

6TH NERIS WORKSHOP

**OPERATIONAL AND RESEARCH ACHIEVEMENTS AND NEEDS TO FURTHER STRENGTHEN
PREPAREDNESS IN EMERGENCY MANAGEMENT, RECOVERY AND RESPONSE**

20 - 22 October 2021. Online



Participatory stakeholders' engagement through national panels and surveys to address the issues and uncertainties arising in the preparedness and management of the transition phase

Milagros Montero (CIEMAT)

CONFIDENCE WP4 Partners

CONFIDENCE WP4 Contributors



SPAIN
Centro de Investigaciones Energéticas,
Medioambientales y Tecnológicas



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Centre d'étude sur l'Evaluation de la
Protection dans le domaine Nucléaire



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Outline

1.- Introduction

2.- Methodological approach

3.- Stakeholder Discussion Panels

4.- Delphi Study

5.- Analysis of the uncertainties

6.- Conclusions

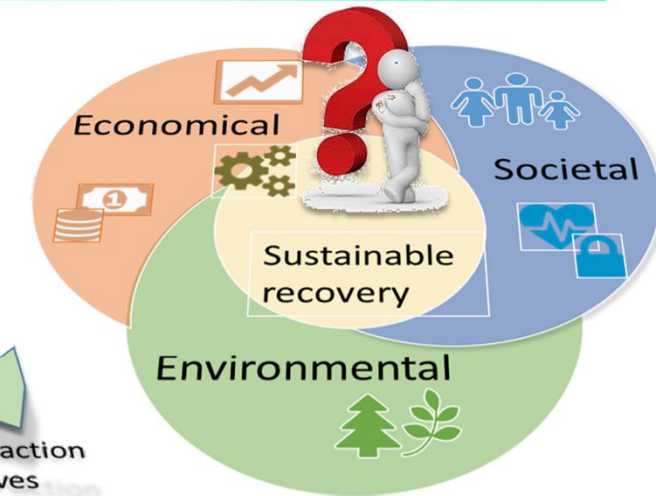
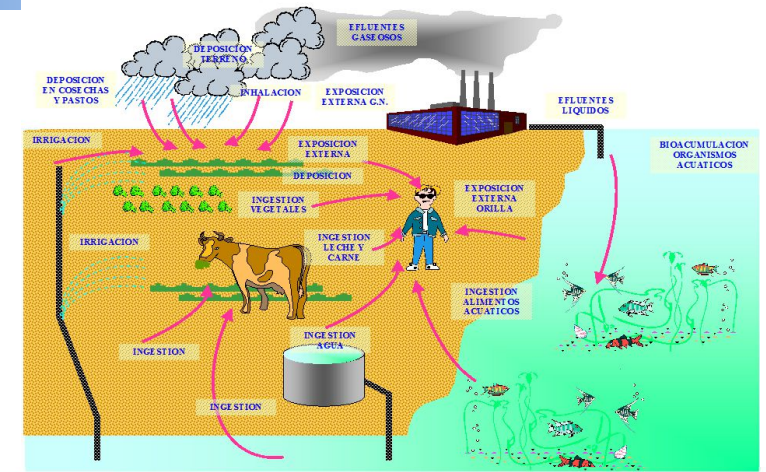
1. Introduction - Motivation

The management of an **emergency** situation is subject to multiple **sources of uncertainty**:

- the knowledge of the actual consequences of the accident
- the response and recovery strategies to be applied
- the potential environmental and socio-economical impact on the affected environment and population.

During the transition phase, **decisions** should be taken to **conclude** the emergency response and establish specific plans to begin the **recovery** of the affected areas, looking for the resumption of social and economic activity, as far as possible.

Identifying such uncertainties **in advance** would make it possible to successfully address these challenges and thus achieve a **sustainable** and **optimal** improvement of the future living conditions of the affected population and the overall quality of their environment.



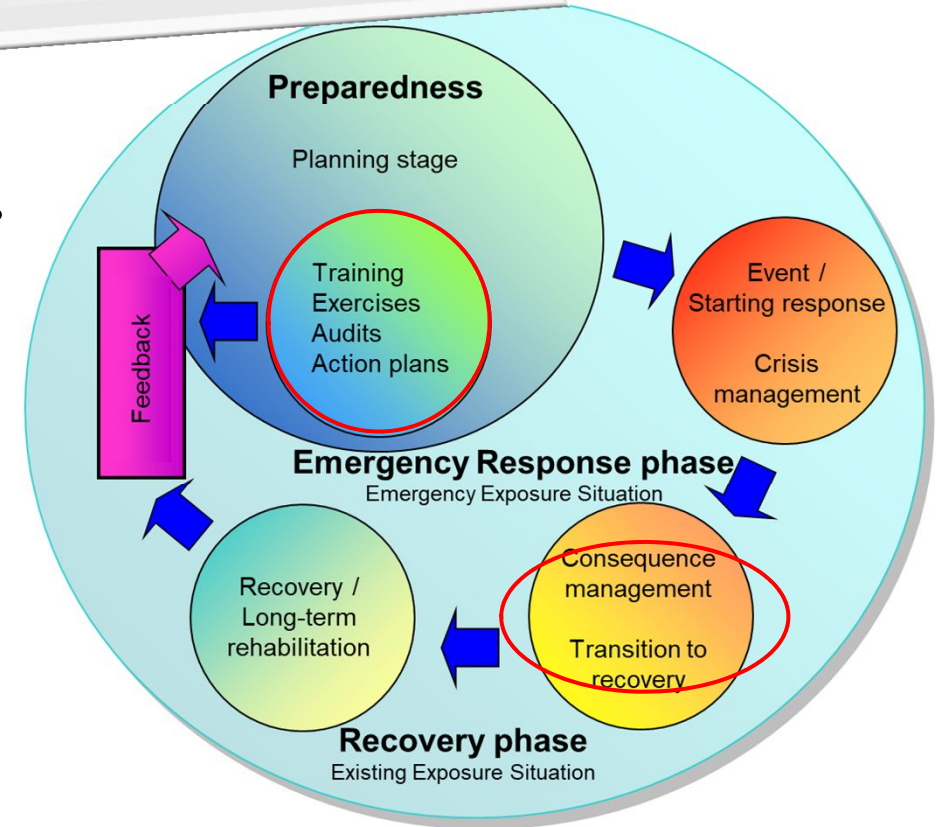
1. Introduction - Motivation

Preparedness is the basis for a good response to emergencies!

