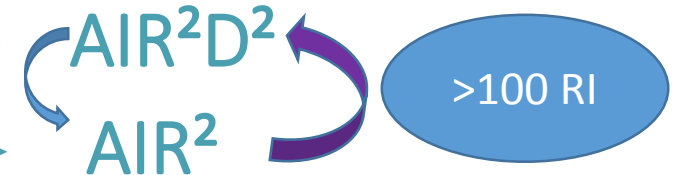
They contribute also to **edit recommendations** for inputs into WP3 about the joint programming CONCERT's calls to maximize integration of the topic “using recommended infrastructures” and facilitating the support to identified research infrastructures.

## Task 6.1: Promote the visibility of research infrastructures

Subtask 6.1.1 Listing infrastructures

Subtask 6.1.2 Develop and update quality criteria

Subtask 6.1.3 Increase the visibility



1618 AIR²D² visitors since April 2016



Top visitors:  
France, USA, Germany, Canada, Italy



35 Issues so far (aiming to 40 in total)

+

4 dedicated Special Issues  
(1 and 2 calls, Medirad, Nasa)

+

Ppt + flyer

## Task 6.2: Harmonize Practices and Protocols

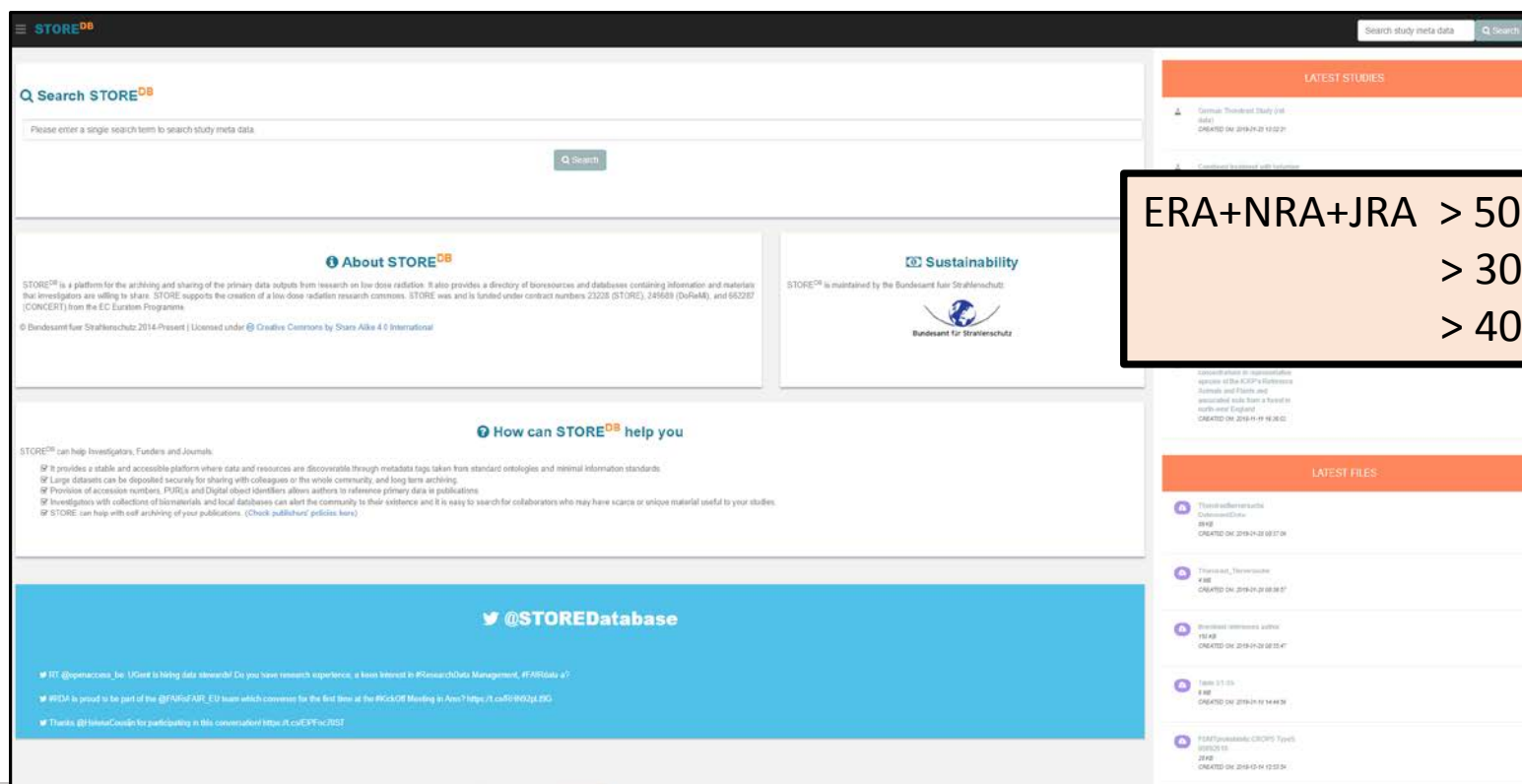
Subtask 6.2.1 Maintaining STORE

Subtask 6.2.2 Incrementing Databases

Subtask 6.2.3 Retrospectives studies (protocols)

Subtask 6.2.4 Harmonization and exercises (proposal)

[https://www.storedb.org/store\\_v3/](https://www.storedb.org/store_v3/)



The screenshot shows the STOREdb website interface. At the top, there's a search bar with the text "Search STOREdb" and a search button. Below the search bar, there's a section titled "About STOREdb" which describes the platform as a tool for archiving and sharing primary data outputs from research on low dose radiation. It also mentions that STOREdb is maintained by the Bundesamt für Strahlenschutz (BfS) and is funded under contract numbers 2328 (STORE), 24968 (Dufield), and 66287 (CONCERT) from the EC European Programme.

