Training Seminar
"Introduction on approaches to deal with uncertainty information within the decision-making process in nuclear emergency"

16 April 2019, University of Milan, Italy

Italian nuclear and radiological emergency planning and international exercises

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Summary

- Italian Emergency Management System;
- National nuclear emergency Plan;
- Issue of the cross-border coordination;
- International Exercises;

Nuclear and radiological emergency planning in Italy
Planning responsibility

- Local: The Prefect supported by Provincial Committee (integrated with representative from ISIN and from Operator);

- National: Department of Civil protection of the Presidency of Council of Ministers in agreement with Ministry of Interior and supported by ISIN, and by others relevant organization of the National Service of Civil Protection.

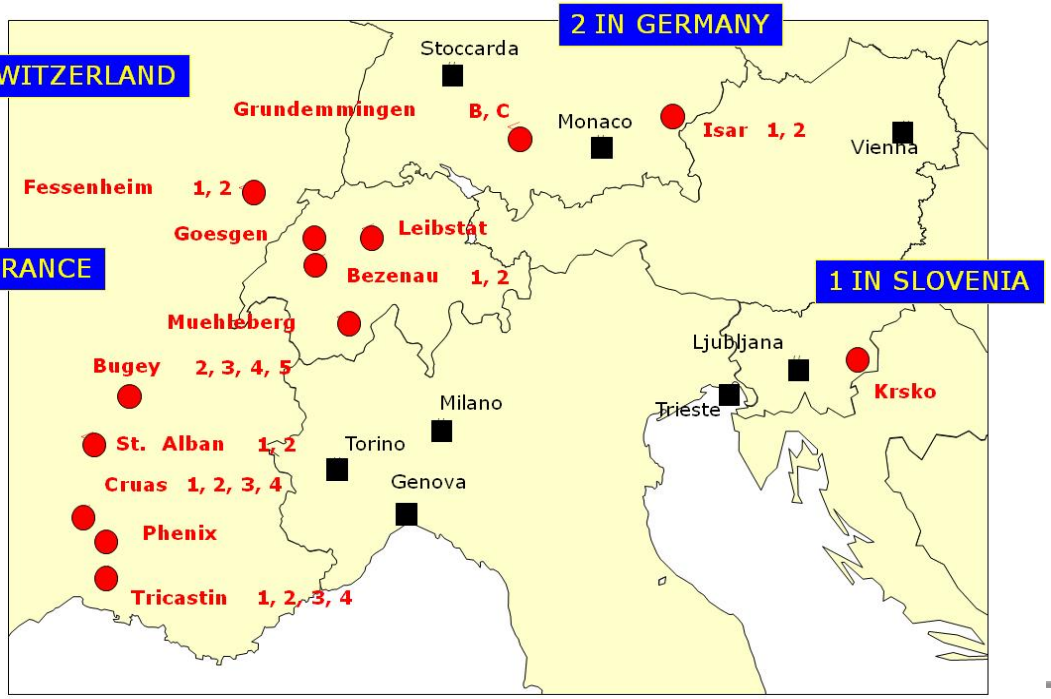
Nuclear and radiological emergency planning in Italy
Local emergency plans

- Off-site Emergency Plans (ex NPPs & nuclear fuel cycle installations, now under decommissioning, research reactors and laboratories, nuclear powered ships or submarines in Italian harbors);
- Emergency plans for the transport of radioactive materials and spent fuel;
- Intervention plans for activities and facilities where the holding, handling or use of radioactive material is carried out, or for operator of radioactive waste storage;
- plans for recovering and making safe the orphan sources following their discovery;

Nuclear and radiological emergency planning in Italy

Nuclear Emergency National Plan

- Accident at an abroad NPP close to national border (within 200 km)
- Severe accident with containment failure, core meltdown and vessel melt-through;
- Criteria for choosing the reference NPP plants:
  - proximity to Italian border
  - Orography and direction of the prevailing winds.
  - The selection of the reference NPP is not based on evaluations of the level of plant safety