According to the new **European Basic Safety Standards (BSS)**¹,
“the **emergency response plans** shall also include provision for the **transition** from an emergency exposure situation to an existing exposure situation (**Article 98**)”.

The Member States “shall arrange for the **establishment of strategies** to ensure the appropriate management of existing exposure situations commensurate with the risks and with the effectiveness of protective measures (**Article 101**)” and

“shall provide as appropriate for the **involvement of stakeholders in decisions** regarding the development and implementation of strategies for managing exposure situations (**Article 102**)”.



The Emergency Management Structure and Coordination of Decision-Making

1. Council Directive 2013/59/EURATOM, of 5 December, Laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation. <https://ec.europa.eu/energy/sites/ener/files/documents/CELEX-32013L0059-EN-TXT.pdf>

1. Introduction - CONFIDENCE project

CONFIDENCE- WP4: Transition to long term recovery, involving stakeholders in decision making processes



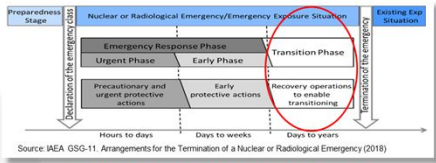
Improve the **preparedness and response** during the **transition phase**, identifying and trying to **reduce the uncertainties** in the subsequent management of the long-term exposure situation.

Structured collaboration involving stakeholders in a sequential process with 3 tasks:

1. **Recovery scenarios planning**: establishment and optimization of remediation strategies in generic scenarios
2. **Scenario based stakeholder engagement**: testing and evaluation through national discussion panels and transnational surveys
3. **Guidelines and recommendations**: proposals to address the post-accident planning and decision making during the transition phase

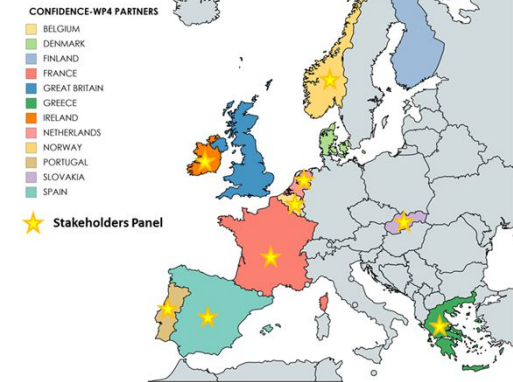


2. Methodological approach



DECISION MAKING PROCESS IN THE TRANSITION PHASE

- Prioritisation of stakeholder preferences:
 - Issues
 - Objectives
 - Challenges
- Ranking the uncertainties in the Decision Making process

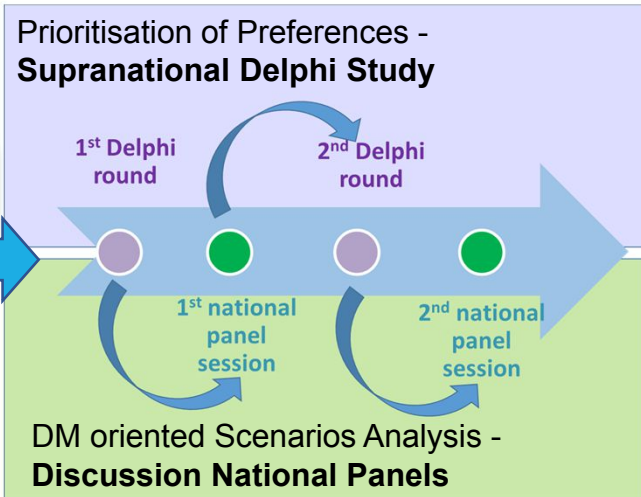


Representative contamination scenario situated in the transition phase

- Methodology design and brainstorming process to define issues and criteria to be considered in the scenario planning and decision-making process.
- Definition of generic contaminated scenarios.
- Selection of a small number of recovery strategies to test the preferences.
- Establishment of common guidelines to facilitate discussions

Used as basis for the national panel discussions

Structured communication technique to establish a generic scenario



Quantitative Assessment



Qualitative Assessment

- Understanding the transition phase
- Stages and challenges of the decision making (DM) process
- Identifying critical aspects of recovery preparedness and response
- Dealing with uncertainties arising in the transition phase
- Post-accident recovery planning
- Exploring stakeholder engagement in DM processes