There's also a "Sustainability" section with the BfS logo. Below that, a section titled "How can STOREdb help you" lists several benefits: it provides a stable and accessible platform, allows for secure sharing of data, provides accession numbers, PURLs, and Digital Object Identifiers (DOIs) for publications, and allows investigators to collect and share data from their studies.

At the bottom, there's a social media section for @STOREDatabase with a list of tweets. On the right side of the interface, there are two sections: "LATEST STUDIES" and "LATEST FILES". The "LATEST STUDIES" section lists two studies, and the "LATEST FILES" section lists four files.

ERA+NRA+JRA > 50 labs  
 > 300 studies  
 > 400 000 animals

## Task 6.3: Strategy for Facilitating access to infrastructures

Subtask 6.3.1 Identification of needs to support sustainability of critical (including rare) facilities => **RI need to be used!!**      **Roadmap**

Subtask 6.3.2 **Developing Training**      **included in annual call WP7**

Subtask 6.3.3 Existing procedures (calls, funding...)      **recommendations 1-2 Calls**

Subtask 6.3.4 Funding scheme (within infrastructure/within project)      **ex : bioPac, CORA  
TERRA**

### **TRAINING RI : Four possible strategies:**

**1.** Encourage E&T proposals to CONCERT T7.3 calls to incorporate sessions on, or practical use of major infrastructures

*Not effective if just an 'add-on»*

*Institution should be using the infrastructure*

*Proposer free to choose content*

**2.** Analyse contents of previous CONCERT E&T courses and make suggestions as to possible incorporation of infrastructures if appropriate

**3.** Invite major infrastructures to host workshops or seminars (stand-alone or at conferences) with possible funding support from the CONCERT T7.3 budget.

**4.** Identify existing training/orientation courses offered by infrastructure establishments and promote them to platform members in conjunction with CONCERT T7.1 student travel grants

## All deliverables and milestones done in time

- D6.1** Recommendations for infrastructure related topics for the 1<sup>st</sup> CONCERT call and recommendations for funding schemes to support infrastructure use for the 1<sup>st</sup> Concert input to WP3 (M5)
- D6.3** Recommendations for infrastructure related topics for the 2<sup>nd</sup> CONCERT call and recommendations for funding schemes to support infrastructure use for the 2<sup>nd</sup> Concert input to WP3 (M17)
- D6.2** List of recommended criteria for infrastructures for radiation protection research (M8)
- D 6.4** Publishing the first version of a web-handbook based on the newsletters each featuring a different type of infrastructure and their access(M36)

5 AIR2 bulletins ->40 ( 120RI) *what about waiting list*

Special Issues : TRANSAT, HARMONIC,

CONCERT Projects (1->9)

(CONFIDENCE, LDLensRad, TERRITORIES)

(LEU-TRACK, PODIUM, SEPARATE, VERIDIC, ENGAGE,  
SHAMISEN-SINGS)

Database AIR2D2

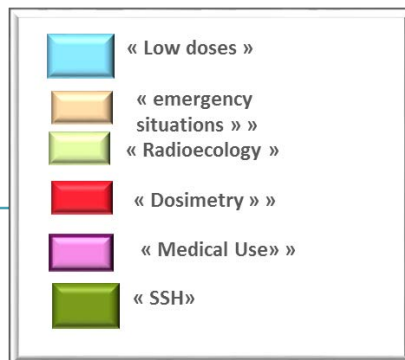
Deliverables planned to be delivered,

D6.5 Report on integration of archive materials in  
STORE /radioecological databases (M48)

D6.6 Publishing the **web-handbook** including  
protocols issued from harmonization procedures  
(M60)