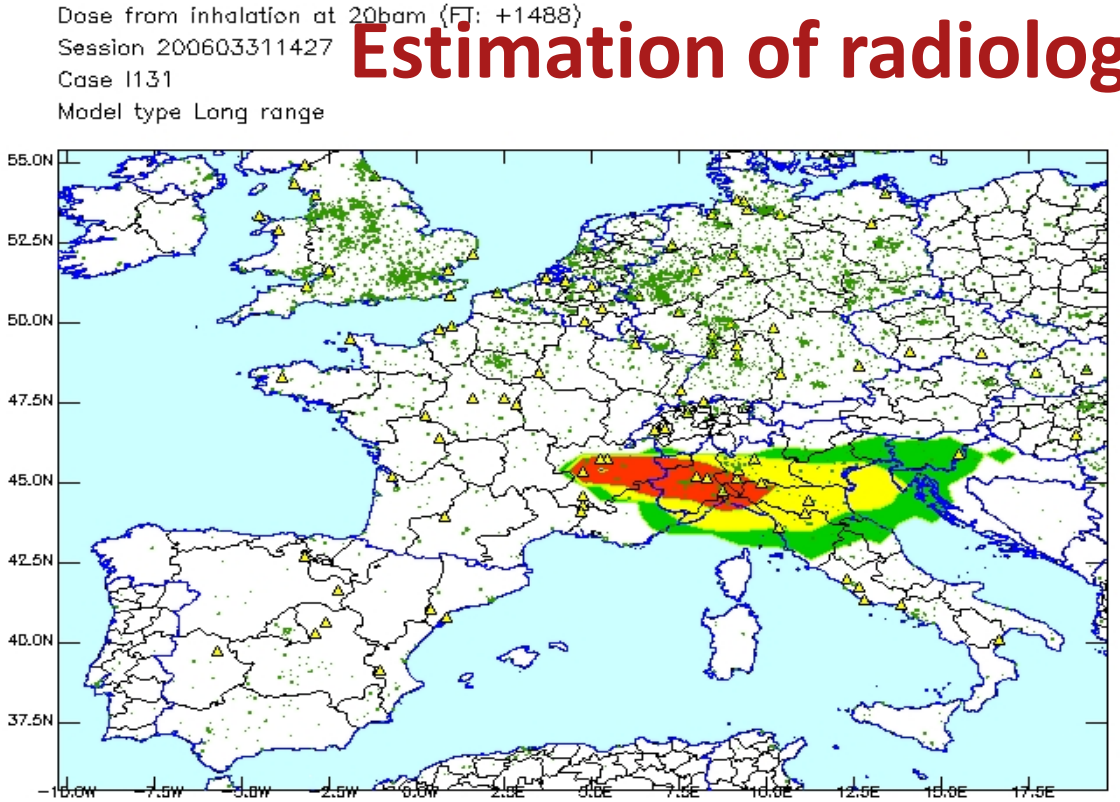


SOURCE TERM

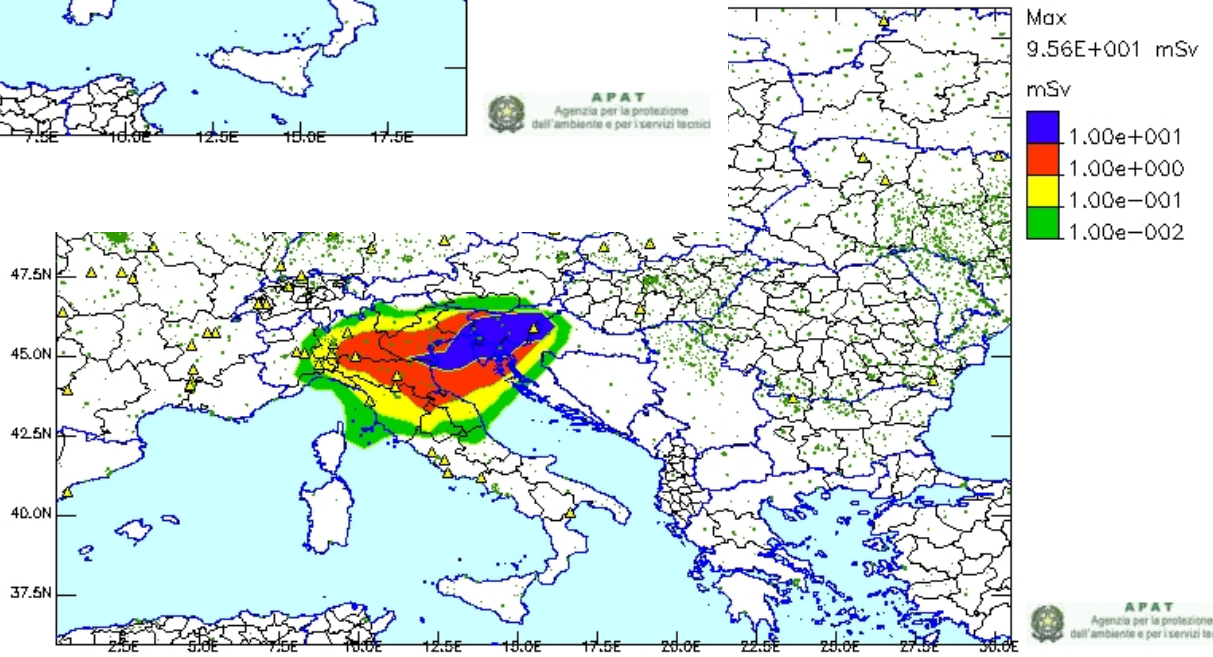
(*) BfS Report BfS-SCHR-55/14
(**) SSM Report 2017:27e

	RELEASE (Bq)					
Isotope	Chernobyl	Fukushima NISA evaluation	National Plan 2010 St Alban NPP	National Plan 2010 Krsko NPP	GERMANY (*) INES 7 scenario (2015)	SWEDEN (**) Without mitigating systems (2018)
I-131	1.80E+18	1.60E+17	3.10E+17	1.60E+17	3.10E+17	1,8 E+17
Tellurium	1.39E+18	5.26E+15	2.90E+17	1.39E+17		1 E+17
Cs-134	4.70E+16	1.80E+16	3.70E+16	1.78E+16		2.6 E+16
Cs-137	8.50E+16	1.50E+16	2.10E+16	1.00E+16	2.90E+16	1.9 E+16
Sr-89	1.15E+17	2.00E+15	5.40E+16	2.70E+16		1.4 E+15
Sr-90	1.00E+16	1.40E+14	2.40E+15	1.20E+15		1.3 E 14
Cs-134	1.80E+18	1.60E+17	3.10E+17	1.60E+17		2.6 E+16