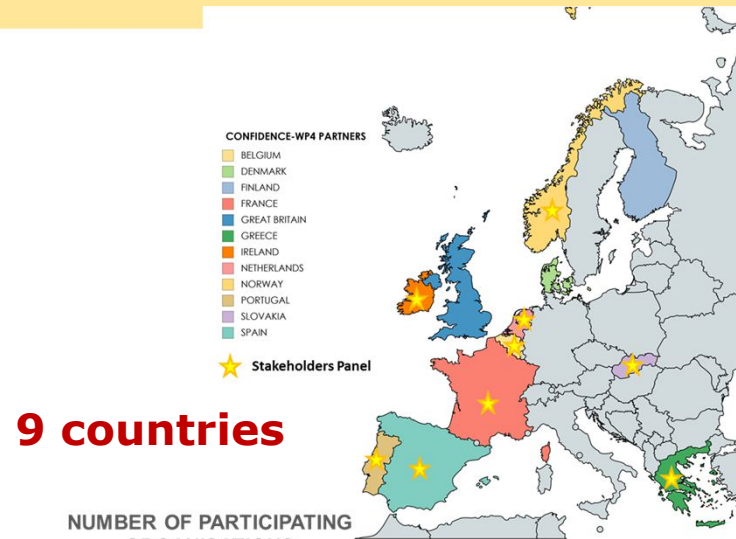
3. Stakeholder Panels

Objectives

- Understanding the transition phase
- Stages and challenges of the decision making (DM) process
- Identifying critical aspects of recovery preparedness and response
- Dealing with uncertainties arising in the transition phase
- Post-accident recovery planning
- Exploring stakeholder engagement in DM processes

Approach

- A “question-driven” table top exercise, to be conducted individually by each participating country (national panel). One or two sessions.
- Simulating an intervention scenario from an accidental release in a Nuclear Power Plant (NPP), based in the contamination pattern monitored after the source term has been controlled and all the contamination has been deposited.
- Focused in the management of the consequences and the post-emergency preparedness for the long term recovery to carry on during the transition phase.



104 organisations

Regulatory Authority, National, Regional and Local Authorities, Public Agencies, Producer, industries, marketers representatives, Researchers and Universities, Scientific Associations, other experts.

Most panels dealt with decisions taken in the transition phase:

- To recover food production in agricultural environments
- To deal the urban decontamination issues,
- To manage and protect the public and international consumption/trade
- To cope and minimize the impact of evacuation and relocation and possible reversion.

Outcomes:

- Individual report by national panel
- Structured grid consolidating the results according to the main issues, criteria and uncertainties identified by the panels.
- Set of common interest and preferences for the planning of action strategies to address the management issues cited above.

3. Stakeholder Panels – Planning action strategies

Issues and challenges

Management of consequences arising from decisions taken during the emergency (including evacuation and food restrictions)

- **Protecting the human health** is the main concern in the emergency phase.
- Uncertainties concerning the **timing of decisions, public distrust** and **stigmatisation**.
- **Availability of resources and infrastructures** for the actions.
- Maintain the **precautionary principle** in restrictions on food production and distribution
- A proper **radiological characterisation** and **knowledge of non-radiological hazards**.
- Wider **information** on the **environmental** and **socio-economic** environment affected.
- To **check that decisions** based on modelling are consistent with the real situation.
- **Development of policies** at the national level and **communication** to assure trust among the population.
- Consider the different issues in the **preparedness phase**.

Protective or remediation actions to implement in urban environments

- **Returning to normal life as soon as possible** and dealing with the possible **psychological problems** and **stigmatisation** of people relocated.
- Combining relocation with decontamination actions.
- The **choice of the decontamination actions** should be dependent on the level of contamination, possible “hot spots”, and according to the typology and spatial distribution of houses and other buildings, the availability of infrastructures and location of green areas.
- The **management of wastes** arising from remedial actions.
- **The strategies should be evidence-informed**, and with a **constrained and temporary implementation**, following a **graded approach** to minimise the **social cost**.
- **To keep flexibility in post-accident management** to have room for local decision-making, giving freedom of choice and supporting self-reliance of the population.

Protective or remediation actions for agricultural environments

- **Management of agricultural production and husbandry**.
- The **socio-economic consequences** are **at least as important as health effects**, or even more so, in areas where the food and feed sector are the major industries.
- **Zoning of the affected areas** should be clearly set and **enforced with ongoing monitoring/measurements programs**.
- **Local conditions** and the **temporal evolution of contamination** and **transfer through the food chain** are challenges when applying recovery actions.
- The strategies should include **actions at different levels in the food production chain** and should be **implemented jointly and interrelatedly**.

Protection and management of consumption and trade of food and other goods

- **Food control**, including restrictions for consumption and trade are the main issues.
- Essential elements are **food safety, availability of personnel** and **resources to undertake decontamination** and **management of waste** resulting from contaminated products.
- Knowledge is needed on **the transfer of contamination through the food chain** in order to plan effective strategies to protect the consumers.
- **Monitoring programs and zoning systems**, taking into account professionals' advice (e.g. producers and distributors).
- **A compensation policy** due the food restrictions.
- **The consumer response to purchase goods** from affected areas.
- **The engagement of all actors involved in the food chain**, including producers, processors, and distributors to implement the control measures.
- **Communication and information** to gain the trust of consumers.

Preparedness for the post-accident recovery

- The recovery plans should address the **minimisation of the radiological impact**, as well as **other impacts on the population** as priority objectives, considering the **effectiveness** and **feasibility** of recovery actions in relation to the environmental, social and ethical factors influencing the decision-making process.
- **Waste management** also needs to be planned.
- **Identification of key actors in advance and the involvement of stakeholders representing the society** in the decision-making processes.
- **Establishing a network of stakeholder** during the preparedness phase is key to ensuring the successful implementation of protective actions in the emergency, transition, and recovery phases.
- Plans to make **information on radioactivity** available to people **routinely**.
- During the transition phase, a **consultation process involving all actors** is needed for an effective response, supported by **predictive and monitoring tools previously adapted, tried and tested for national conditions**, and by **information on the environmental and socio-economic settings of the affected areas**.