Chapter 1 : Exposure platforms			
Subcategories	Infrastructure	Other categories	Page
(a) Low doses and low dose rates	<a href="#">FIGARO</a>	<a href="#">(d)</a>	8
	<a href="#">PULEX-Cosmic Silence</a>	<a href="#">(c)</a>	9
	<a href="#">Silesian Centre for Environmental Radioactivity (SCRS-GIG)</a>	<a href="#">(c) (d)</a>	10
	<a href="#">LIBIS</a>		11
	<a href="#">Microtron Laboratory</a>		12
	<a href="#">Low dose rate facility at Stockholm University</a>		13
	<a href="#">MICADO*LAB Experimental Platform</a>		14
(b) Microbeams	<a href="#">SNAKE</a>		16
(c) Particular radiation qualities: ions, neutrons, alpha...	<a href="#">Radon Exposure Chamber</a>	<a href="#">(a) (d)</a>	18
	<a href="#">Biological Irradiation Facility (BIO)</a>	<a href="#">(a)</a>	19
	<a href="#">CIRIL</a>		20
	<a href="#">Mixed alpha and X-ray exposure facility</a>		21
	<a href="#">Alpha particles irradiator</a>		22
	<a href="#">Changing dose rate exposure facility</a>		23
	<a href="#">Proton IRRADIation facility (IRRAD)</a>	<a href="#">(f)</a>	24
(d) Internal contamination	<a href="#">B3, Animal Contamination Facility</a>	<a href="#">(c)</a>	26
	<a href="#">Facility radionuclides availability, transfer and migration</a>		27
	<a href="#">Nanoparticle Inhalation Facility</a>		28
(e) Observatory sites	<a href="#">The Chernobyl Exclusion Zone</a>		30
	<a href="#">Forest observatory site in Yamakiya</a>		31
	<a href="#">Belgian NORM Observatory Site</a>		32
(f) Metrology exposure platforms	<a href="#">Laboratory for retrospective Radon and Thoron dosimetry</a>	<a href="#">(c)</a>	34
	<a href="#">Calibration Laboratory at KIT</a>		35
	<a href="#">MELAF</a>	<a href="#">(c)</a>	36
	<a href="#">Radiation Metrology Laboratory (DOS)</a>		37
	<a href="#">Laboratory for Dosimetry Standards (NDS)</a>		38
	<a href="#">CALibration LABoratory(CALLAB)</a>		39
	<a href="#">Radon Calibration Laboratory of BFS</a>		40
	<a href="#">Calibration and Dosimetry Laboratory (INTE-UPCI)</a>		41
	<a href="#">The Nuclear Metrology Group (NMG)</a>		42
	<a href="#">UNIPi neutron irradiation facility</a>	<a href="#">(c)</a>	43





## Conclusion

Competitive access

Funding upgrades

Harmonization, Standardization

Interoperability of data

Education  
and Training  
on RI

**Increased  
Visibility  
of RI**

Open Access  
Archives  
Quality Process  
Outside RP



RI are key issues  
for excellent  
research



2009  
HLEG report

Most of RI are  
available in EU



2010

2020

2030

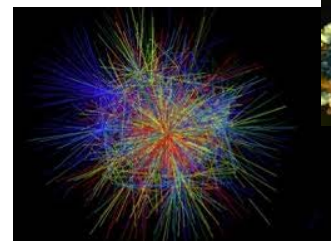
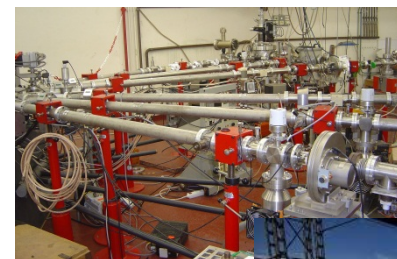
FP7

H2020

Horizon Europe

thank your attention  
questions?

- Exposure platforms
- Databases, sample bank and cohorts
- Analytical platforms models and tools





# TOP 10

# WP 7

## Education and Training

**Lead: University of Pavia, Italy**

**Andrea Ottolenghi**

The objective of this work package is to maintain, develop, and extend the expertise of the research community in the CONCERT scientific area through education and training (E&T) initiatives.

Specifically:

- To attract new students into the research field
- To support young scientists starting a career in the field
- To sponsor a range of courses to give students hands-on experience of new topics
- To consult and coordinate with interested parties on E&T priorities and initiatives

## Workpackage 7: Education and Training

- Task 7.1 Attracting and retaining students and junior scientists into the Radiation Protection research fields
- Task 7.2 Education and training as an essential part of dissemination and knowledge management within CONCERT
- Task 7.3 Targeted E&T initiatives
- Task 7.4 Coordination and collaboration on E&T policy and strategy
- Task 7.5 European integration of junior scientist career development

## **Task 7.1: Attracting and retaining students and junior scientists into the Radiation Protection research fields**

### 7.1.1 Student travel grants

- Travel assistance to attend conferences, courses,...
- New call for applications each quarter
- Maximum budget €10,000 for grants per year
- Grants started June 2016
  - total of 51 grants awarded up to December 2018 (11 calls) to students from 14 EU states (Belgium, Finland, Poland, Sweden, Portugal, Germany, Spain, UK, Hungary, Italy, Greece, Czech Republic, Netherlands, Croatia)

### 7.1.2 Facilitating transferability between EU universities

- Investigation showed limited options

## **Task 7.2: Promotion of E&T as an essential component of all research**

- All proposals to the two CONCERT research calls were required to include an E&T plan to show integration of student work, teaching seminars, etc. into the work programme.
- Review of the projects funded in the first call indicates they will achieve the required aim.

