

# Recent regulatory developments in the control of radon exposure in Spain

May 17, 2012

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## Outline

**1. Introduction**

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**2. Legislative framework**

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**3. Regulatory guidance**

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**4. Mapping radon-prone areas**

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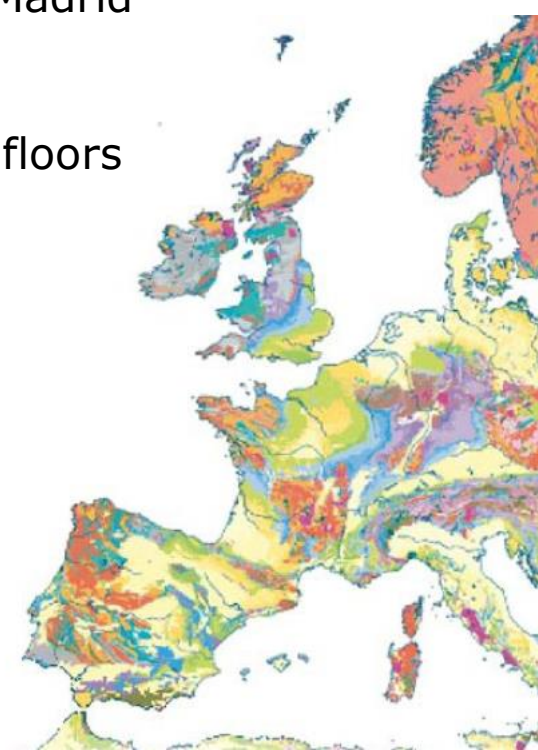
**5. Future work**

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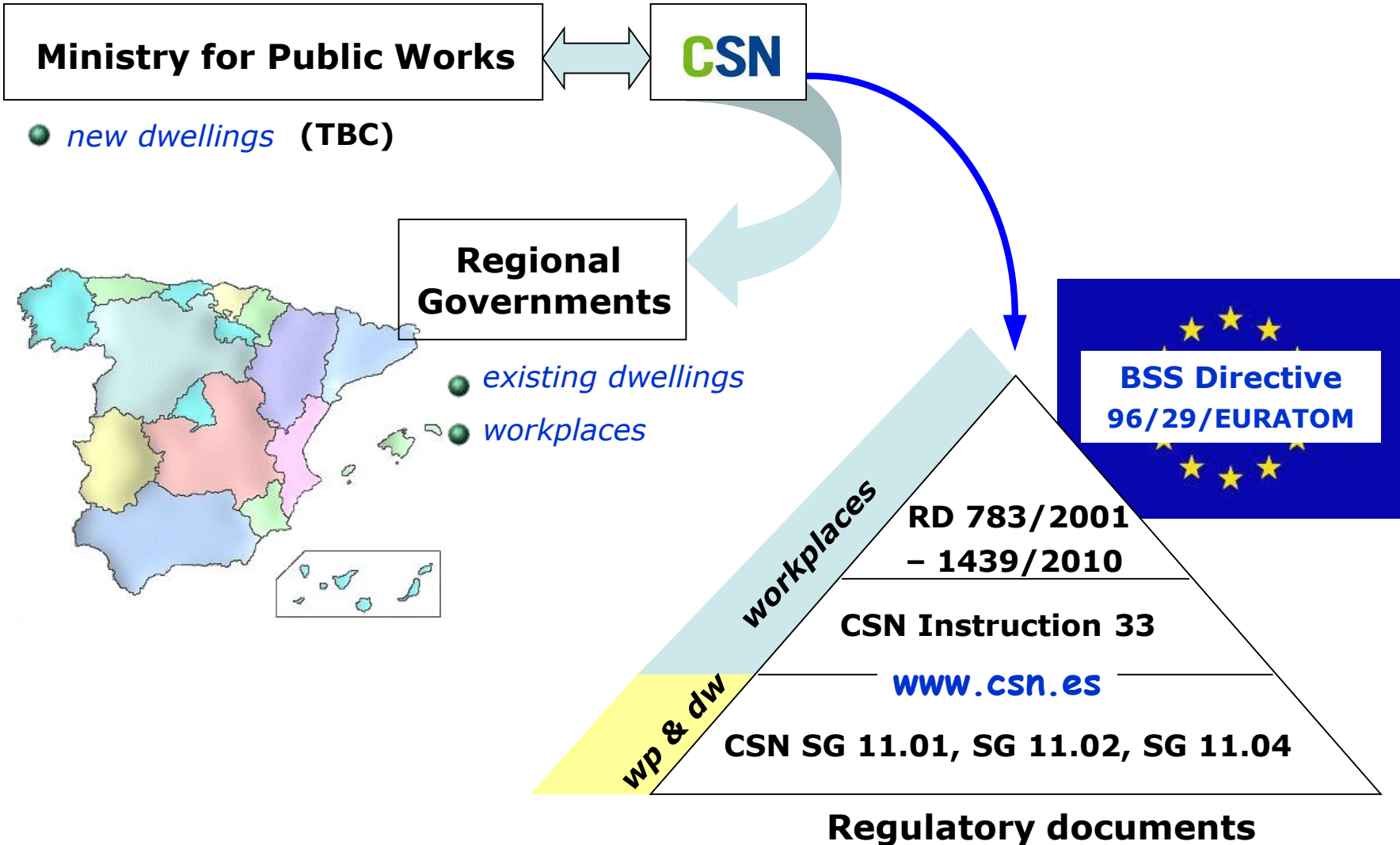
# 01 | SPAIN FACTS