Estimation of radiological impact



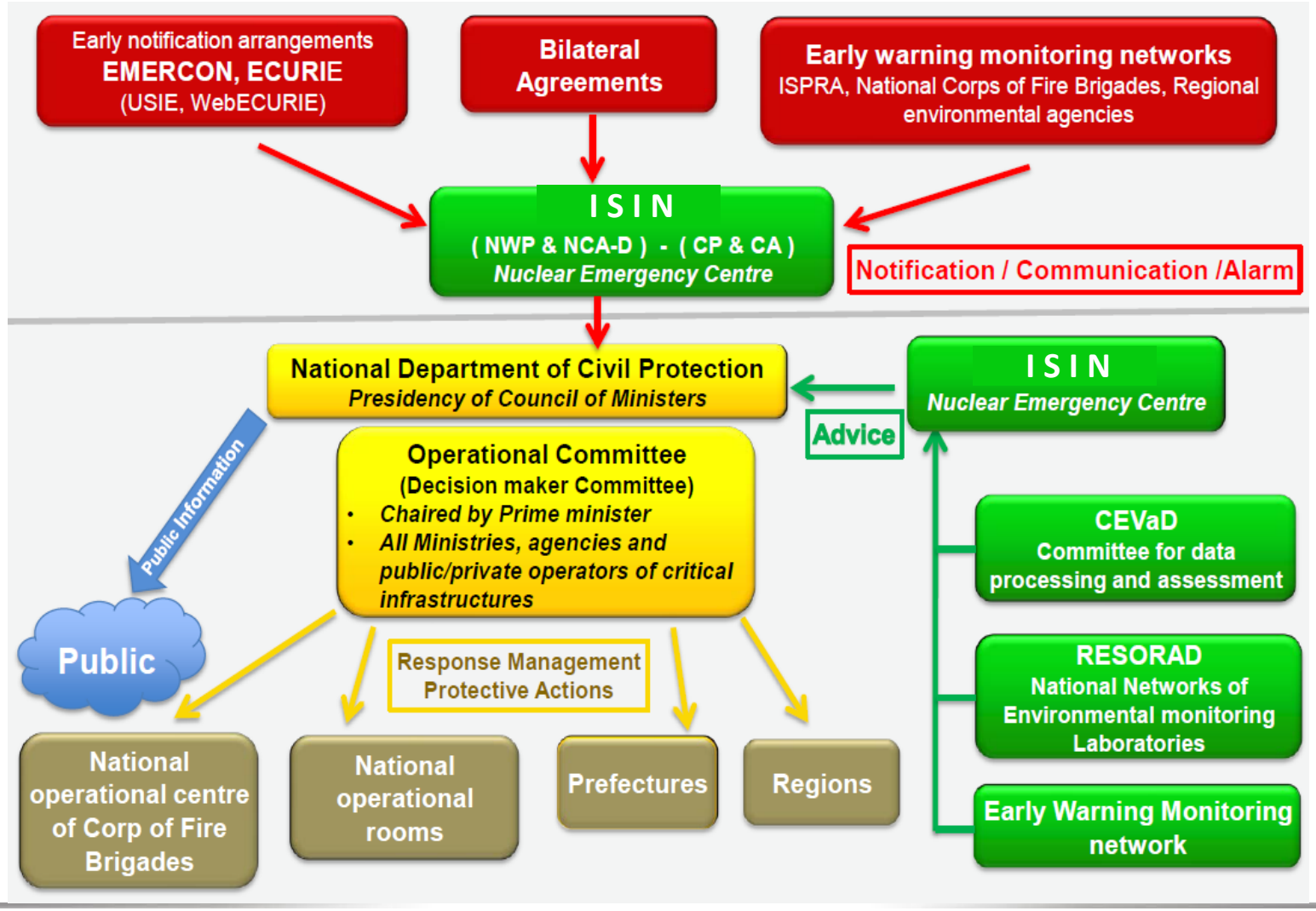
THYROID EQUIVALENT DOSE (mSv) I131 children



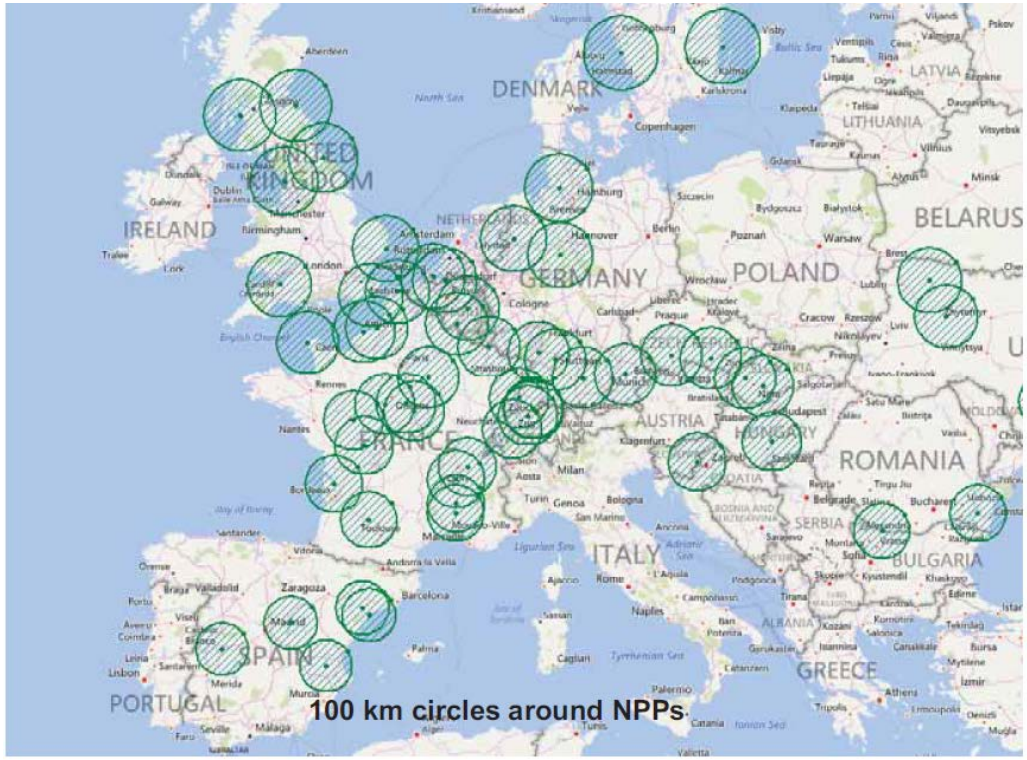
Operational requirements for planning

- Radiological consequences deriving from the reference accident scenario require, for areas of the north and center-north of Italy, the possible adoption of protective measures of:
  - Sheltering;
  - ITB;
- Radiological monitoring of the environmental and food samples has to be performed on large areas of the national territory and for long time;
- Based on the radiological survey, in the intermediate phase of the emergency, it may be necessary to take some measures to avoid the intake of contaminated water and food by the people and also by livestock, such as for example:
  - inhibition of grazing and / or confinement of animals in enclosed areas;
  - feeding animals with food and water is not contaminated;
  - restrictions on production, marketing and consumption of agricultural products.