## Task 7.3: Targeted E&T initiatives

- Five annual calls for short (up to 3 weeks) courses at MSc/PhD level hosted by CONCERT partners
- List of possible topics given in call
- EC contribution up to €6000 per week (or €8000 if there are laboratory classes)
- Courses generally offered free with accommodation often provided
- In first 4 calls:
  - Total of 49 courses, 850 participants
  - 33 radiation risk assessment, basic science (radiobiology, epidemiology, radiation physics) (MELODI)
  - 9 emergency response (NERIS)
  - 4 environmental risks (ALLIANCE)
  - 3 dosimetry (EURADOS)
- Student feedback from each course recorded and analysed

## Short courses sponsored by CONCERT: Series 4, 2018-19

13 – 24 Aug 2018	Summer School in Radiobiology. SCK•CEN (Belgian Nuclear Research Centre), Belgium
21 Jan – 1 Feb 2019	Radiation epidemiology, dosimetry and radiation protection concepts of ICRP. Helmholtz Center, Munich Institute for Radiation Protection, Germany
11 - 22 Feb 2019	Two-week training course on radiation-induced effects with particular emphasis on genetics, development, teratology, cognition, cancer as well as space-related health issues. SCK•CEN (Belgian Nuclear Research Centre), Belgium
18 – 22 Feb 2019	Emergency and recovery preparedness and response. National Center of Radiobiology and Radiation Protection, Bulgaria
11 – 15 March 2019	Radiation Protection: Basics and Applications. Forschungszentrum Jülich, Germany
15 – 19 Apr 2019	EURADOS-CONCERT School on uncertainty in biological, physical, and internal dosimetry following a single exposure. Institut de radioprotection et de sûreté nucléaire (IRSN), France
29 April - 10 May 2019	Cellular effects of ionising radiation – introduction to radiation biology Acronym: CELOD, Stockholm University, Sweden
27 May - 7 June 2019	Modelling radiation effects from initial physical events. University of Pavia, Italy
23 Apr – 3 May 2019	Assessment of long-term radiological risks from environmental releases. Technical University of Denmark, Risø Campus, Denmark
19 May- 2 Jun 2019	Measurement techniques used in monitoring of naturally occurring radionuclides. Central Mining Institute, Katowice, Poland
24 Jun – 5 Jul 2019	ADORE - Application of cytogenetic and EPR/OSL techniques for biological dosimetry and physical retrospective dosimetry. Bundesamt für Strahlenschutz, Germany



## **Task 7.4: Coordination and collaboration on E&T policy and strategy**

Organising and participating in sessions in European conferences on radiation protection to discuss the priorities and promotion strategy for E&T:

- ERPW (European Radiation Protection Week), Oxford, 2016
- ERPW, Paris, 2017
- ETRAP (Education and Training in Radiological Protection) Valencia, 2017
- ERPW, Rovinj, 2018
- Planning under way for ERPW, Stockholm, 2019

## **Task 7.5: European integration of junior scientist career development**

- Intended to be a collaboration with the European Radiation Research Association for Young Scientists (EURAYS) but the group was discontinued
- Young scientists' day held at ERPW 2018, Rovinj, Croatia
- Planning underway for young scientist participation and activities at ERPW 2019, Stockholm

- Deliverables are all reports relating to E&T activities held.
- Events were all held as per schedule, with the exception of those dependent on EURAYS (Task 7.5)
- It is expected that the remaining E&T activities will occur according to schedule.

## Lessons learned from WP7

- Calls for courses could not be open because of EC rules on co-funding for third parties
- WP7 built on experience from DoReMi and has been very successful in reaching new students and young scientists
- Very important to continue funding for a programme to drive, coordinate, and support E&T.
- Particularly:
  - Optimal use of the 5% budget for E&T required by Euratom
  - Targeted knowledge management of new research results
  - Continued free taster courses for new students
  - Top level planning of CPD and refresher sessions in conferences
  - (E&T does not “self-organise”!)

Thank you for your attention.

# TOP 11

# WP 1

## Project coordination and management

**Lead: Bundesamt für Strahlenschutz (BfS), Germany**

## Primary activity

***“To set up, accompany and monitor  
all management and administrative  
structures and processes to run CONCERT”***



# Dashboard of CONCERT

**Euratom**  
**H2020 - NFRP 7-2014/2015**

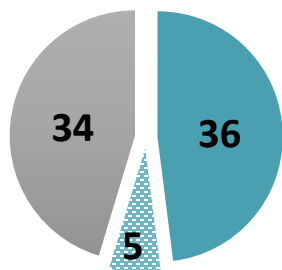
**CoFund - European Joint Programming**

Main Objectives:

More integration and More funds

Implementation of a joint programme of activities, ranging from research to coordination and networking activities, including training activities, demonstration and dissemination activities

**Participants (Σ75)**



■ POMs ■ RPR platforms (exceptionality) ■ LTPs

almost all European countries are a POM of CONCERT  
total number 25 = 23 Member States plus Norway and Switzerland

**H2020 EU contribution**  
**19,82M€**

**CO-FINANCING**

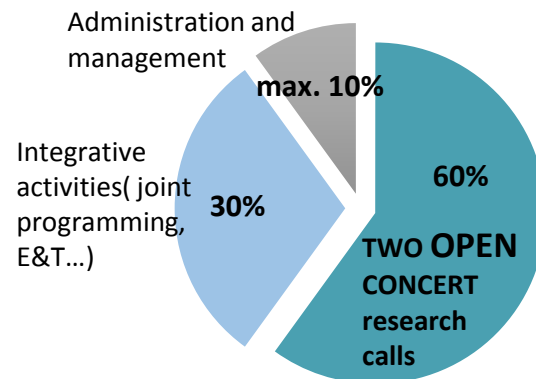
30% 70%



■ EURATOM

■ national funding (mostly own resources)