- 47,190,493 inhabitants (87 p/km<sup>2</sup>)
- Mostly concentrated along the coast and Madrid
- Less than 3% dwellings in ground or first floors
- Diverse geology: western *Hercynian* and eastern *Alpine* areas



# 02 | LEGISLATIVE FRAMEWORK



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PROTECTION

## ...at home



## ...at work



### Existing dwellings

- Reference level: **300 Bq/m<sup>3</sup>**

### New development

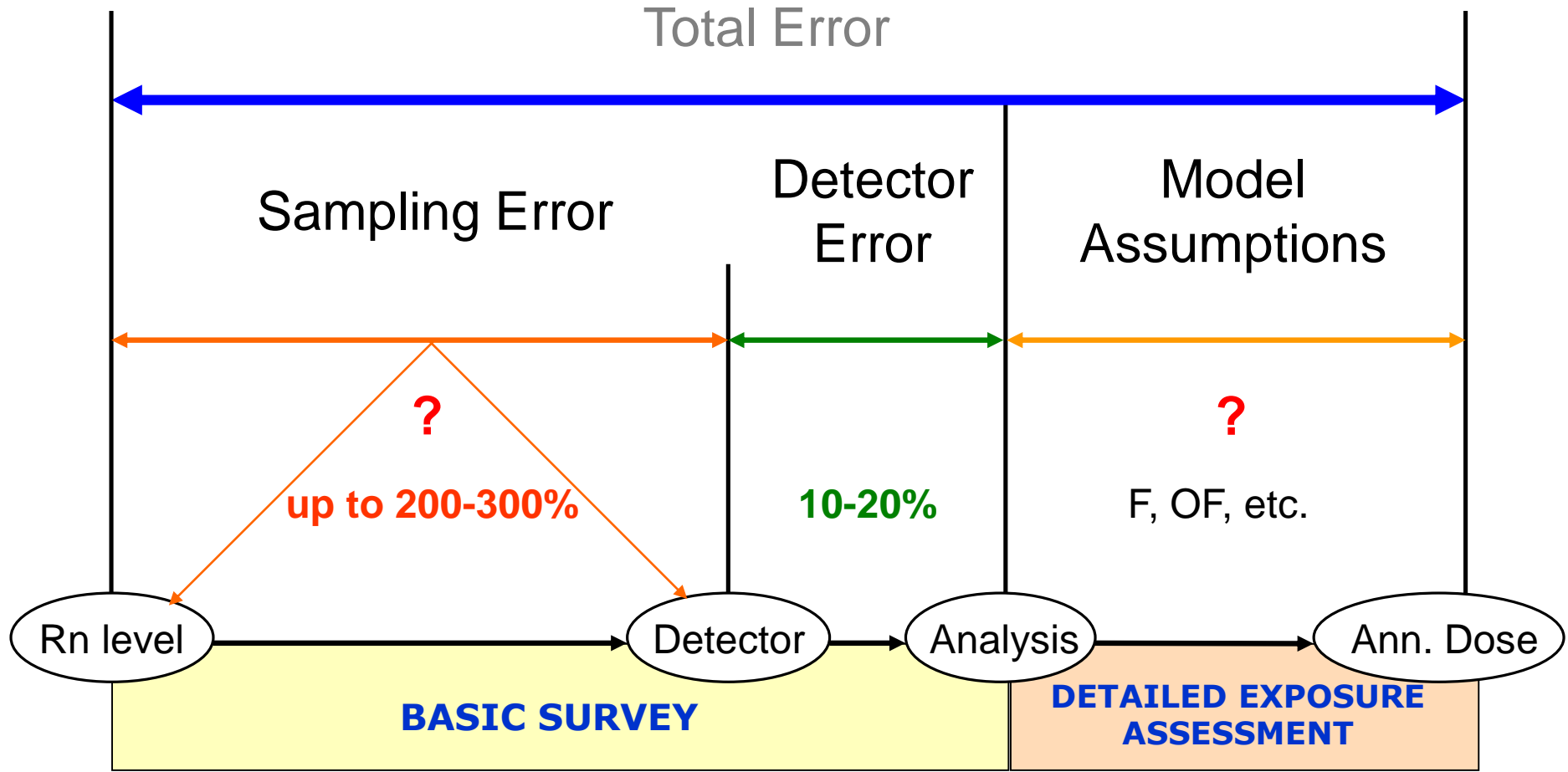
- Design objective: **100 Bq/m<sup>3</sup>**  
(TBC)

