

Guidelines and recommendations for decision making during the transition phase

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Training course

Use of uncertain information by decision makers at the various levels within
the decision making process and its communication

VUJE, 13 - 15 May 2019. Trnava, Slovakia



Outline



Introduction - Motivation

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**)”.*

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>

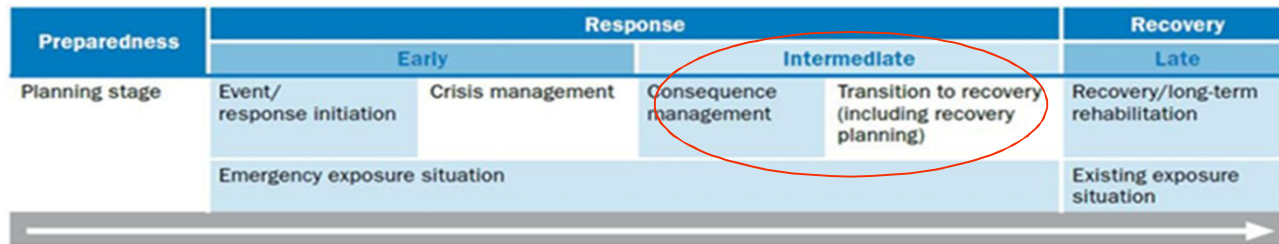
Introduction

CONFIDENCE-WP4

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.



(NEA 2010)

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:** in decisions to recover acceptable living conditions
- 3. Guidelines and recommendations:** to address the planning and decision making during the transition phase

Transition phase Framework and challenges

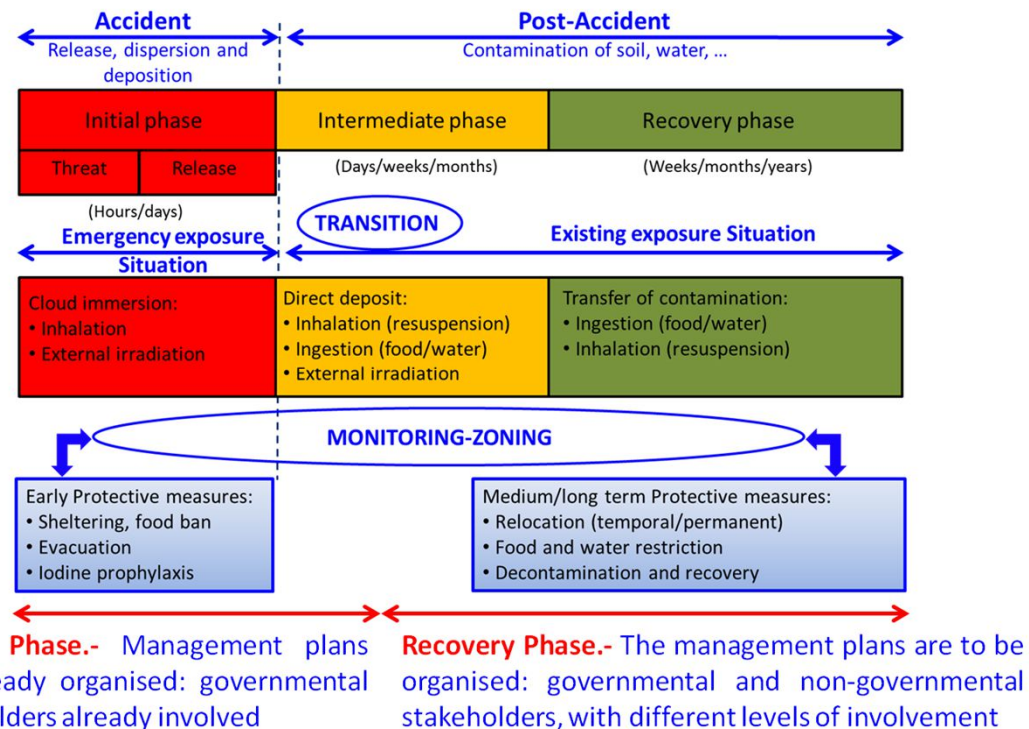
Following the course of a nuclear emergency, the transition phase is:

*“The process and the time period during which there is a progression to **the point at which an emergency can be terminated**” (IAEA, 2018).*

