Towards improving radiological assessments and management
Big data sets, spatial distribution and source to sink modelling

An ALLIANCE-NERIS topical workshop

thierry.schneider@cepn.fr - www.eu-neris.net

jacqueline.garnier-laplace@irsn.fr - www.er-alliance.org

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The goal of the workshop….

What are the questions still to be addressed to tackle this issue of "improving radiological assessments and management"? and how?

- On the basis of the recent joint key gap analysis performed by platforms which identified :
  - 11 gaps identified jointly by two or more platforms; plus one cross-cutting gap dedicated to SSH
  - among them, several are relevant with regard to our ALLIANCE-NERIS workshop
    - Gap 1 - Modelling of the biokinetic behaviour and risk for internal emitters
    - Gap 2 - Improving environmental and health monitoring, particularly by lay people
    - Gap 10 - Integration of environmental exposure assessment for ionising radiation and other stressors
    - Gap 11 - Optimising emergency and recovery preparedness and response
    - and SSH priorities

  - Those are consistent with the joint R&D challenges we jointly developed under CONCERT (draft version of the joint roadmap)
    - Challenge F - Integration and optimization of environmental exposure assessment for ionising radiation and other stressors
    - Challenge G – Optimizing emergency and recovery preparedness and response
    - Challenge H – Enhanced integration of radiation protection science with society

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Gap 1: Modelling of the biokinetic behaviour and risk for internal emitters

- **In many exposure situations internal exposure to radionuclides is important.** Assessment of the health risks associated with internal radionuclide exposure is complex and there remain substantial uncertainties related both to dosimetric aspects and health outcomes. Reduction of these uncertainties will improve risk assessment of internal exposures and hence inform appropriate protection measures
- **Improved modelling for internal doses after accidental situations based on environmental monitoring data and personal monitoring data**

- EURADOS, NERIS, MELODI, ALLIANCE

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Gap 2: Improving environmental and health monitoring, particularly by lay people

- **Improving environmental and health monitoring by lay people**, and **new equipment such as drones and a European wide harmonization of such tools and methods and how to integrate this into operational approaches**
- These can be considered as overlapping open topics in both gap analyses, excluding the work to be done in Shamisen-sings.

- EURADOS, NERIS

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Gap 10: Integration of environmental exposure assessment for ionising radiation and other stressors

- **Mechanistic understanding** of radionuclide dispersion **in space and time**, and transfer processes.
- **Development of process-based models to improve dose assessment predictions, considering both environmental monitoring and personal monitoring data.**
- Advanced modelling of **process interactions at the various biosphere interfaces at the local, regional and global scales**, in different ecosystems (including urban).
- **Advanced methods for data treatments** to cope with the large amount of data available.
- **Integrated holistic modelling approach and advanced methods** to identify the most significant sources of uncertainty in radiological impact assessments.
- In reality exposures to radiation rarely if ever occur in isolation, populations **are co-exposed** to other stressors concurrently. Understanding the interactions between radiation and other potential co-exposures may be relevant to risk assessment if substantial modulation of the radiation effect on humans (including patients) or non-human species is observed

- ALLIANCE, NERIS, MELODI, EURAMED

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Gap 11: Optimising emergency and recovery preparedness and response

- **Customisation of** atmospheric, river, marine, brackish water, terrestrial and urban **dispersion models, food chain models and dose assessment models**.
- **Improvement of monitoring** of the different environmental compartments, foods and goods.
- **Improvement of dose assessment models** for better dose reconstruction and predictions of the impact of an accident.
- **Methods and guidance for optimization** (residual dose approach, temporal dynamics for the evolution of countermeasures…)

- NERIS, ALLIANCE

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And cross-cutting issues from SSH

- The SSH community encourages multi-disciplinary approaches attending also to social and ethical considerations (eg. Low dose risk communication; holistic approaches of emergency management, public information and stakeholder engagement, societal aspects of medical applications, etc.).

- **Risk communication about low doses and related uncertainties.**
- **The understanding of ionizing radiation concepts, risks and uncertainties by different stakeholders** in the context of medical exposures, industrial applications and natural radiation.
- The interplay of psychological aspects associated with radioactivity, social environment and radiation protection behaviours.
- Potential and pitfalls of citizen involvement in knowledge production for radiological risk governance.
- **Socio-economic valuation and multi-criteria decision and methods** to formally structure the evaluation and integration of radiological and non radiological factors.
- Enhancing the reflexive awareness of actors involved in radiation protection R&D about the societal implications of research.

Key features for further scientific developments jointly between ALLIANCE and NERIS

- Environment to be considered in a broader view of protection of the people and the environment
- Address the scientific developments in the perspective of improving the holistic / multidisciplinary approach including assessment and management issues
- Contribute to the promotion of informed decision processes for the various categories of stakeholders

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The specific objective of the workshop

- To address the **spatial re**distribution of radionuclides, focusing on water- and solid-mediated fluxes of radionuclides from the source to the ocean
- To discuss how to develop **a holistic understanding of key processes** to improve radiological impact assessment and management
- To use **large volumes of possibly heterogeneous data and combining model predictions with monitoring results** in an optimized way
- To promote relevant **crowd-science methods** to populate data sets and to integrate social sciences in the holistic approach (open research, open share)

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The method adopted for the workshop

- Invited speakers on key issues to share the state of the art for knowledge and know-how
- Two major umbrella topics identified
  - Session 1 - Processes and environmental factors influencing the water- and solid-mediated fluxes of radionuclides from source to ocean: Improving the environmental impact assessment and management considering temporal and spatial issues.
  - Session 2 - Combination of model predictions and measurements (big data sets) in various situations.
- Slots for group discussions :
  - Priority given to new ideas, disruptive approaches
  - Identification of missing elements
  - Connection with the elements from the gap analyses
  - Connection with regulation and practices

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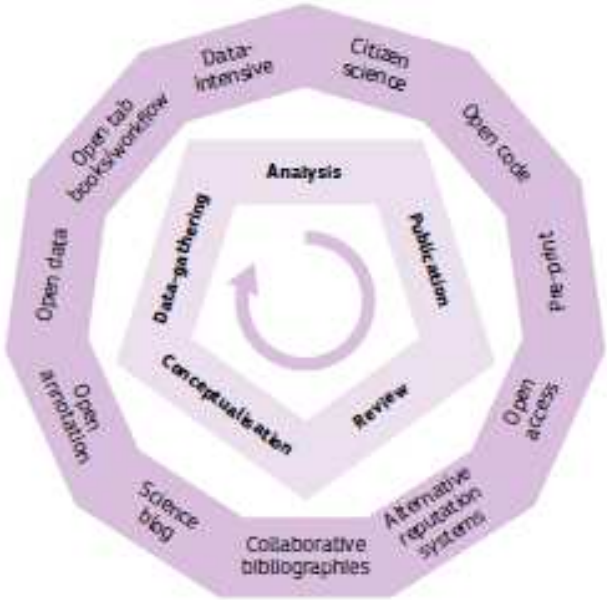
The expected outcomes of the workshop

- Statement paper(s) as a reference for the main lines for research in this field (decision on how to proceed)
- Networking to answer the current call (NFRP-8) and the next ones (preparation of WP 2019-2020 and of FP9)
- Joint brainstorming between NERIS & ALLIANCE, plus SSH community

- Think and act to improve the « 3 Os» -Open data / science ; Open innovation (EIC) ; Open to the world

Europe's Future : Open Innovation, Open Science, Open to the World, Reflections of the Research, Innovation and Science Policy Experts (RISE), High Level Group, March 20



Source: http://ec.europa.eu/research/consultations/science-2.0/background.pdf

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