**Originally estimated eligible costs: ~ 29.2M€**



**commitment of**  
**17.1M€**

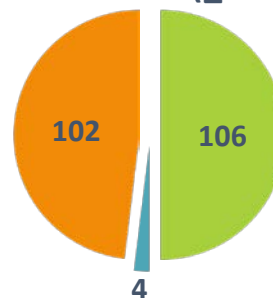
**2016**  
**1<sup>st</sup> OPEN**  
**call**

**3 Projects**  
**funded**

**2017**  
**2<sup>nd</sup> OPEN**  
**call**

**6 projects**  
**funded**

**Deliverables (Σ212 )**



■ approved ■ submitted ■ pending

## Coordination/ Management

- coordination of activities, fluent day-to-day management, reporting to EC and supporting project activities
- MB/ ExB Meetings etc.

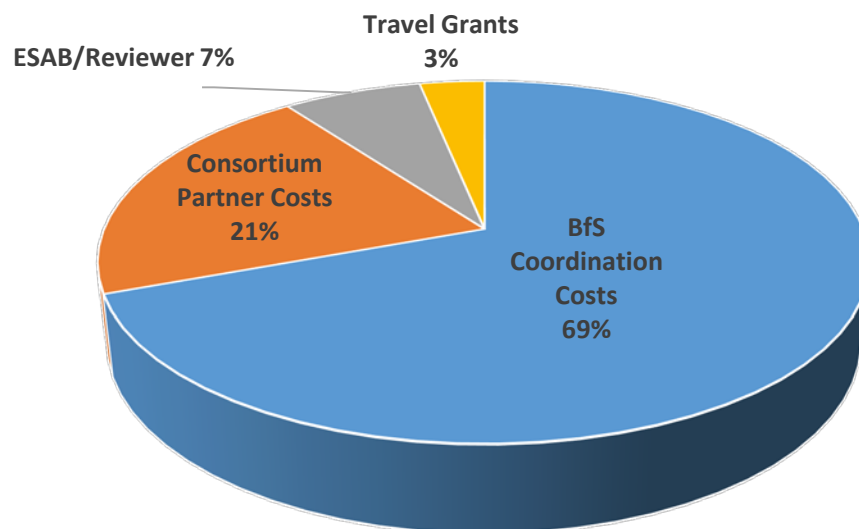
## Legal

- Contractual Issues

## Finance

- Controlling/Management of funds

## Costs for WP 1: periods 1–3



BfS Coordination Costs)	1st Period		2nd Period		3rd Period		Total	
	PM's	k€	PM's	k€	PM's	k€	PM's	k€
Administration (legal/budgetary)	9,85	54	7,94	44	3,78	27	21,58	124
Assistance (Budgetary)	21,59	125	24,17	138	21,53	127	67,29	390
Assistance (secretariat/accounting)	0,41	2	0,96	4	0,00	0	1,36	5
<b>Total</b>	<b>31,85</b>	<b>181</b>	<b>33,07</b>	<b>186</b>	<b>25,32</b>	<b>154</b>	<b>90,23</b>	<b>519</b>

# Budget Breakdown

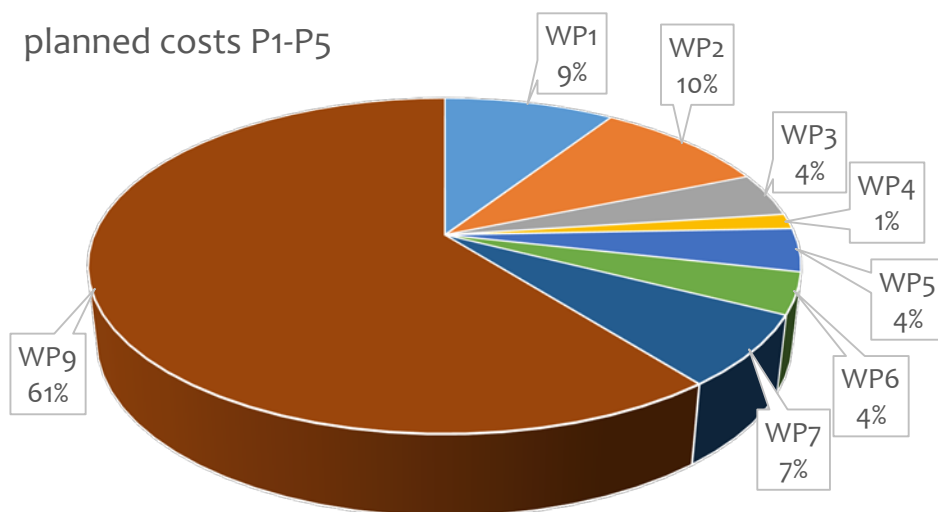
Planned:  
periods 1–5

	planned costs P1-P5
WP1	2.63M€
WP2	2.71M€
WP3	1.21M€
WP4	0.42M€
WP5	1.19M€
WP6	1.13M€
WP7	1.97M€
WP9	17.31M€
Total	28.56M€