*“... when **the source has been brought under control**, no further significant accidental releases or exposures resulting from the event are expected and the future development of the situation is well understood” (IAEA, 2018)*

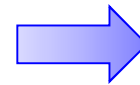
■ The situation requires:

- specific efforts to conclude the emergency response,
- and establishing specific response plans to begin the recovery /long term rehabilitation of the affected areas, supporting **the return to normal social and economic activity, as far as possible**



Transition phase Framework and challenges

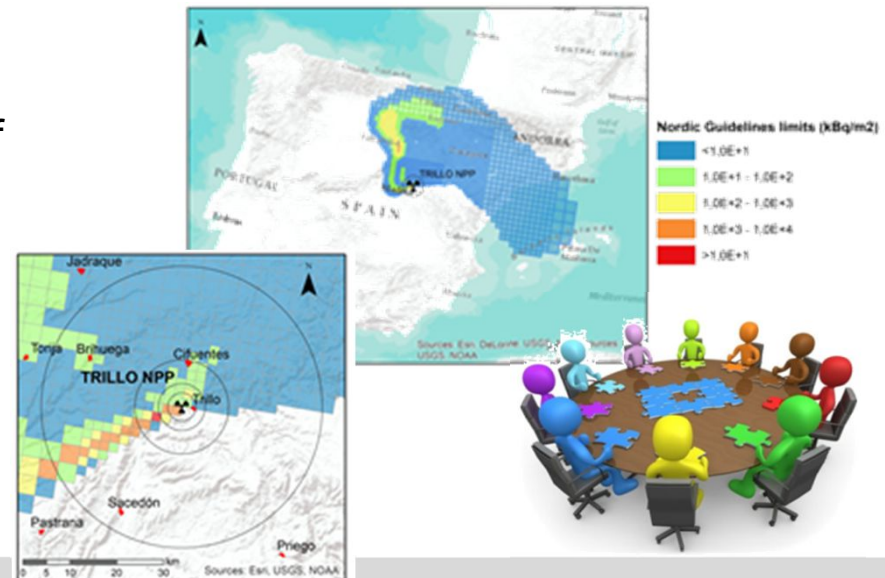
- The transition phase is not driven by urgency and allows,
 - For lifting the emergency protective actions,
 - For adapting, justifying and optimising specific protection strategies, to prepare and begin the late phase recovery and
 - For the engagement of the interested parties .



**Main objective:
to facilitate the timely
resumption of social
and economic
activities**

- Plans need to be developed through a process of **national dialogue with stakeholder (SH) involvement**, taking into account the inherent uncertainties on:

- the knowledge of the real consequences of an accident,
- the strategies to be implemented, and
- the potential socioeconomic impact on the affected population.



Methodological approach in WP4

To build best practices for planning the establishment of optimal remediation strategies for the transition phase with stakeholder involvement in the decision-making process.

Based in a Structured Decision Making

An organized approach to identify and **evaluate alternatives** that focuses on **engaging stakeholders**, experts and decision makers in productive **decision-oriented scenario-analysis** and dialogue and that deals proactively with complexity and judgment in decision making.



The key steps of a typical Structured Decision Making (SDM) process

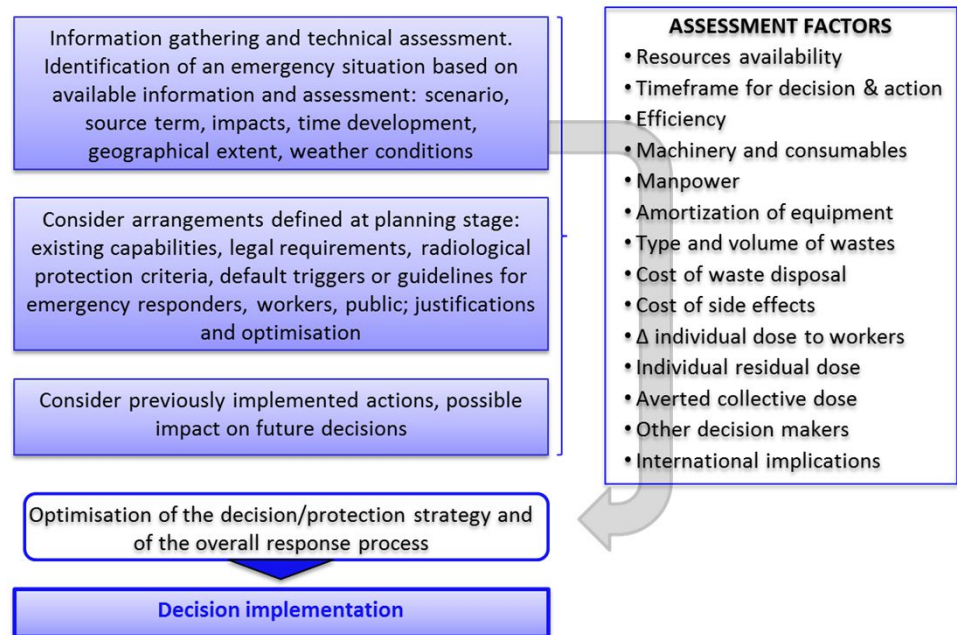
(Source: Structured Decision Making (2013). <https://www.structureddecisionmaking.org/>)