National Emergencies Management System



EPR issues along cross-border



Five cross-border situation within 20 km around NPPs

CH-D-F

F-B-LUX

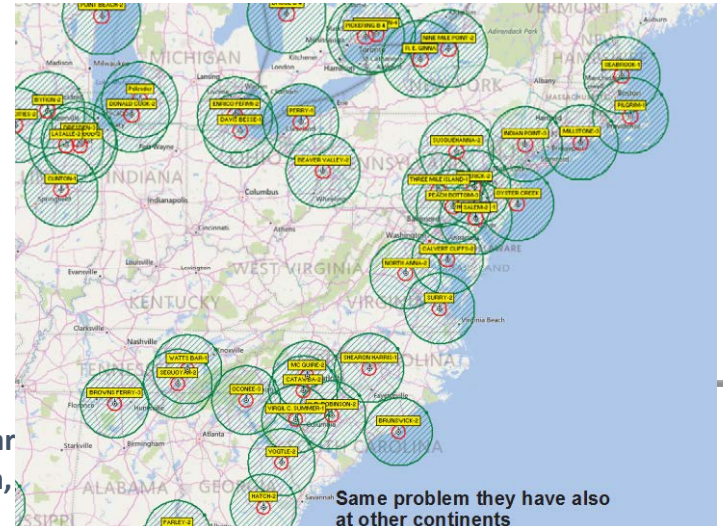
SI-CRO

BG-RO

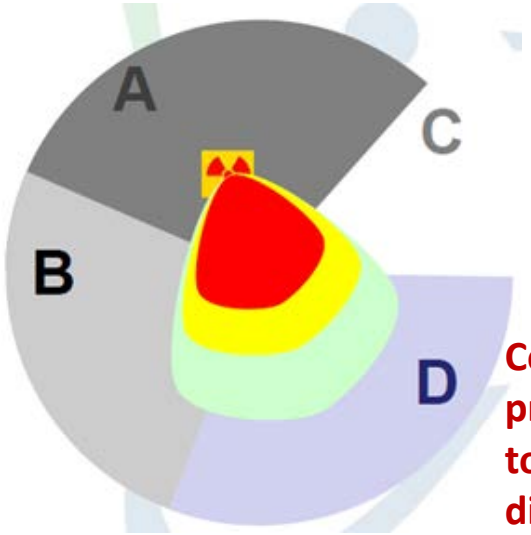
B-NL

From "Why are we here, what do we want? How do we harmonize response to our ultimate challenge?", Andrej Stritar, SNSA, Workshop on the Implementation of the HERCA-WENRA Approach, 13-15 June 2016, Bled, Slovenia

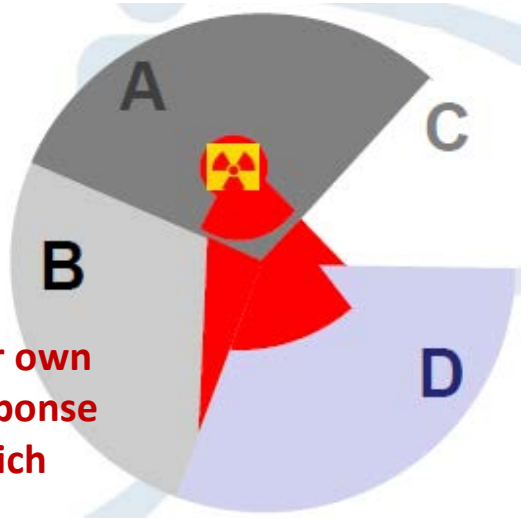
Not only an European issue



Differences in emergency responses among affected countries



Accident in the Country A with consequences in neighbouring Countries B,C & D

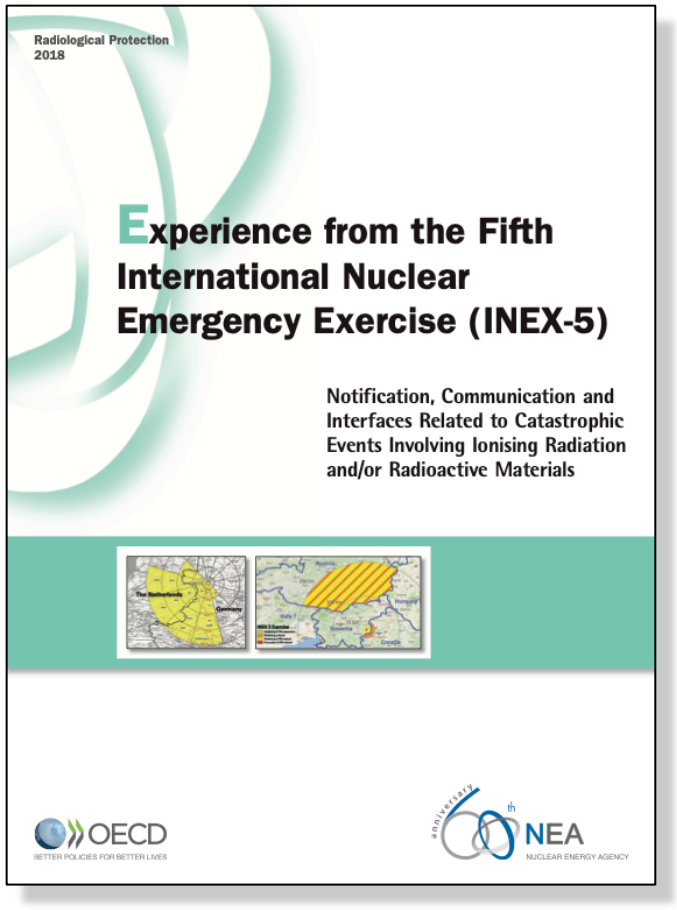


Countries are fully sovereign in defining their own priorities and objectives for planning the response to nuclear emergencies occurring abroad which directly affecting their own territory

