

# Summary debate sessions

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[www.star-radioecology.org](http://www.star-radioecology.org)  
[www.radioecology-exchange.org](http://www.radioecology-exchange.org)

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# Pursuing sustainability and integration

**A domination by radiobiology**

42%

**Lack of interest in radioecology as a science**

46%

Incompatibility between the...

Not sexy enough for...

**Lack of funding for radioecology**

67%

**Problems with involvement in CONCERT for non-partners, especially universities**

38%

Inadequate interaction...

Too much focus on "the how"...

The "Hobby-hors...

**An external view that all that's needed has been done before**

56%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Norwegian University of Life Sciences

# Pursuing sustainability and integration

## Lack of funding in Radioecology

Whilst the lack of funding was the most highly rated issue, regulators stated if there was an identified need the money would be found. We need better communication between regulators, industry and the scientific community to identify and respond to issues (especially those of current concern) where funds would be available. The Radioecology Exchange can help with this.

## It's all been done before?

There was a perceived failure to disseminate successes and relevant current challenges. We need to archive data and knowledge to underpin the process and explain where the problems remain in a direct and clear manner, especially for long term characterisation.

## Lack of interest

There was a difference of opinion between those that wanted to do good science versus what could be funded. We need to find appropriate mechanisms to do both, and make it sexy.

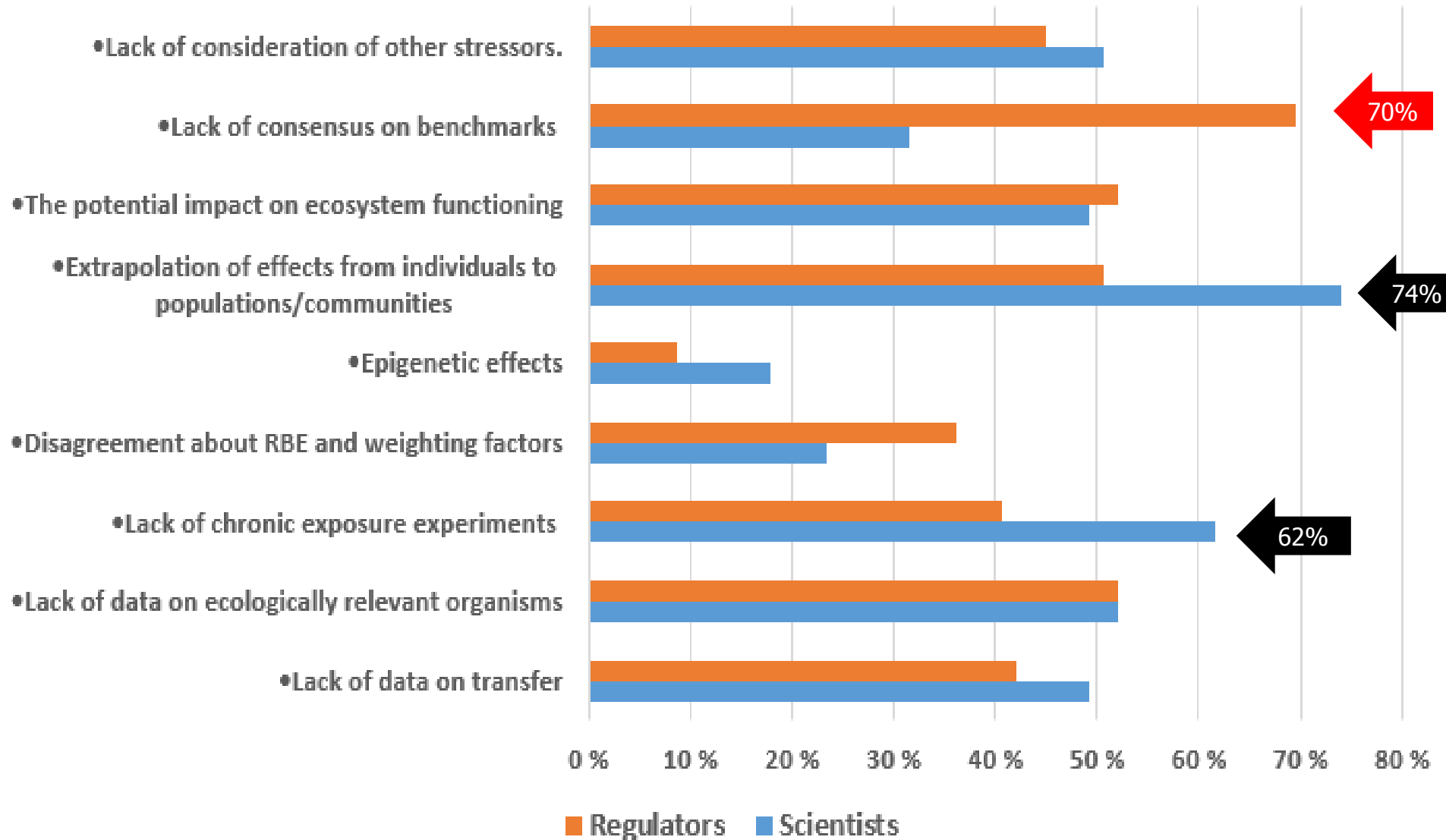
## Domination by radiobiology

There is a concern that the prior relative strength of MELODI had led to radiobiology dominating radiation protection (eg. all WP leader in CONCERT are from MELODI). In part this reflects the understandable focus on human health in Euratom. However, the ALLIANCE needs to become stronger and enhance its influence.