Methodological approach

Recovery plan

- The success of the recovery plan will be measured by the ability of the recovery actions to meet the stakeholders' main concerns and to be implemented in a timely manner. It depends on:

- How is the problem addressed?
- Who is involved? (stakeholders)
- What concerns are considered: health, environmental, social, economic, ...?
- What are the objectives, the things that matter, in the context of the decision under consideration?
- What options are possible?

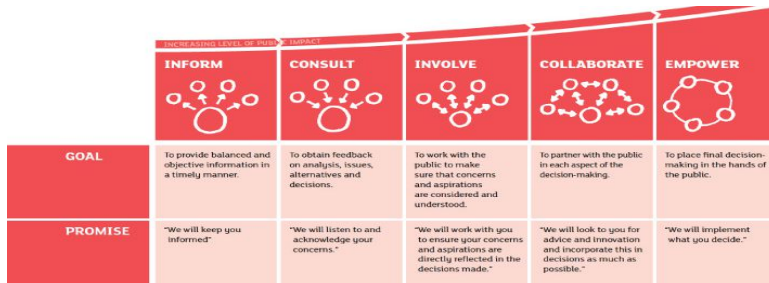


Key issues and factors in the decision-making process

(Based on "Strategic Aspects of Nuclear and Radiological Emergency Management NEA n° 6387, 2010)

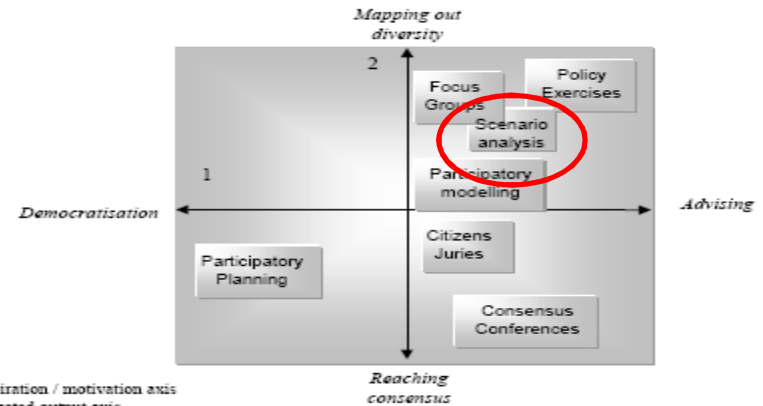
Methodological approach Involvement of the stakeholders in the DM

Degree of involvement of participants



Source: International Association for Public Participation (IAP2)
Adapted from Arnstein's ladder (1969)

Categorization of participatory methods



Source: International *Centr*[®] for Integrative Studies (ICIS)
Building Blocks for Participation in Integrated Assessment *A review of participatory methods (2001)*

■ The degree of involvement of stakeholders, varies:

- **Objectives:** Reasons for the involvement and expected outcomes
- **Topic:** The nature and scope of the issue
- **Participants:** Who is affected, interested or can contribute to solutions
- **Time:** Amount of time available
- **Budget:** Availability of resources

Stakeholders categories, according their involvement:

- Directly involved (Decision makers, Government institutions, agencies or companies)
- Others affected but not involved (Population, producers, industries, marketers, directly affected)
- Others unaffected but interested (Experts, NGOs,...)