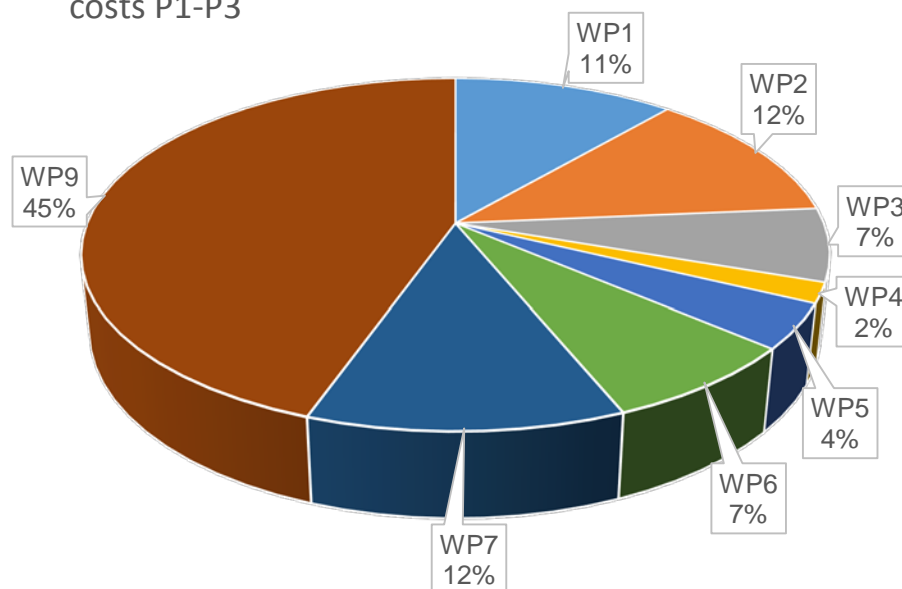
Spent:  
periods 1–3

	spent costs P1-P3
WP1	1.15M€
WP2	1.25M€
WP3	0.68M€
WP4	0.19M€
WP5	0.42M€
WP6	0.77M€
WP7	1.19M€
WP9	4.54M€
Total	10.199M€

planned costs P1-P5



costs P1-P3



Thank you for your attention

- Joint programming on the basis of SRAs and road maps developed by multidisciplinary European Radiation Protection Research Platforms; Tailoring of research programmes to societal challenges by stakeholder and national funding institution consultation.
- Open and competitive research calls and international peer reviewing of research proposal.
- Integration of E&T in research programmes.
- Cofunding of RP research with unbiased funding of research partners (TP and LTP); Reduction of administrative requirements for research institutions.
- Permanent structure/secretariat for administration and management of a joint European RP research programme.



# Supplementary Information



# List of WP1 activities

1	<b>Kick-off meeting;</b> back to back ExB meeting	17 June 2015	Munich
2	Management Board back to back ExB meeting	24 Sep 2015	Brussels
3	Management Board back to back ExB meeting	12 Nov 2015	Munich
4	Management Board back to back ExB meeting	16 Feb 2016	Pavia
5	<b>Information Day on the 1st OPEN RTD CALL</b>	27 Jan 2016	Munich
6	<a href="#">Webinar on Opportunities under EURATOM</a>	12 July 2016	webinar
7	Management Board back to back ExB meeting at the first <b>ERPW in OXFORD</b>	23 Sept 2016	Oxford
8	<b>1<sup>st</sup> funding decision meeting</b>	17 Nov 2016	Brussels
9	extraordinary Executive Board meeting	17 Feb 2017	Munich
10	<a href="#">Webinar "Opportunities for Radiation Protection research projects under CONCERT programme"</a>	21 March 2017	webinar
11	<b>2<sup>nd</sup> Funding decision meeting</b>	27th July 2017	Munich
12	MB meeting +ExB+ ESAB at the <b>ERPW in Paris</b>	09 Oct 2017	Paris
13	Together with the RP research platforms CONCERT organised an open information day related to the EURATOM Call NFRP-2018-8	20 Feb 2018	Munich
14	MB meeting to inform about involvement of CONCERT in the EURATOM Call NFRP-2018-9 and development of the Joint Roadmap for Radiation Protection Research	21 Feb 2018	Munich
15	MB meeting organised as a whole day meeting during the <b>ERPW in Rovinj</b>	04 Oct 2018	Rovinj



### Project Info

#### □ Content

- Improvement of modelling and decision making for the protection of the affected population and minimal disruption of normal living conditions

#### □ Goals

- Understand, reduce and cope with the uncertainty, including social and ethical aspects, in both the threat and early release phase of an accident and the engagement of stakeholders in planning and recovery



### Status

#### □ What was done?

- ✓ Uncertainties early phase
- ✓ Risk based model
- ✓ Field and greenhouse studies on radionuclide transfer
- ✓ Scenarios and strategies analysis and stakeholder WS
- ✓ Studies on past events and social uncertainties
- ✓ MCDA and agent based mod
- ✓ Lectures at Universities
- ✓ Set-up of training courses