Criteria to evaluate the success of the recovery strategies

- | | |
|------------------------------------|--|
| • Effectiveness | • Availability of resources and infrastructures |
| • Feasibility | • Availability of information supporting the decision-making process |
| • Radiological criteria | • Effects on the quality of life |
| • Health consequences | • Trust |
| • Psychosocial consequences | • Public participation |
| • Waste amount and characteristics | • Population perception |
| • Acceptance of countermeasures | • Communication |
| • Side-effects | • Ethical factors |
| • Economical costs | |

3. Stakeholder Panels – Summary of main findings

- **As time passes** and depending on the distance from the contamination source, **the social and economic issues** would be probably **more important** than health issues, and the main goal will be **to resume infrastructures and socio-economic conditions** that allow returning, as much as possible, to normal living conditions;
- The implementation of **prompt food and animal-feed actions**, both in terms of consumption restrictions (followed by gradual release based on actual measurements) or **protective actions to reduce the transfer** of radioactivity are **essential to preserve the food and agriculture industry**.
- It is relevant for the decision-making process **to involve various stakeholders** during **the transition phase** and in the **preparedness phase**.
- It is important and necessary **to understand and be aware of the uncertainties**, including the scientific ones, which could arise around decision-making. Most uncertainties can be considered and exercised in the preparedness phase.
- Other elements to take into account are :To have **predictive and monitoring tools** previously adapted, tried and tested, **well-identified roles** for the different public authorities and other bodies that should act, and **well-established coordination**, with the provision of **adequate resources and infrastructures**.
- There is a need to ensure that **information** related to the local situation is **available at every stage** of the decision-making process; local conditions are very **important** for both the **implementation and effectiveness** of a particular recovery action;
- **Communication plans** should be ready in advanced; **coherent** and **clear messages** understandable by the population should be prepared in order to gain public trust in the implementation of a specific recovery strategy.

4. Delphi study - Prioritisation of preferences

Objectives

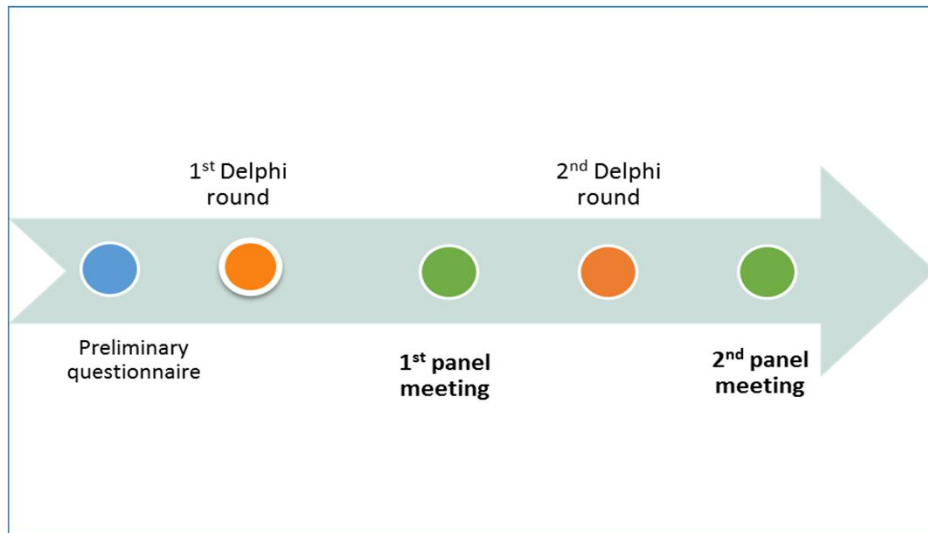
- To obtain a prioritization/ranking of stakeholders' views concerning most important issues, criteria and uncertainties for the decision-making in the transition phase.
- To explore consensus amongst stakeholders of different European countries.

Approach

The study was carried out in three phases:

1. **A first open-ended questionnaire** to collect some first ideas regarding future recovery strategies and other issues (October 2017 - February 2018).
2. **First round:** A questionnaire with closed questions to assess the importance of different issues, objectives, and challenges for recovery (June - October 2018).
3. **Second round:** A second questionnaire aimed at creating a ranking of the most relevant issues. We asked participants to distribute points among the main issues to be considered during the transition phase, indicating the relative importance of each in terms of efforts and resources to devote to them (April - May 2019).

The final responses were obtained by weighting equally all the experts' estimates from the second round and aggregating them (as there were not extreme values, the average was considered a good measure).



4. Delphi study - Prioritisation of preferences

1st round questionnaire

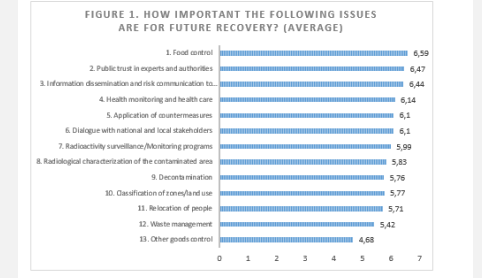
- **Topics:**
 - Demographic section (country, professional field, and level of influence).
 - Concerns in the transition phase
 - Issues to be addressed
 - Objectives of the recovery plan
 - Main **challenges**

OBJECTIVES OF THE RESTORATION	1 (not important) 7 (very important)						
Q3. How important are the following outcomes after the implementation of the restoration plan?							
	1	2	3	4	5	6	7
Dose levels restored							
Minimum impact in the population (e.g. in the living conditions)							
Public confidence							
Minimum economic costs							
Minimum environmental impacts							
Other issues not included in the list:	Comments:						