Methodological approach


Scenarios for planning

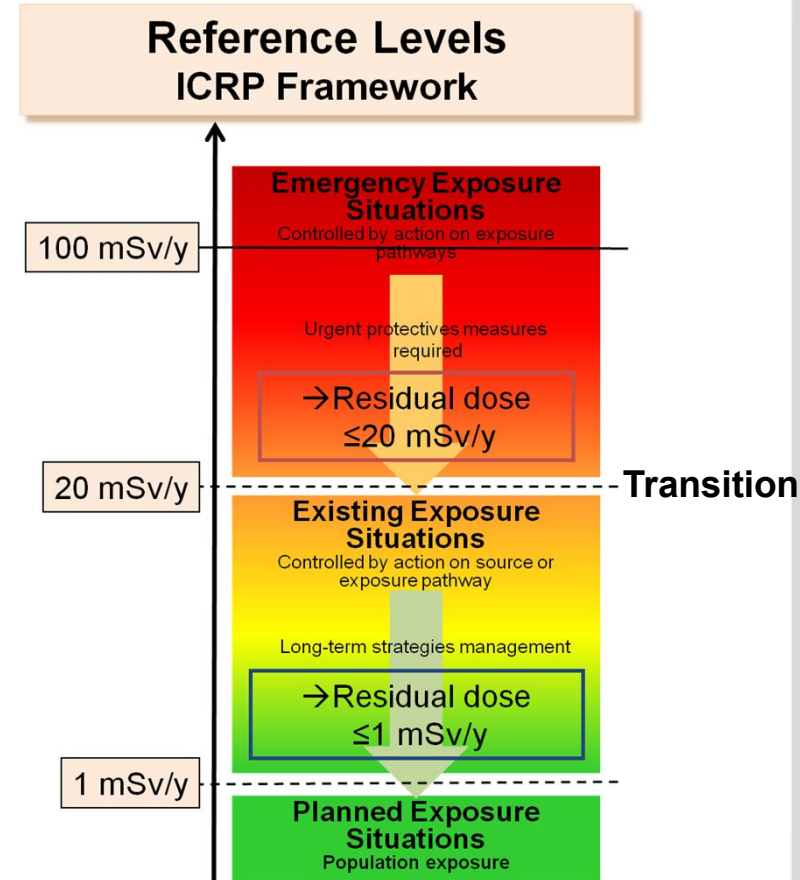
- Scenarios are **narrative descriptions** of **potential futures** that focus attention on **relationships** between **events** and **decisions** that have to be taken.
- They must be characterized from a **radiological, socio-economic** and **environmental** point of view and their evolution in the space and along the time
- The scenarios will explore:
 - the different **recovery alternatives** taking into account the potential importance of each element described above
 - an estimation and measure of the **consequences** of the implementation of such planned strategies
 - an approach to assess the **practicability and optimisation** of the strategies assuring the sustainability of the recovery and rehabilitation in terms of social, economic, political, environmental and/or ethical factors
 - the **uncertainties** that arise during the transition phase, associated to the preparedness of the recovery strategies, the decision-making process and the involvement of the stakeholders.

Context of decision-making process

Decision Context

- The primary aim of protective actions is to avoid all serious deterministic health effects and to reduce the probability of stochastic health effects → **justification** and **optimisation**
- Actions must be **motivated** by the **radiological situation** – Radiological criteria
 - Reference level bands ICRP > Zoning
 - Indicator: Residual dose from all pathways
 - Other: Deposition levels, Maximum permitted levels (MPL) in food/ feed
- **Optimisation** includes other factors, economical, societal, environmental, ethical...


- **Reference Scenario:** Initial situation of contaminated area and exposure impact estimated or measured.
- **Potential future scenarios:** Estimating the spatio-temporal evolution of the scenario applying the recovery strategies taking into account uncertainties