#### □ What are we currently working on?

- ▶ Scenarios with ensembles of meteo. and source terms
- ▶ Monitoring strategies
- ▶ Process based models
- ▶ Report on national panels
- ▶ Mental models and observation of exercises
- ▶ Visualisation of uncertainties
- ▶ Agent based models (ABM)
- ▶ Preparation of training

#### □ What's next?

- ▶▶ Operational recommendation
- ▶▶ Improved operational picture
- ▶▶ Improved data assimilation
- ▶▶ Improved food models
- ▶▶ Understanding of preferences of stakeholders
- ▶▶ Communication of uncertainties
- ▶▶ ABM simulation of decision making process
- ▶▶ Training and dissemination



L Ainsbury, PHE, UK



### Project Info

#### ☐ Content

- Human studies indicate the lens is sensitive to low dose IR. LDLensRad seeks to understand the biological aspects of radiation cataract

#### ☐ Goals

- To identify mechanistic pathways and elucidate the impact of dose, dose rate, age, gender and genetics on radiation cataract



### Status

#### ☐ What was done?

- ✓ Experimental optimisation for short and long term mechanistic endpoints
- ✓ Long term studies of cataract development following 0-2 Gy radiation exposure, at 0.3 and 0.063 Gy min<sup>-1</sup>
- ✓ Genetics, age, sex, dose and dose rate all influence...

#### ☐ What are we currently working on?

- ▶ Experimental endpoints at 4 and 24 hours, 4 and 12 months post IR exposure
- ▶ In vitro experiments to fill the 'gaps'
- ▶ Pathology and histology of the eye and brain: Could the lens be an indicator of global radiosensitivity?

#### ☐ What's next?

- ▶▶ Publication of radiation cataract data in mouse strains
- ▶▶ Amalgamation of data to form systems biology style models to inform the mechanistic hypotheses
- ▶▶ Investigation of mitigators of radiation damage



## Project Info

### □ Content

- WP1 & WP2: radioecology, dose assessment
- WP3 & WP4: risk management, remediation, communication, E&T

### □ Goals

- Integrated and graded management of contaminated territories characterised by long-lasting environmental radioactivity



## Status

### □ What was done?

- ✓ Field studies, databases
- ✓ Comparison monit. data vs simple/advanced models
- ✓ Lab ethnography (STIR)
- ✓ Review about uncertainty management in decision making processes (D9.65)
- ✓ Involving students (E&T scholarships & workshops)
- ✓ Continuous update of website territories.eu & blog

### □ What are we currently working on?

- ▶ Technical guidance about fit-for-purpose dose assessment: sampling & monitoring, modelling, UA/SA, exposure scenario
- ▶ Socio-economic analysis and remediation (CBA+MCDA)
- ▶ Stakeholder panels, holistic view of uncertainties (multi-dimensionality)

### □ What's next?

- ▶▶ Final Event, 12-14 Nov 2019, Aix en Provence to discuss both final deliverables (D9.71: post-accidental situations, D9.72: NORM): how to deal with uncertainties in risk assessment and decision-making processes taking into account the preferences of stakeholders



### Project Info

#### □ Content

- Examine rationales and frameworks for engagement; analyse participation practice, and clarify the role of radiation protection culture through case studies; provide guidance

#### □ Goals

- Identify and address key challenges & opportunities for stakeholder engagement (SE) in radiological protection (RP) for medical, post-accident and indoor radon exposures



### Status

#### □ What was done?

- ✓ Research protocols
- ✓ Document review of SE challenges and best practices
- ✓ Draft analysis of regulations and recommendations for SE
- ✓ Analysis of radon websites
- ✓ Case studies, workshops and preliminary report RP culture
- ✓ Roundtables on SE in practice; special session RICOMET

#### □ What are we currently working on?

- ▶ Interviews with key stakeholders
- ▶ Final reports on SE rationales and frameworks per field
- ▶ Detailed analysis of case studies of participatory practices
- ▶ Knowledge base structure specification

#### □ What's next?

- ▶▶ Transversal issues for SE rationales and frameworks
- ▶▶ Report with case studies of SE in practice
- ▶▶ Final report on RP culture
- ▶▶ Knowledge base concept
- ▶▶ Draft recommendations
- ▶▶ Final project workshop (11-13/09/2019, Bratislava)
- ▶▶ Final recommendations
- ▶▶ Scientific publications, special journal issue (open)



### Project Info

#### Content

- Study of basic mechanisms in low dose radiation-induced leukaemia by focusing on the role of EVs in the crosstalk between the bone marrow microenvironment and the stem cell compartment in initiating the leukemic process

#### Goals

- to investigate mechanisms and pathways how bone marrow-derived EVs can modulate low dose radiation-induced leukaemia
- to identify EV-related biomarkers of radiation exposure and/or leukaemia risk



### Status

#### What was done?

- ✓ Leukaemia-prone CBA mice were treated either with irradiation or with EVs originating from irradiated animals for long-term follow up of the incidence of leukaemia
- ✓ Bone marrow-derived EV samples were collected from irradiated mice and distributed to partners for EV analysis