## CONCERT 'Problems'

The participants welcomed the opportunity to hear about CONCERT but concern was expressed that for some participants this was the first time they had heard about it. There is a strong request for clear guidance on how CONCERT will work for organisations outside of CONCERT otherwise there will be a perception of a closed shop. Current third party arrangements are critical and currently worrying for many.

# Robustness of ecological radiation protection criteria



# Robustness of ecological radiation protection criteria

- **Lack of consensus on 'benchmarks'**
  - because of lack of agreement on other things? What and how to protect? How they should be applied?
  - 'benchmarks' are much lower than dose rate at which the majority of effects are observed in experiments - are the uncertainties large enough to raise concern?
- **Need for chronic exposure**
  - Why and what is chronic exposure?
  - To expose all potentially sensitive life stages, whole life cycle exposures are needed
  - Multiple generation exposures can be useful to address/demonstrate effects/lack of effects at lower dose rates - ecologically more relevant; regulatory more useful?
  - Are more needed? Lots already

# Robustness of ecological radiation protection criteria

- **Relevance of effect data**
  - few field studies - can we do more? They are complex to carry out and difficult to interpret. But ecology is complex. Field data can be useful to validate predictions
  - community/mesocosm studies could be useful
  - effects in the lab should be made more relevant to field conditions, low food, varying temperature, etc. ("take the organisms out of their comfort zones")
  - mechanistic models (DEBtox, population modelling) can provide important insight

## Multiple stressor research

- Should multiple stressor research be continued?
- What can we say about the robustness of protection benchmarks in a multiple stressor context based on the STAR results
- Is further research needed and if yes suggestions for a multiple stressor research roadmap



# Multiple stressor research

## Should multiple stressor research be continued?

- Very positive return on the research performed
- MS studies needed
- Does radiation matter as stressor?
- MS tests showed that the MS models work across 4 different species
- Models have stood up to be quite robust for a number of scenarios but have seen synergistic and antagonistic effects.
  - What kind of model uncertainties are important to address?
  - We are never going to deal perfectly with synergism and antagonism.
- Can we extrapolate from high dose rate effects to realistic environmental concentrations?
- Clear story
  - → antagonistic/synergistic depending on CA/IA → creates confusion

# Multiple stressor research

What can we say about the robustness of protection benchmarks in a multiple stressor context based on the STAR results

- Generally antagonistic, what with limited synergism
  - Define AF – conservative enough, not too conservative
- Data should be generated so that we we can obtain an idea (for different stressor groups) what is the maximally added effect you can observe in an MS context
- Field data and lab data are complementary – field can give idea of variability of results, on importance of a given stressor
- Need to develop a tiered pragmatic approach
  - → tools to identify those stressors that matter
  - →if close to benchmark, more work

# Multiple stressor research

## Is further research needed and suggestions for a multiple stressor research roadmap

- MS studies needed
- Future studies should deal with
  - More realistic environmental conditions and at physiological boundary conditions of organism
  - More realistic dose ranges (lower dose ranges)
    - We can not prove 'no effect' – non-bound NOEC
  - Mechanistic modelling is way forward
- What are major concerns of regulators?
  - Need to communicate with regulators and industry to see which of the uncertainties are relevant
  - We should not be doing research in a vacuum. There is a source of societal challenges.
  - Should guide our research ← → science driven research

# Integration of assessment methodologies and protection frameworks

- Emerging perspectives for integration of humans and biota presented
  - Basic concepts are similar
  - Endpoints are different
- International organisations (ICRP, IAEA, working groups...) are instrumental in this development
- Technical feasibility of integration was discussed
  - positively evaluated by some speakers
  - difficulties highlighted by others
- Holistic approach
  - Humans as part of the ecosystem
  - ethical issues (valuing humans vs biota)

# The protection framework and assessment tools are developing

- New data should be included when available (ICRP, IAEA, other sources)
- Philosophical reflections / documents (ICRP) and associated communication needed
- More focus on low dose effects needed
- Understanding and definition of 'significant risk', not only screening benchmarks

# Protection principles and assessment tools

- Not only assessments, also a basis for potential actions (e.g. remediation, waste repositories)
- Justification of intervention is necessary
- Optimisation of remediation for biota protection is more challenging
- Assessment tools
  - Dispersion and transfer modelling should be the same
  - Some tools already include biota and humans in the same system
  - Should be fit-for-purpose
  - Decision support criteria should be included

# Thanks to all members of panels

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