**CSN SG-11.02**

- Reference level : **600 Bq/m<sup>3</sup>** (or **300 Bq/m<sup>3</sup>**)
- Graded approach to regulation: **1000 Bq/m<sup>3</sup>**
- Compulsory risk evaluation at workplaces: below ground; containing a groundwater source; at radon-prone areas

**CSN IS-33**

**CSN SG-11.04** on the *Methodology for radon studies at workplaces*



## 03 | REGULATORY GUIDANCE

- SG-11.04**
- 1 year sampling period – in some cases 3-6 month (Oct-Apr)
  - Homogenous zones (1 detector/HZ; 1 detector/100 m<sup>2</sup>)

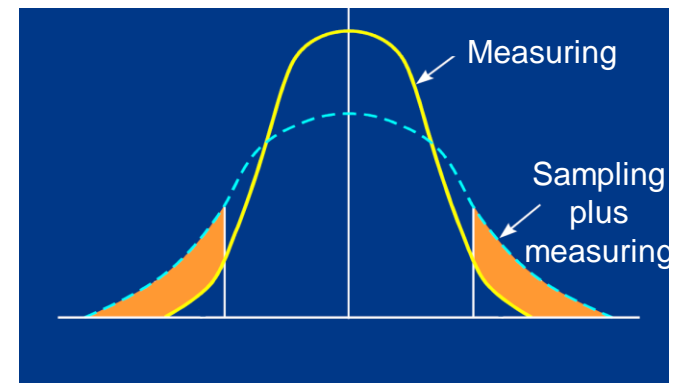
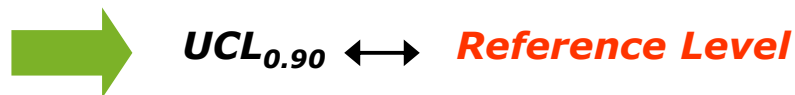
■ **Rn diurnal variation**  
( $C_{WT}/C_{24h}$ ):

- Continuum measurements
- At least over 5 non-consecutive days

■ **Equilibrium factor (F):**

- Long-term or continuum meas. (as appropriate)
- F-value representative of working conditions

### Statistical demonstration of compliance



## Radon-prone areas

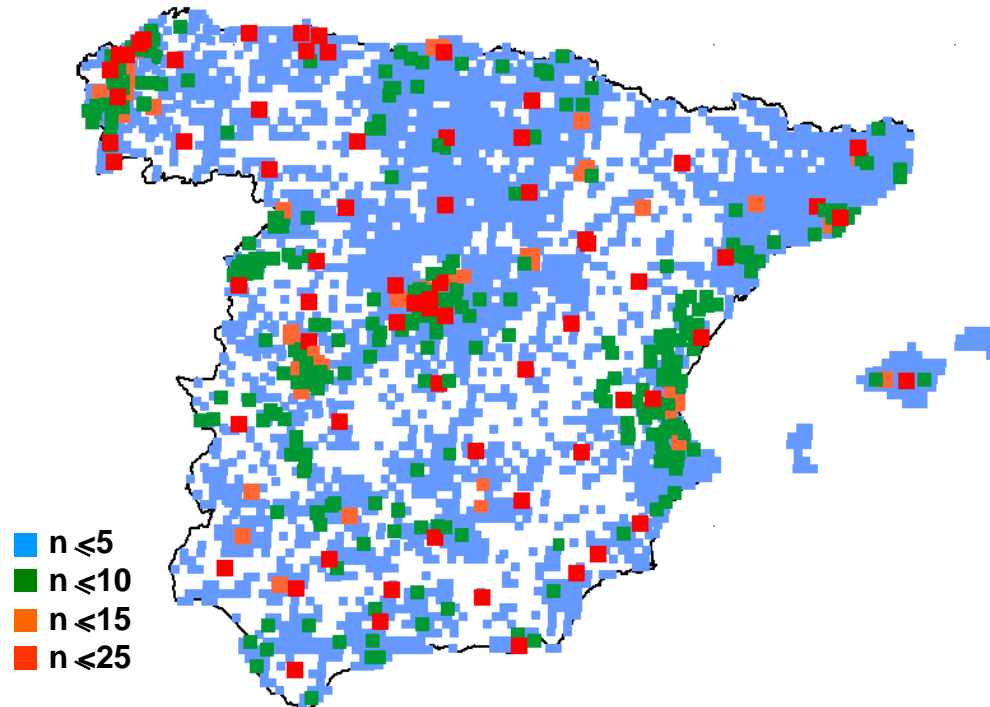
**Type I:**  $X_{90} = 300 \text{ Bq/m}^3$