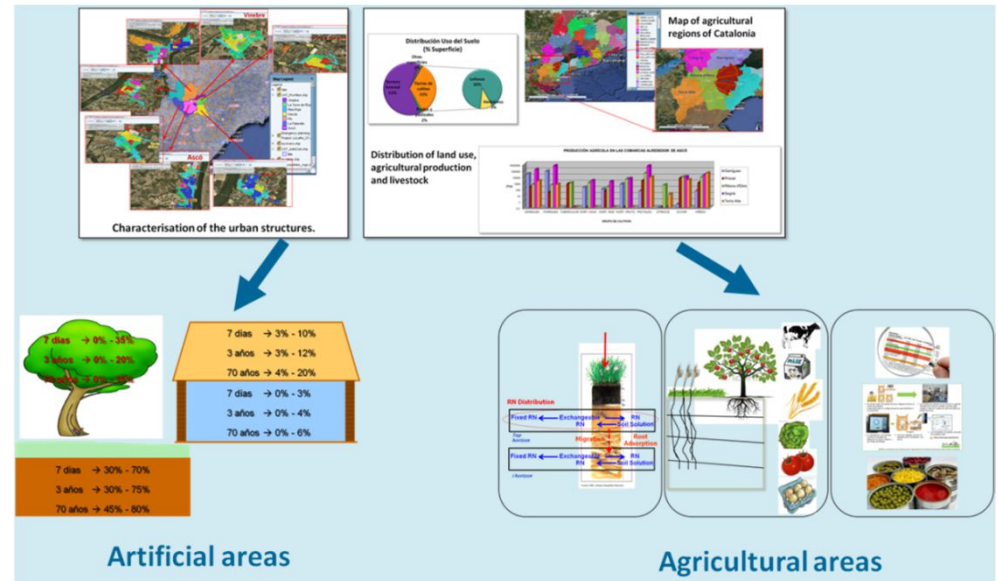


Framework of radiological protection criteria, categorising reference levels to use in existing and emergency exposure situations.

Context of decision-making process

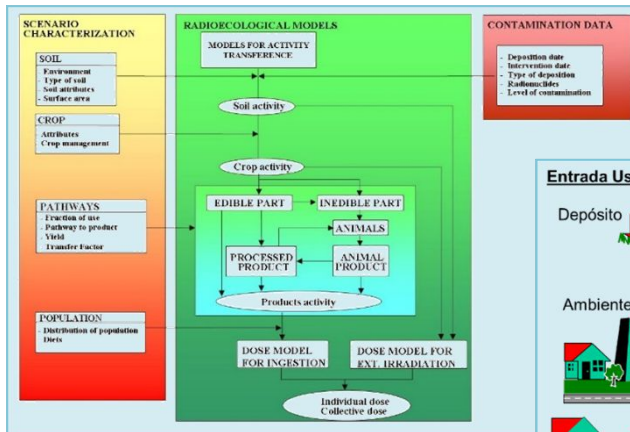
Evaluation context

- The **evaluation models** are necessary to assess the space-time evolution of the reference scenario with and without recovery actions, helping to define the objectives and to **quantify the factors for decision-making**.
- The scenarios are structured according to their potential for transferring radiation and radioactivity to individuals and knowing their features that influence the implementation of the countermeasures.
- From the **environmental** point of view, the generic scenarios should consider climatic conditions and land cover, making distinction between **urban**, **agricultural** and **natural/forest** environmental systems.
- The systems are subdivided in **elemental units for the restoration**, taken into account the applicability of the intervention options in terms of **practicability**, **radiological efficiency**, **cost** and other **non-radiological effects**.

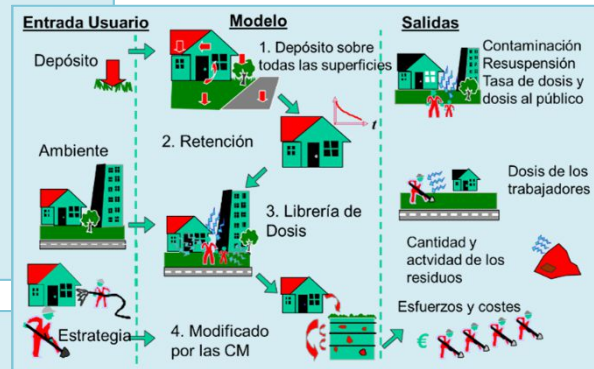


Context of decision-making process

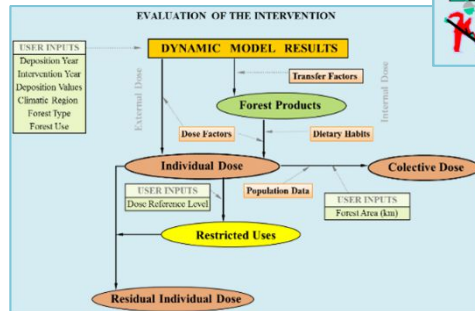
Modelling the radiological impact



Agricultural environments



Urban environments



Forest environments

Main exposure pathways:

- Urban systems - external irradiation.
- Agricultural and grazing land - ingestion of contamination through foodstuff.
- Forest - both ingestion and external irradiation must be considered.