- the figure illustrates schematically how the protective actions could be implemented when the decisions are purely **based on national considerations**;
- At international level, populations would feel unequally protected, depending on where they live, leading **to distrust in governmental decisions** and potentially **to panic**;
- It is **very difficult to explain the rationale** for such differences to the affected populations **during the crisis.**

INEX-5
International Series of Exercises

- Exercise addressing Emergency management aspects of notification, communication and interfaces related to catastrophic events involving NPP or Radiological Materials (for NPP and non-NPP countries);
- Planning started in 2013, played 2015-2016;
- 22 participants countries
- Promoting regional exercise with a NPP Accident Country and Neighbouring Countries;
- Cross-border issues testing: two groups played regional exercises.



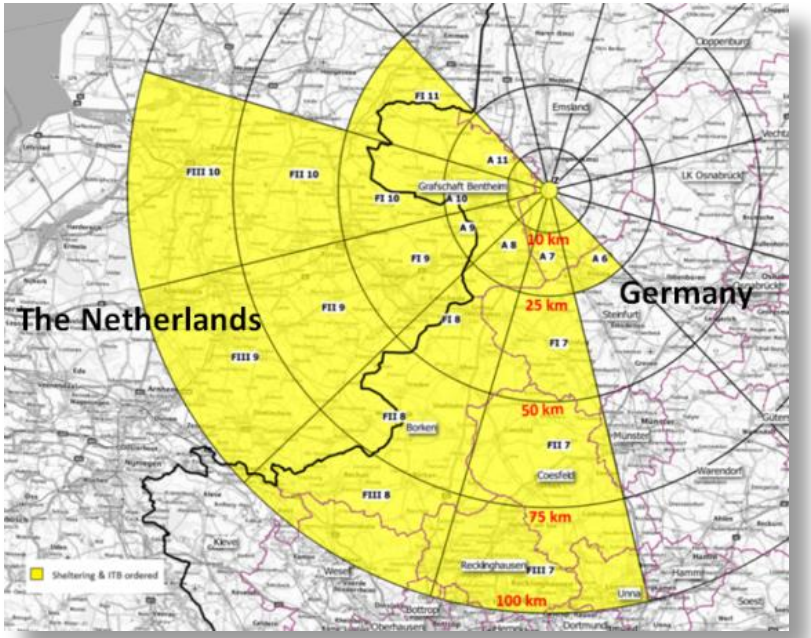
https://www.oecd-nea.org/rp/pubs/2018/7379-inex-5.pdf

INEX-5 Cross-border coordination testing

Two cases where the cross-border alignment of recommendations was exercised but with very different results

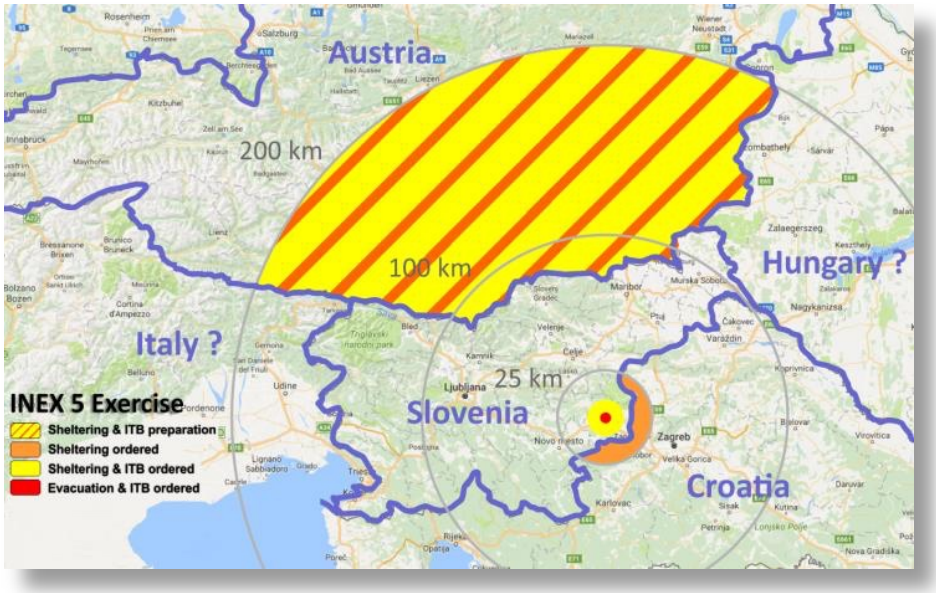
Protective actions implemented/ordered in the regional exercises involving:

Germany and the Netherlands



Source: BfS, Germany

Slovenia-Austria-Croatia-Hungary-Italy



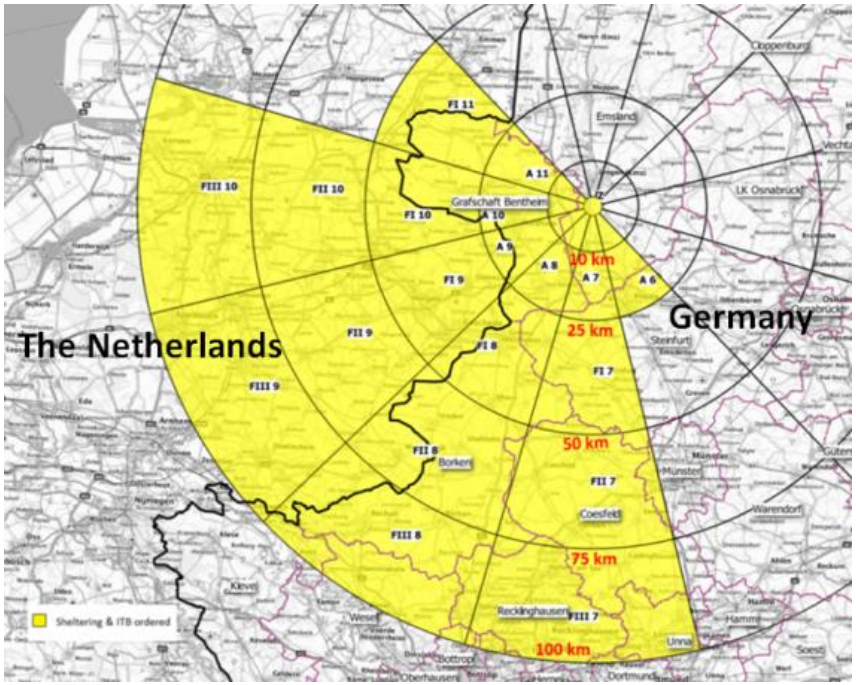
Source: SNSA, Slovenia

https://www.oecd-nea.org/rp/pubs/2018/7379-inex-5.pdf

Germany-Netherlands regional exercise

- German as Accident Country and The Netherlands as Neighboring Country;
- A good cross-border coordination was expressed;
- This was mainly due to the flexibility of the emergency planning zones in the Netherlands.
- Indeed, in the Netherlands a harmonized approach was developed (approved in 2014 by responsible Ministry);

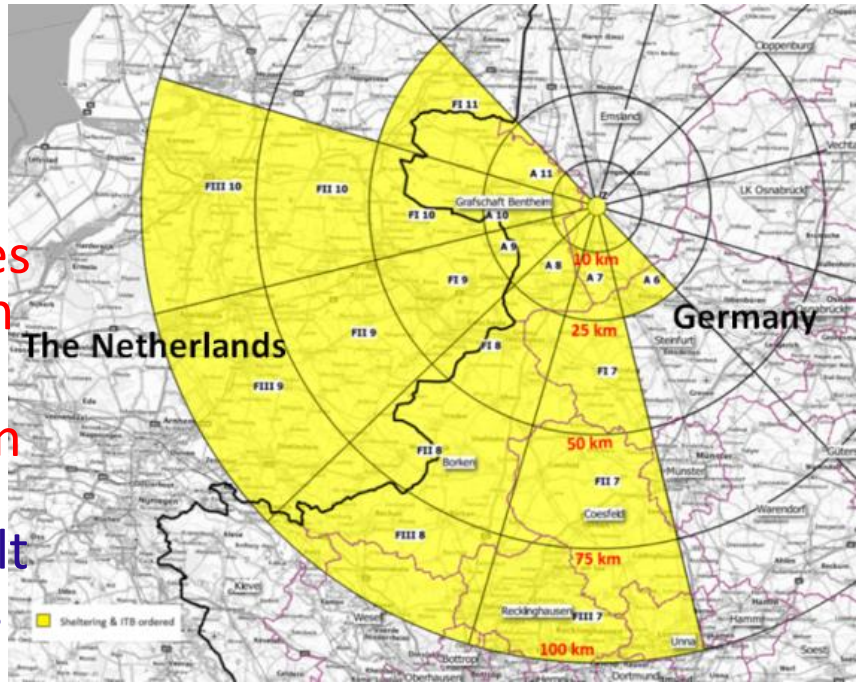
EMSLAN NPP (KKE)



Source: BfS, Germany

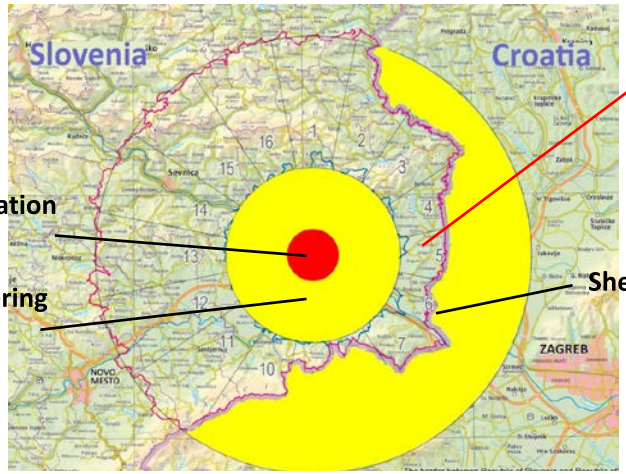
Germany-Netherlands regional exercise

- In case of an emergency in a neighboring country the Netherlands will initially follow the protective actions of the Accident Country;
- For this reason the emergency zones were harmonized with the zoning in Belgium and Germany;
- Furthermore a range of intervention levels was introduced, with a lower and upper value; moreover a default value is used for domestic accident.
- In case of an incident in a neighboring country, intervention levels within the range can be used to align with the neighboring country.