2nd round questionnaire

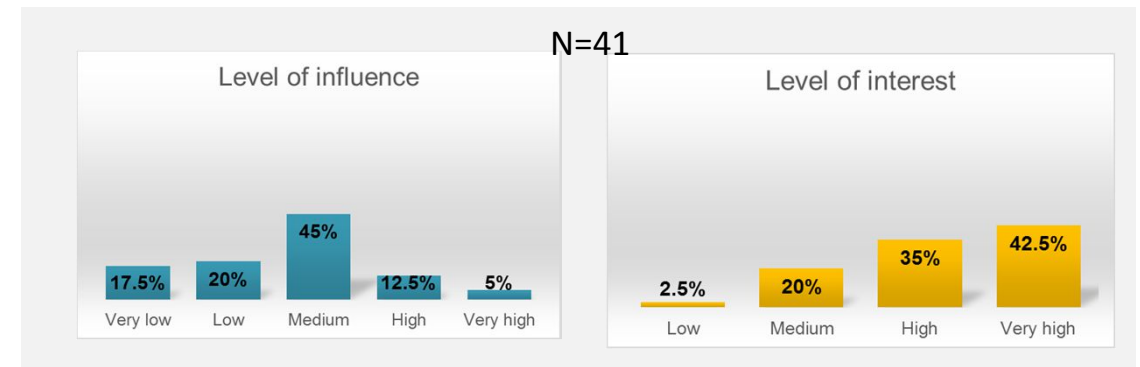
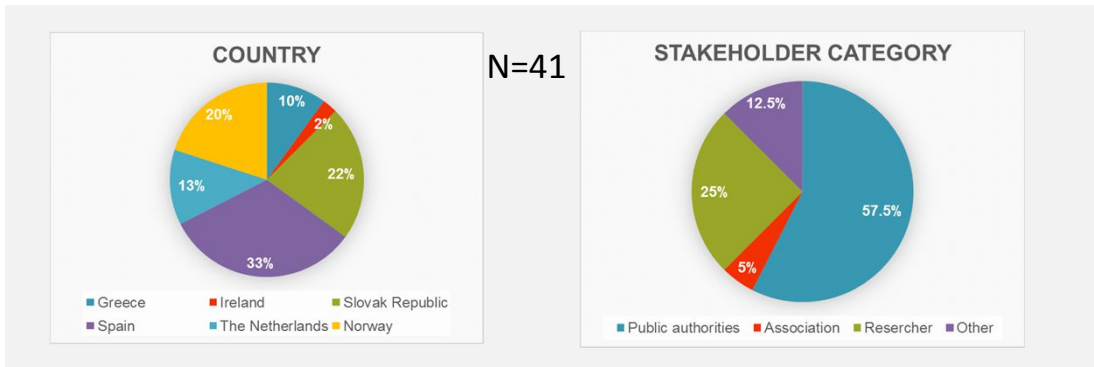
- Very similar to the one of the 1st round, providing feedback from the first round results.
- **Topics:**
 - Issues to be addressed
 - Objectives of the restoration plan
 - Main challenges
 - **Uncertainties**

In the first round, you were asked: "How important do you consider the following topics for the recovery phase after a nuclear or radiological emergency?" The aggregate responses of 71 participants from seven European countries, rated between 1 and 7 according to increasing importance, are shown in Figure 1.



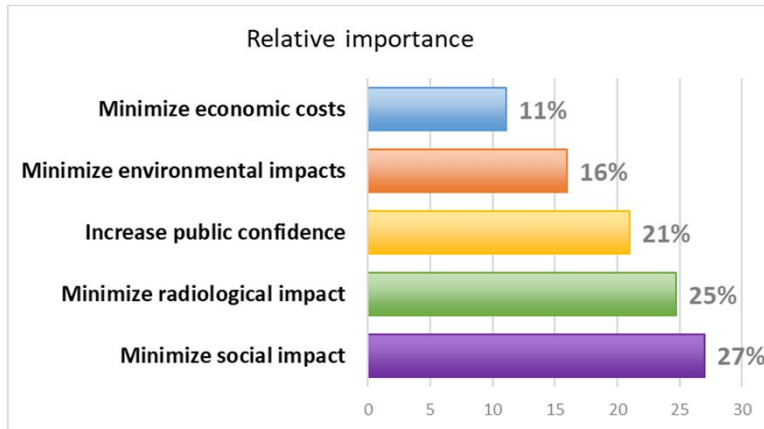
Considering those five topics accepted or selected by you, as the most important ones to consider, how would you distribute 100 points among them, to indicate their relative importance in terms of efforts and resources to allocate to them? (You can leave some in 0 points if you wish).