#### What are we currently working on?

- ▶ Phenotypical and omics characterisation of mouse bone marrow EVs to reveal cellular producers of EVs and radiation effects
- ▶ Investigating basic mechanisms of bone marrow damage by EVs
- ▶ Initiating patient enrolment for plasma EV collection from leukaemia patients

#### What's next?

- ▶▶ In vitro co-culture studies to identify major EV acceptors within the bone marrow
- ▶▶ Phenotypical and ~omics characterisation of leukaemia patients' blood EVs to identify EV-related biomarkers of exposure and disease
- ▶▶ To analyse leukaemia incidence in EV-treated mice



### Project Info

#### ☐ Content

- to improve occupational dosimetry by an innovative approach: using computer simulations coupled with flexible phantoms and personal tracking devices

#### ☐ Goals

- to develop an online application in which we will calculate individually the occupational doses, instead of measuring them with doseimeters



### Status

#### ☐ What was done?

- ✓ An Indoor Positioning System based on an infrared reflection time-of-flight sensor camera together with the corresponding software
- ✓ Guidelines for implementing the workplace geometry
- ✓ Phantoms of different statures and postures
- ✓ Advisory board meeting

#### ☐ What are we currently working on?

- ▶ Fluence to dose conversion coefficients for reference phantoms and postures for photons and neutrons
- ▶ Documented test of concept in an experimental set-up for interventional settings and neutrons
- ▶ Radiation field mapping
- ▶ Exploitation plan

#### ☐ What's next?

- ▶▶ User-friendly online application
- ▶▶ Feasibility study performed in four hospitals
- ▶▶ Feasibility study in real neutron field
- ▶▶ Workshop for the dissemination of the results and the application of the ALARA



### Project Info

#### ☐ Content

- To examine the effects of inhomogeneous exposures under conditions that closely replicate realistic human exposure scenarios

#### ☐ Goals

- To identify molecule(s) and pathways involved
- To discover candidate biomarker molecules of whole body (TBI) and partial body (PBI) irradiations



### Status

#### ☐ What was done?

- ✓ Animal breeding and irradiation
- ✓ Dosimetry
- ✓ Distribution to other partners of organs for omics (coding and non-coding transcriptomes, proteome and metabolome)
- ✓ Optimisation of the protocol for exosomes extraction

#### ☐ What are we currently working on?

- Analysis of differential omics responses in tissues from TBI and PBI mice
- Exosome-mediated radiation signalling between tissues exposed in different conditions, mechanisms of transfer, analysis of exosomal cargo

#### ☐ What's next?

- Integrative bioinformatics analysis of omics data sets for biomarker discovery
- Search for differentially expressed miRNAs, transfer of exosomes to *in vitro* cultures for validation
- To test *in vivo* the potential of irradiated exosomes to signal damage in brain of non-irradiated recipient mice





### Project Info

#### Content

- Stakeholder consultation to assess needs & interest in contributing to dose and health assessment
- Guidelines for APP(s) to monitor radiation, log behavioural and health for citizen science studies & provide a channel for practical information, professional support and dialogue.
- Assess ethical challenges and implications of APPs and citizen science activities through consensus workshop



### Status

#### What was done?

- ✓ Multinational Survey on Stakeholder needs (T 1.1)
- ✓ review of existing Apps and devices for dose measurements (T 2.1)
- ✓ review of existing Apps & devices for health (T 3.1)
- ✓ project's web created (T 5.1)

#### What are we currently working on?

- ▶ WP1→ Completion of analysis of survey results & preparation of stakeholders ethics workshop
- ▶ WPs 2-4→Development of guidelines/concept for Apps and tools based on stakeholder input and recommendations for APPs for monitoring dose, health & welfare and communication (WPs 2-3)

#### What's next?

- ▶▶ WP4→working meeting on tools & protocols development (Oslo, May2019)
- ▶▶ WP1-3 completion – consensus stakeholder workshop (Barcelona, July 2019)
- ▶▶ WP4 completion – APP(s) specs & data management plan
- ▶▶ Dissemination



### Project Info

#### ☐ Content

- Testing of software products used for skin dose calculation (SDC) in interventional cardiology (IC)
- Analysis of skin dose determinants in IC

#### ☐ Goals

- Harmonisation of digital dose reporting in IC
- Protocols for quality control (QC) of SDC software
- Reference Levels and dose reduction strategies in IC



### Status

#### ☐ What was done?

- ✓ Review of the existing SDC software products
- ✓ Analysis of data necessary for SDC in dose reports
- ✓ Establishment of beam qualities representative of IC
- ✓ Establishment of QC protocol

#### ☐ What are we currently working on?

- ▶ Establishing data base of IC procedures
- ▶ Dosimeters characterization
- ▶ Testing of QC protocol on various SDC products

#### ☐ What's next?

- ▶▶ Recommendations for accurate SDC and measurements
- ▶▶ IC data base analysis for dose reduction strategies
- ▶▶ Establishment of dose reference levels
- ▶▶ Dissemination of QC protocol