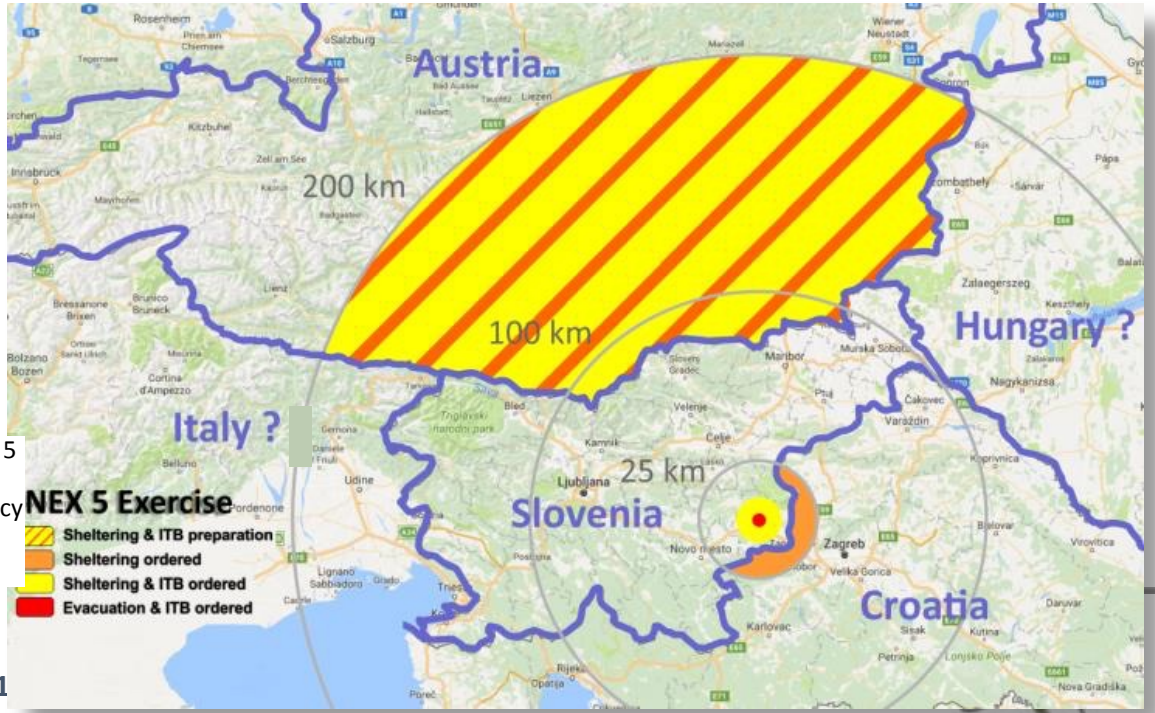
Source: BfS, Germany

AT-HR-HU-IT-SI Regional Exercise



Protective actions implemented by

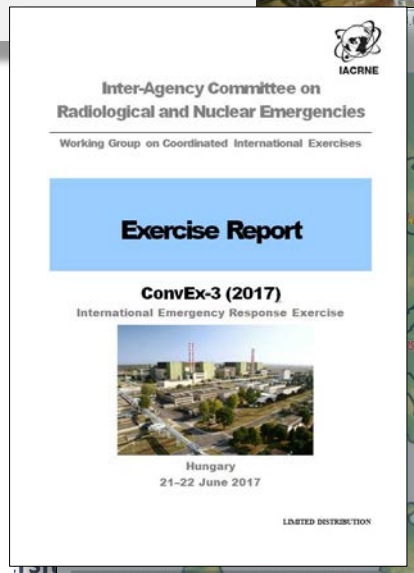
- **Slovenia = Evac./ITB - 3km, Sheltering/ITB - 10 km;**
- **Croatia = sheltering - 25 km.**



From presentation of Marjan Tkavc on INEX 5 – Regional Exercises, at the 41st Meeting of the NEA Working Party on Nuclear Emergency Matters, 23-26 January 2017, OECD Conference Centre, Paris

…again , from ConvEx-3 (June 2017) exercise

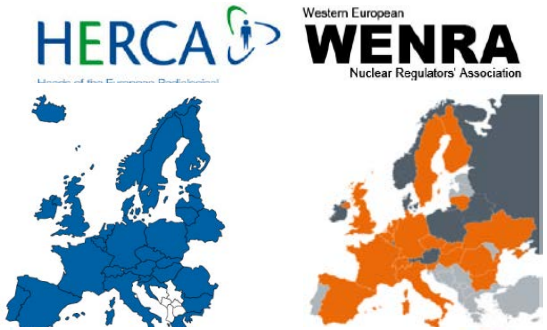
Lack of communications among Accident State and neighbouring countries and lack of consistency in response (blue areas where sheltering was adopted)

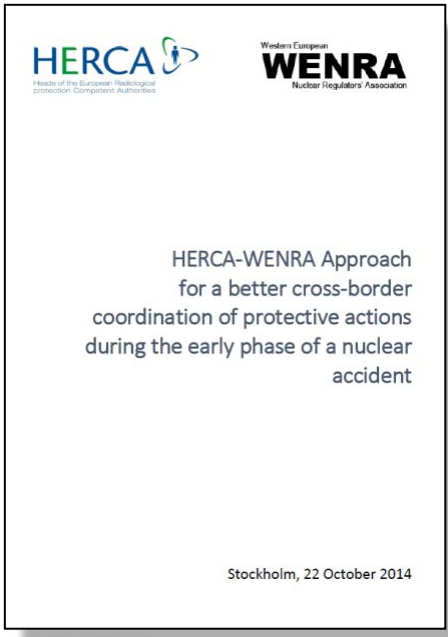


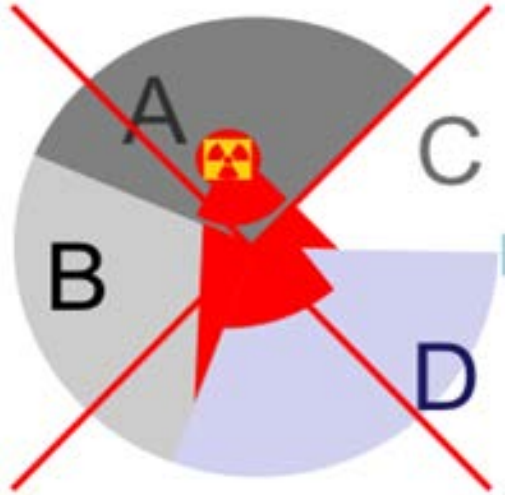
From presentation of Hannalene Aaltonene, 15th Meeting HERCA-WGE, Oslo, Norway, 12-13 September 2017