N	Topic	Points
		100

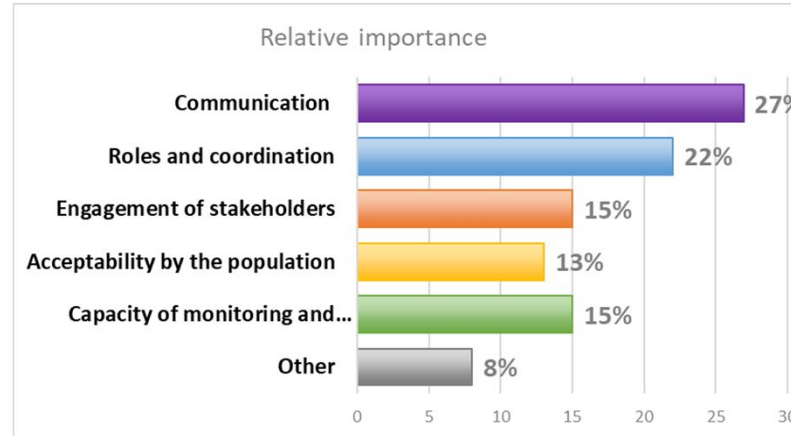


4. Delphi study - Prioritisation of preferences

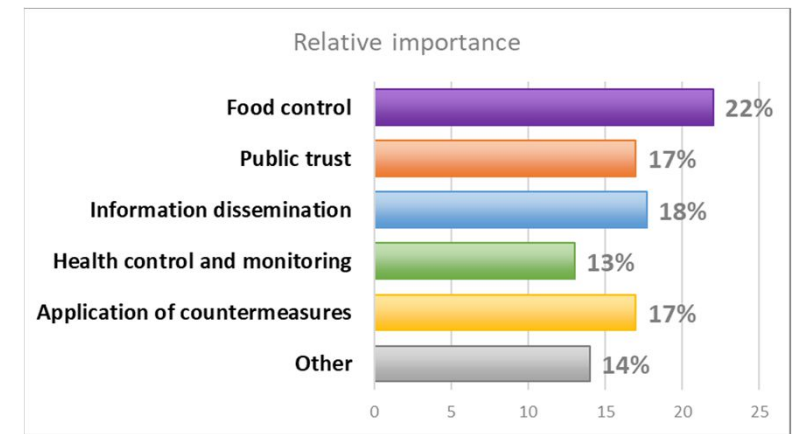
Objectives of the recovery plan



Challenges



Issues to be addressed during TrP



- All uncertainties were considered highly important, ranging from 4.6 (What are the effects at low doses? How accurate are the predictions of future levels of contamination in food and feed?) to 6.05 (How to ensure that foods found in homes and on the market do not generate panic or rejection?).
- In general, from the results, three groups of uncertainties can be derived:

Level of importance	Score (1 to 7)	Example
Very High	Rated 6 or above	What are the social consequences of the different strategies? How to ensure that foods do not generate panic or rejection?
High	Rated between 5 and 6	What to do with the waste? What is the acceptable level of contamination to lift or finish recovery actions?
Medium	Rated 5 or below	Who will pay the compensations? How to manage the maintenance and surveillance of restricted areas in the long term?

4. Delphi study – Summary of main findings

- **Health** and **society** are the first **concerns** of the participants.
- To **minimize social impact** is highlighted as the main **objective** that the restoration has to pursue.
- **Communication with the affected population** is seen as the most important challenge during the transition phase.
- **Food control, information dissemination/risk communication** and **public trust** appeared as main issues to be addressed during the transition phase.
- Although all uncertainties were evaluated as highly importance, a ranking of relative importance according broad groups could be established: the **social uncertainties** stand out as the most important following by the relatives to governance, economic aspects, environmental issues and human health issues.
- High level of agreement has been found among participants, that could be due to:
 - Similar importance of all issues and uncertainties included
 - Homogeneity in the stakeholder group selected (majority of participants are public authorities)
 - Inadequacy of the method used

5. Analysis of uncertainties arising in the SH panels

“Uncertainty refers to the situation in which there is not a unique and complete understanding of the system to be managed”⁽¹⁾

INFLUENCE RELATIONSHIPS IN DECISION-MAKING & KNOWLEDGE RELATIONSHIPS

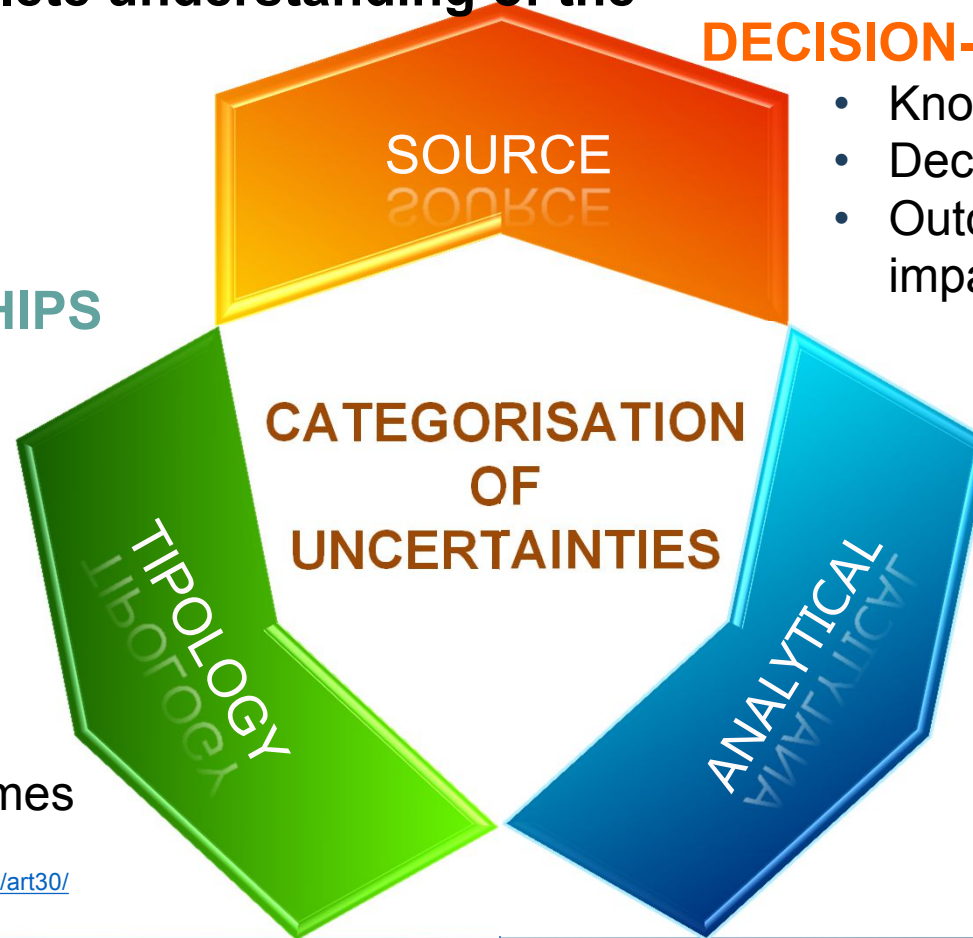
- External
 - Unpredictability
 - Incomplete knowledge.
- Internal
 - Multiple knowledge frames

