

# Mental models of EP&R for improvement of plans

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## Introduction:

- Emergency Preparedness and Response (EP&R) plans are prepared for many radiological threats at different levels: national, regional, local, off-site, on site, for individual organisation, for facilities etc.
- All these plans are usually prepared by responsible authorities/institutions and very rarely developed based on public involvement or consultations.
- As a consequences, they are sometimes lacking the appropriate information, not addressing relevant uncertainties and public concerns.
- As part of the CONFIDENCE project also an investigation on the mental models of understanding, processing & management of uncertainties in EP&R will be performed with the aim to improve communication tools and planning.

## Methodology:

- The work will assess differences in mental models of uncertainty management in emergency situations for lay citizens and emergency actors in various national contexts (Germany, Greece, Slovenia, Slovakia, Spain).
- The method will be based on special protocol which will include the main understanding of uncertainties in EP&R and other socio-demographic variables affecting people's behaviour and information needs:
  - What is foreseen in plans: the announcement, the measures and enforcement, emergency routes and relocation centres, termination of emergency,...
  - Special considerations: children, elderly, hospitals, others who are ill or can not move
  - Reality of foreseen modes in emergency plans: what people would do, applied, zones, sources of information,
  - Dissemination of material and experiences from exercises
  - Trust
- The interviews will be performed within approximately 20 different individuals in countries, tracing the concepts and understandings, but also other important points of lay people.
- These results will be compared with the findings of the interviews with professionals (approximately 10) to obtain similarities and differences between the mental models.
- The analyses performed will be the base for improved communication strategies and tools.

## Input data:

- The work on mental models of radioactivity and radioactive waste.
- The analyses of characterisation and response to uncertainties in past nuclear emergencies (Belgium, France, Norway, Spain, Slovenia).
- The findings from empirical research based on public opinion survey in Belgium, Norway and Spain, and past surveys (Slovenia).

## Time schedule:

- Research design (interview protocol) ready in June 2018,
- Preliminary report ready in October 2018,
- Final report in December 2018.

## Uncertainties based on emergency preparedness research:

- Faculty of Social Science, University of Ljubljana, October 2012
- N-502, within 3 km of NPP Krško, personal interviews with standardized questionnaire
- 12 institutions
- Findings:
  - The knowledge of local population how to react and what to do in case of nuclear accident is limited and one important source of uncertainty.
  - The reality of foreseen modes of reactions in emergency plans have to be tested as some assumptions are not working (e.g. evacuation of children, appropriateness of defined zones).
  - The needs of more vulnerable groups (elderly, people without adequate social support, people with special needs and ill) in emergency plans shall be addressed.
- What raises strong concern is the fatalistic view held by some responsible authorities that in the event of a serious nuclear disaster there is nothing that can be done, an evacuation would not be possible or necessary, the consequences would be too serious, and people live too close to the Krško NPP in order to be evacuated in time.

## Results from study on mental models of radioactivity and waste management, Slovenia, 2009:

- Findings on mental models from experts and lay people

Topic	Expert models	Some of lay mental models that differ from the expert model
Radioactivity, time dependence, process	Nuclei are unstable and decay exponentially with various half life, they gradually become stable, not radioactive after 300 years, natural and man-made process	Radioactivity is an artificial process Radioactivity increases with time or is not time dependent Natural radiation is different to artificial radiation, since people are used to it. There is no radiation in nature
How radiation effects humans,	High doses can kill or modify living cells, but there are repair mechanisms that correct the damage. Doses compared with natural background (low doses) have no effect. Late (stochastic) and acute (deterministic) effects.	Irradiated objects become radioactive themselves All radiation, even low doses, causes cancer, Hiroshima effect Radiation influences fertility, genetic changes, it stays for many generations A person disappears and burns down, There is a chain reaction of contamination in the cells – like viruses
Processes in the LILW repository,	No active processes in the repository, decay of radioactive waste, possible chemical disintegration, very slow degradation of the barriers, corrosion, then possible release through water and air, ingestion, inhalation, direct contact, all accidents studied and protected ...	Processes like earthquake, war, terrorist attack may release inner forces with possibility of atomic bomb, Waste emits radiation which is then transported through the barriers to humans, Psychological consequences, A stroke of lightning that can release radiation, Plants absorb radioactivity, Radiation evaporates from repository
Transport of radioactive waste,	Transport by road or rail, use of special packages and containers with pre-testing. Normal procedure with licensing.	Transport only with special vehicles with police escort In case of accident total contamination of land with many people irradiated, injured or dead Many accidents but not openly reported