Estimating radiological impact:

- **Radioecological models** describing fluxes of radioactivity through soil, plant, animals and consumption products, and
- **Dose models** evaluating radiological impact to population from external and ingestion exposure

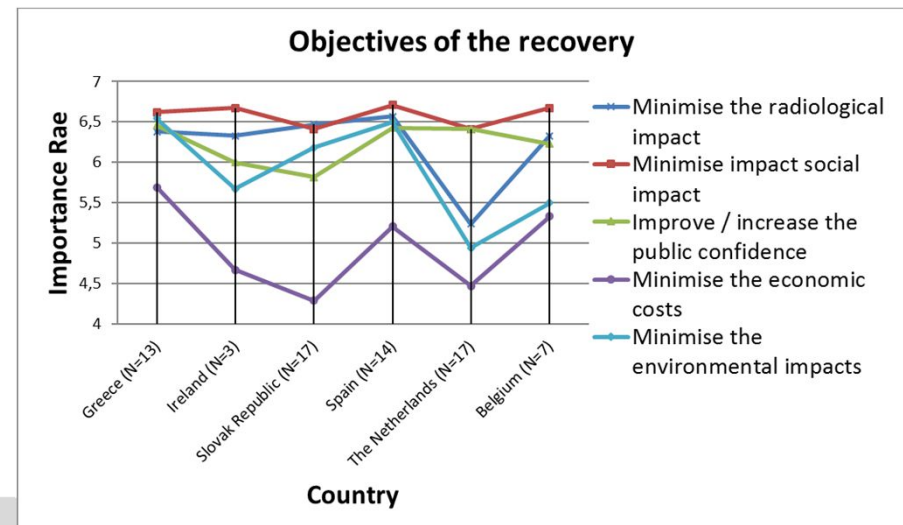
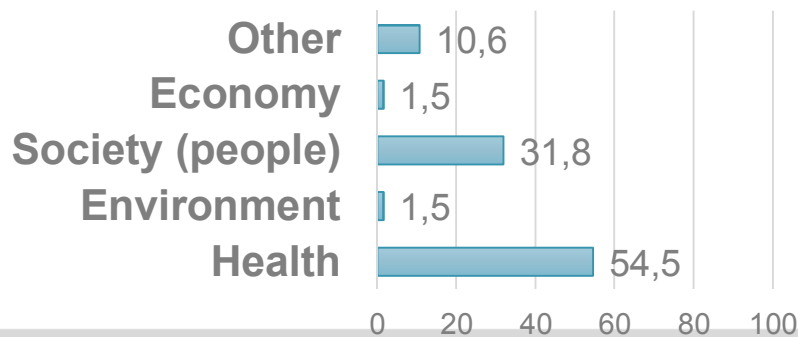
Issues and main concerns to response during transition phase and prepare the recovery

Issues

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

Concerns and objectives

In the transition phase of a nuclear emergency, what would be your first concern? (%)



Identification and selection of recovery alternatives

The objective of any technique used in a remediation project is either to remove or reduce the **source term** or to block the **exposure pathways**.