LOCATION IN THE STAGES OF THE DECISION-MAKING PROCESS

- Knowledge of situation
- Decision-making process
- Outcomes: Implementation and impact of decisions

INDICATORS DESCRIBING THE CONTEXT OR FRAMEWORK OF THE SCENARIO

- Governance
- Environment
- Human Health and Safety
- Social aspects
- Economical aspects
- Other transversal items



1. Brugnach et al. <http://www.ecologyandsociety.org/vol13/iss2/art30/>

5. Analysis of uncertainties – Selection

Selection and grouping of uncertainties found in all panels

Uncertainties related to Governance



- Who, how and when to involve local stakeholders in the decision-making process and in the planning of policy strategies?
- How to balance local, national and even international interests?
- When is the best time to make a decision?
- Should other criteria or additional information to support the decision be taken into account?
- How to adapt decisions and communication according to the evolving situation?

Uncertainties in Human Health and Safety



- What are and how are the exposure levels of the population estimated in terms of doses received and doses averted? Will there be health consequences? How to estimate them?
- How does the selection, implementation and control of protective actions affect the affected population and workers?
- What are the consequences for those implementing protective/ remediation measures?
- How to manage and provide measurements of radioactivity in a reasonable timeframe?
- What are the psychological, social and economic effects on the population affected by the emergency?

Economic Uncertainties



- What are the costs of the protection measures envisaged? Who will pay for the necessary human resources and technical equipment?
- What about damage/loss of products? How can we assess the impacts?
- Who will pay for compensation? Are sufficient resources available?

Environmental Uncertainties



- How does pollution impact on different natural and human environmental compartments (air, soil, water or urban structures and agricultural systems)?
- How and where are the different possible alternative actions planned, implemented, assessed and monitored?
- What are the impacts on the ecology of implementing some countermeasures or invasive management actions?
- How should resources be used and waste be managed?

Social Uncertainties



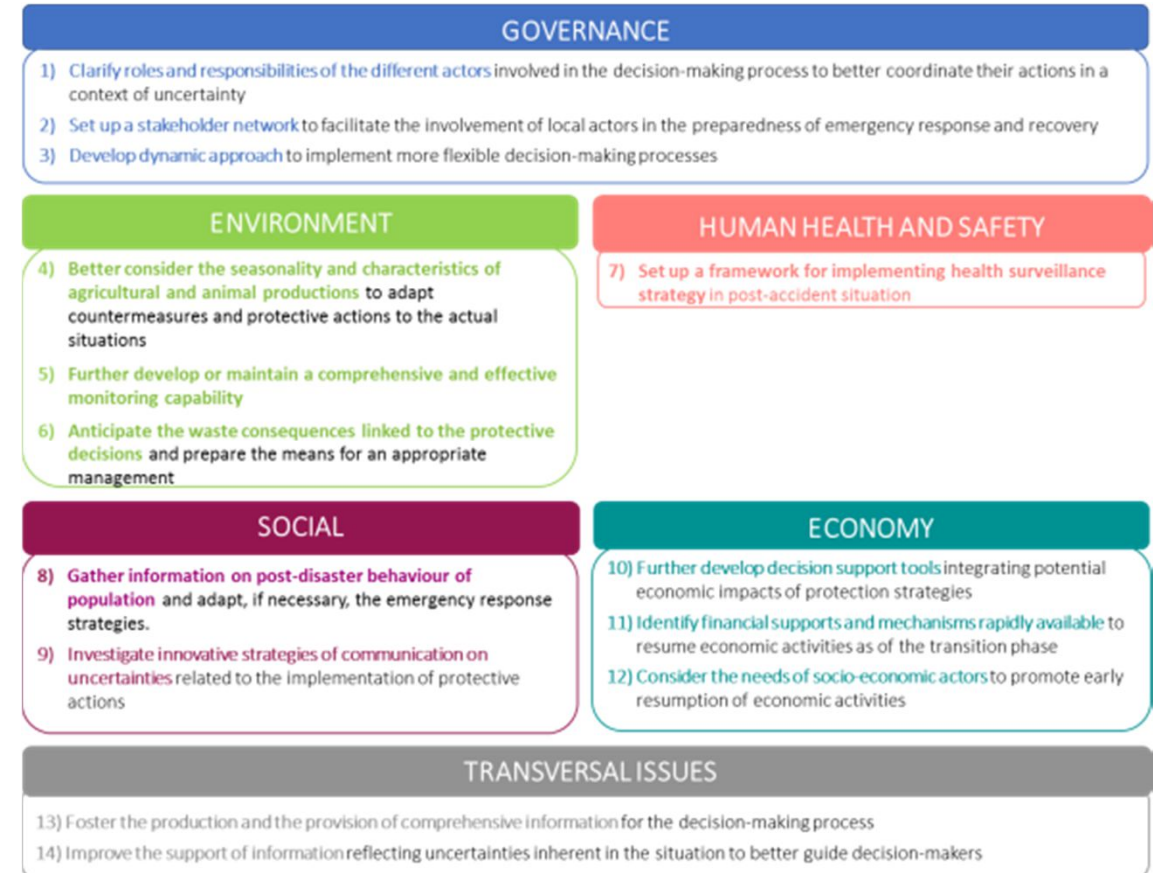
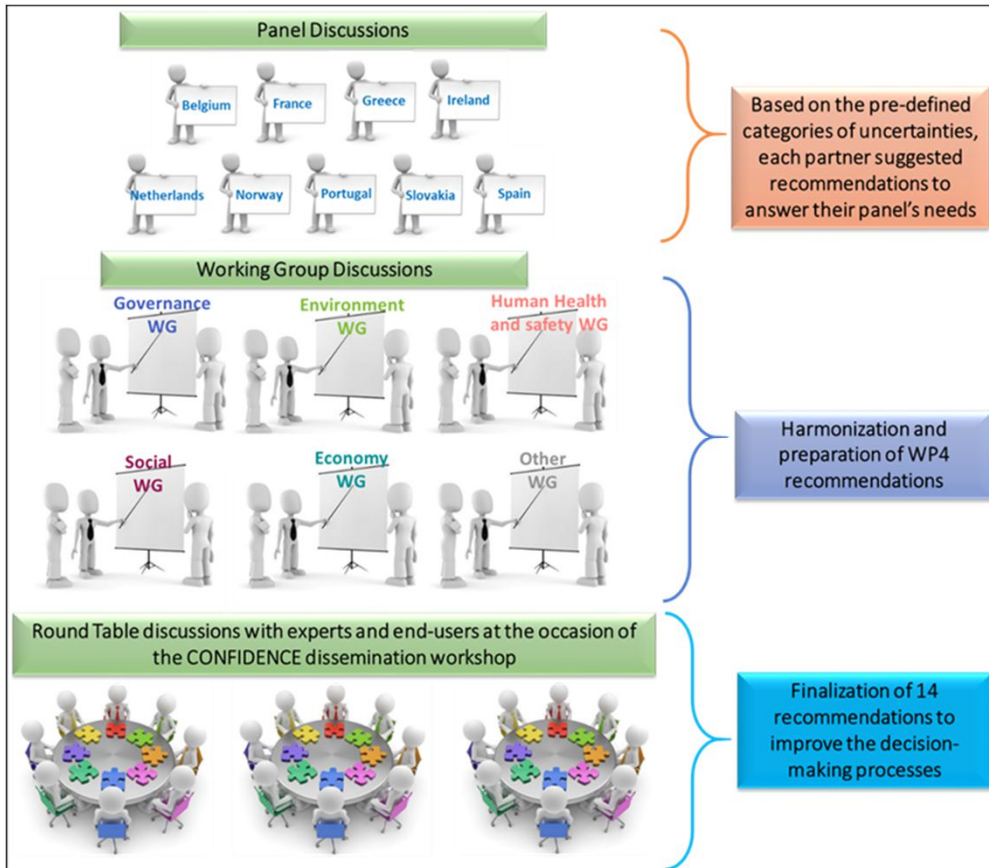
- How can the population be better informed/communicated?
- Will the population comply with the instructions? Will they understand and accept the proposed measures?
- Will the population trust the competent authorities? Will they trust the information provided?
- What are the social consequences of the countermeasures? (e.g. relocation) How to manage the stigmatisation of relocated persons and affected territories?
- How to deal with people's indifference in peacetime to improve preparedness plans?