HERCA-WENRA Approach (HWA)

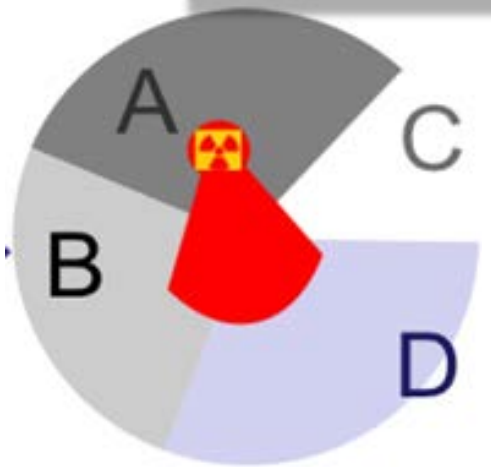
New European Approach for a better cross-border coordination of protective actions during the early phase of a nuclear accident





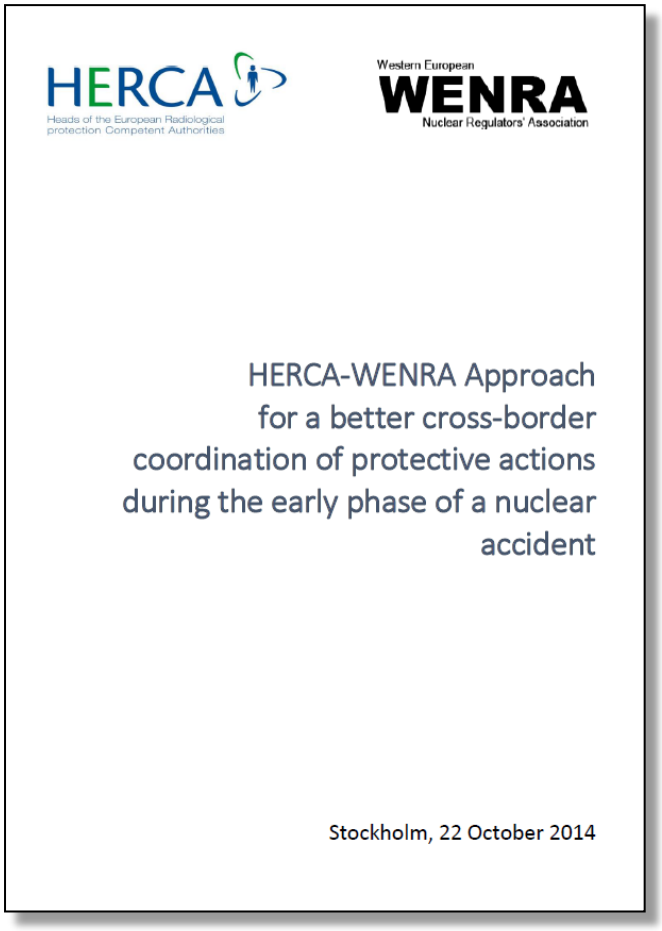


The goal is to make coherent the emergency response of the affected Countries



HWA - OBJECTIVES

- The **coordination of the response** between the countries affected by the emergency, especially in the "Initial phase", in order to obtain a **coherent cross-border response**; (making use of a strategy aimed to align the response between neighbouring countries or neighbouring territories)
- The use of **simplified approach** for the adoption of urgent protective measures in responding to the initial phase of a (highly improbable) **severe accident** (e.g. Fukushima), when rapid decisions are required while **very little is known about the plant conditions**.



HWA - PRINCIPLES

Step 1: preparedness phase – the aim is to achieve and mantain a **shared underdstanding** of the existing national emergency arrangements by developing or improving **bilateral or multilateral arrangements** (also promoting **common exercises**):

➔ **"build a strong relationship of mutual trust"**

Step 2: Early phase - Rapid information exchanges by using existing dedicated bilateral and international arrangements**. If, in the first hours of the accident, the response adopted by Accident Country (AC) is considered consistent**, then in the neighboring countries (NCs) it is possible to recommend their authorities to follow such recommendation:

➔ **"We do the same as the accident country (AC)"**

The AC provides and updates information to allow for understanding the situation

→

The NCs make their own assessment based on information received and verify the consistency with the AC assessment

→

The NC strive to align their recommendations and decision with the protective actions adopted by the AC

HERCA-WENRA - Mechanism for triggering decisions in emergency situation and planning criteria

- Concern the **initial phase** of an emergency;
- Provide **simplified and robust** decision making process and criteria;
- Allows for **better coordination** of protective actions between countries;
- Based on **JEF = Judgement Evaluation Factors**

JEF	Description	Possible values of JEF		
1	Is there a risk of core melt?	Yes	No	Unknown
2	Is the containment integrity maintained?	Yes	No	Unknown
3	Is the wind direction?	Steady	Variable	Unknown

- **Evacuation** should be prepared **up to 5 km** around nuclear power plants, and **sheltering and ITB up to 20 km**;
- A general strategy should be defined in order to be able **to extend evacuation up to 20 km and sheltering and ITB up to 100 km;**

Need for a more coherent cross-border emergency response following a nuclear accident

- The **harmonization of the protection strategies** responding to a nuclear or radiological emergency, specially **along national borders**, is crucial and represent the **main challenge** for the national nuclear and radiological EPR system;
- **International exercise** have illustrated dramatically the need for further work on improving cross-border coordination;
- **HERCA-WENRA Approach provides an effective tool for the response coordination**;
- This approach should be exercised specially **playing more exercises at regional level**;
- but harmonisation should not be considered only a matter for the RP & NS competent authorities, rather this is an **emergency management issue**;
- Therefore, any efforts should be made **for involving the national Civil Protection Competent Authorities (decision-maker level)** within the processes for strengthening EPR arrangements at all levels: national, bilateral, regional and international arrangements.

Thanks for your attention