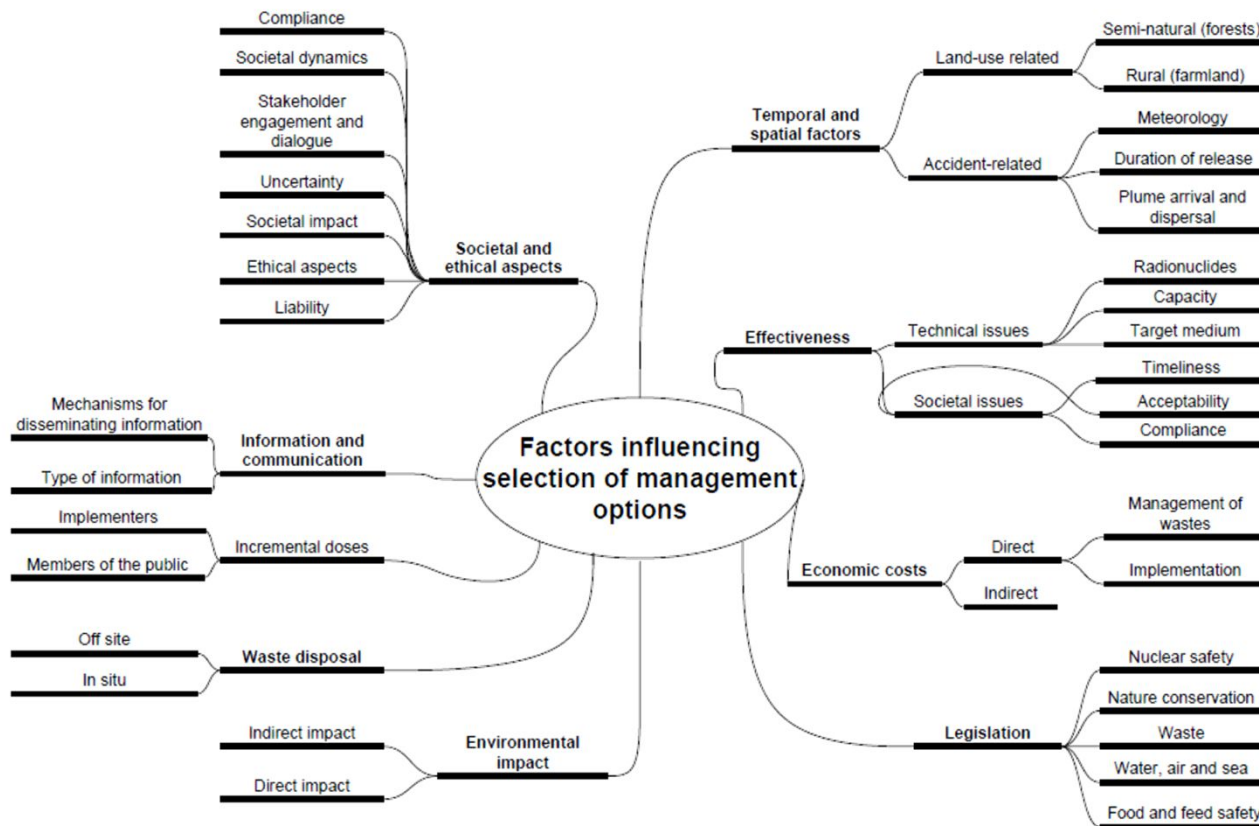
- (a) **Monitored non-intervention**. Leave the site undisturbed, while establishing a monitoring scheme for determining the evolution of the site. This option relies on natural processes to prevent significant exposure. The entire process needs to be carefully monitored so that alternative action can be initiated if required.
- (b) **Containment**. Contain or restrict the mobility of the radioactive contaminants: this involves immobilizing the contaminants inside the area in which they already exist, reducing the potential for further migration or entry into active pathways of exposure.
- (c) **Removal**. Remove the radioactive contaminants from the site, using an appropriate treatment scheme: this involves extracting, concentrating and then safely disposing of the contaminants at another location.

Other protective measures seeks to reduce the exposure by modifying the **location** or **behaviour and habits** of the exposed individuals.

Factors for selection and implementation

The selection will be influenced by the actual radiological situation, the contaminated system / environment and the objective / endpoint to achieve.

Figure 2.1 Diagram showing some of the factors that might influence the selection of management options



EURANOS
recovery
handbooks for
management of
food production
systems,
inhabited areas
and drinking water
supplies

Uncertainties in the transition phase

- The overall process generates uncertainties.
- The **sources** of the uncertainty are related to the different challenges to face in the recovery process:
 - the knowledge of the real consequences of an accident,
 - selection and implementation of the recovery strategies,
 - identification and evaluation of the socioeconomic impact and environmental
 - the involvement of stakeholders in decision-making
- Regarding their **influence** in the decisions can be:
 - **External**, related to the acquisition /availability of information and production of data supporting the decisions - State of knowledge and fit to “reality” of the scenarios.
 - **Internal**, related to the formulation, dissemination and understanding of decisions – Description of objectives and endpoints, points of view and preferences of stakeholders
- According to [French et al., 2018], uncertainty is interpreted differently by different people and disciplines. It can include **stochastic**, **epistemological**, **judgemental**, **computational** and **modelling** uncertainties, but there are also those related to **ambiguity**, **lack of clarity and endpoints** as well as **social** and **ethical** uncertainties.