Other type of uncertainties



- Is the information available sufficient and is it accurate? Is it up to date? How to monitor the situation and its evolution?
- What is the level of reliability of the measurements? What is the level of conservatism?
- What is the degree of uncertainty and error in code and model estimates? Are they adequately presented and displayed?
- What is the level of reliability of probability maps?

5. Analysis of uncertainties – Elaboration of the recommendations



Recommendations to improve the decision-making process

• Source: Durand et al. Radioprotection 2020, 55(HS1), S135-S143

6. Conclusions

- A structured process of participation combining scenario-based discussion panels and transnational surveys has been used to engage stakeholders in the preparedness process for consequence management and planning the post-accident recovery during the transition phase.
- The nine panels organized under the CONFIDENCE WP4 allowed a **broad and comprehensive view** of many **issues of interest** to be obtained, including the **stakeholder priorities** associated with decision-making and the preparation of recovery plans during the transition phase of an emergency.
- **Preferences** and **expectations** of local and national stakeholders have been collected together with **key criteria/attributes** influencing the development and preference setting of the recovery strategies within the transition phase. From these results, **recommendations** to deal with and try to reduce such uncertainties were elaborated upon with the additional aim to identify gaps and further research needs.
- Using Delphi methodology has allowed the **preparation of questions and issues** to be used as a basis for panel discussions, **to select and prioritize** the most relevant preferences and criteria resulting from the different panels and **to assess the relevance of the uncertainties** identified. They can be used in the decision-making tools.

6. Conclusions

- Stakeholder engagement is a **key challenge** in the preparedness, response and recovery phase of a nuclear or radiological emergency.
- It is necessary to go further in the **techniques of analysis of scenarios** and in the **participatory processes structured** with the stakeholders as they are crucial tools to cope with the preparedness for response and post-accident recovery.
- Stakeholder panels are needed to consider not only the **technical or scientific aspects** (as can be considered in the simulation models) that improve the understanding or knowledge of the situation, but the **complexity of the relationships** among the actors involved in the decision-making confronted with their different views and preferences.
- In a complementary way, the Delphi technique could be a valuable and efficient tool to obtain a **quantitative assessment**, looking **consensus** and **convergence** among the different points of view if relevant stakeholders can be involved.
- It is necessary maintain an **active network** of stakeholders to assay the process of national dialogue and to be prepared for whatever event. In particular, **international panels** may help closing the gaps that could exist at national level.

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THANKS FOR YOUR ATTENTION

milagros.montero@ciemat.es