How to deal with the uncertainties?

- Taking them into account in the decision-oriented scenario-analysis allowing to identify and evaluate different alternatives.
- This will arise different potential endpoints with different values according to the criteria considered.
- **Uncertainties related to the information gathering, production of data supporting the decision-making process:**
 - Improving the acquisition of information and carry out additional studies or research to gain more knowledge.
 - Use process of expert elicitation to improve the subjective judgement.
- **Uncertainties related to the ambiguity, lack of clarity, and endpoints during the decision-making process:**
 - By means of the participation of the stakeholders in discussion panels, the different decision criteria, concerns and viewpoints, can reduce or at least consider the uncertainties in order to foresee the possible changes in the response of the long-term recovery.
 - By means of surveys as complementary methods, allowing to identify the items of interest for discussion purposes and prioritise the preferences of the stakeholders.

Factors in the DM, identified with uncertainties (I)

From national stakeholders panels:

- Information needed for decision making and planning
 - Geographic, environmental, socio-economic, radiological
 - Type of information support
- Management and decision making
 - Regarding decisions
 - Moment / time
 - Search for balance between the different evaluation criteria
 - Impact in the long term
 - Consideration of all the interests involved
 - Zoning, identification of the areas / sectors subject to the measures adopted
 - Involvement of local levels in the decision
 - What strategy must be adopted
 - Assumption of the worst case scenario

Factors in the DM, identified with uncertainties (II)

- Management and decision making
 - Regarding governance
 - Communication
 - Social, economic and environmental factors
 - Evolution of the situation
- Actions and strategies
 - Legal aspects and compensation
 - Acceptance by producers and population
 - Control and surveillance
 - Conservative, political, social, environmental criteria
- Specific management of the economic sectors affected (farming, national / international market)

How to organise the factors influencing the achievement of the objectives of restoration?

The uncertainties can be assessed regarding their social, economic or environmental consequences / implications in achieving a restoration of the living conditions according the **principles of the sustainability** (Bardos et al., 2018).

| Environmental Factors | Economical Factors | Social Factors |
|--|---|--|
| <ul style="list-style-type: none"> • Impacts on air • Impacts on Water • Impacts on soil • Impacts on ecology • Intrusiveness • Resource use and waste | <ul style="list-style-type: none"> • <i>Direct costs and direct economic benefits (use of economic resources)</i> • <i>Indirect costs and indirect economic benefits</i> • <i>Gearing</i> • <i>Employment /human capital (level of employment, skills base, education)</i> • <i>Life-span and “Project risks”</i> • <i>Flesibility (Adaptation to the changes along time)</i> | <ul style="list-style-type: none"> • Community involvement and satisfaction • Human health • Ethical and equity considerations • Impacts on neighbourhoods or regions • Fit with panning and policy strategies and inicitives • Uncertainty, evidence and verification |

Some remarks

- The approach based in decision-oriented scenario-analysis allows to identify and evaluate alternatives that focus on engaging stakeholders, experts and decision makers. It deals proactively with complexity and judgment in decision-making.
- The results from the stakeholders' panels point out, that there are a set of uncertainties in the transition phase appearing in the different studied countries. Thus, there is something common beyond the different national contexts and they should be taken into account in the preparedness for the recovery.
- These uncertainties can be categorised according different criteria. According to the Simon French approach, they are mainly classified in the ambiguity and socio & ethical categories.
- But it is also possible to classify them in terms of economic, environmental and social implications. It is interesting because it could support a optimization based in the sustainability, influencing the decision-making and also the objective of the recovery.
- The more and better we can consider and assess all these uncertainties when preparing the plans and strategies for the recovery, the greater will be the opportunity to adequately incorporate stakeholders' preferences and interests.

Next steps - In-depth analysis of uncertainties

- In the coming weeks, we will go in-depth into the panels conclusions:
 - Cross-country analysis of panel conclusions
 - Categorization of uncertainties
 - Combining with Delphi study conclusions

*The treatment of the uncertainties identified, and how to consider the factors that affect the achievement of the objectives set in the restoration plans, will be included in **guidelines** after the final analysis of the panel conclusions.*

Training course

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Thank you for your attention!

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