**Type II:**  $X_{90} = 600 \text{ Bq/m}^3$

*long-stay buildings, schools*

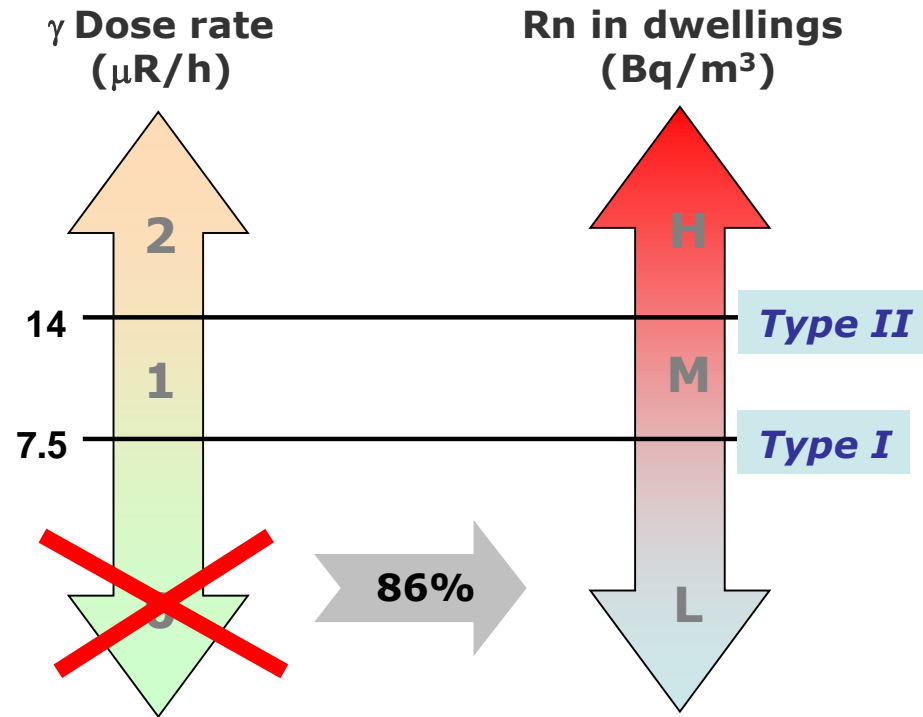
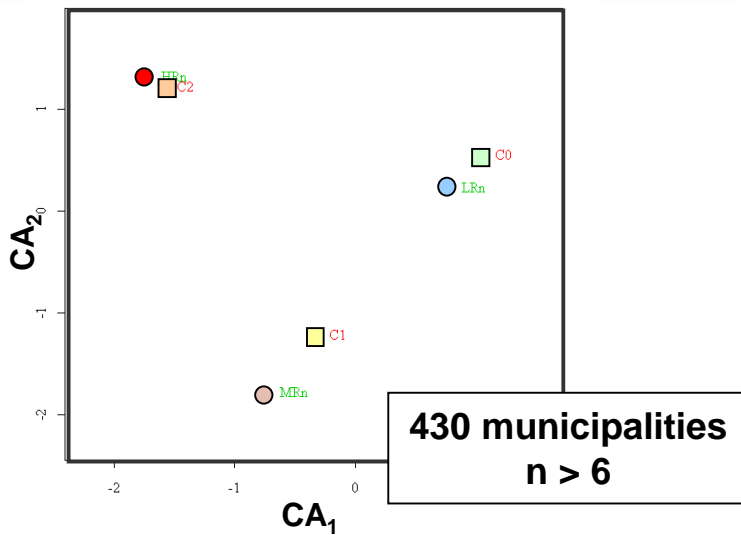


*all workplaces*



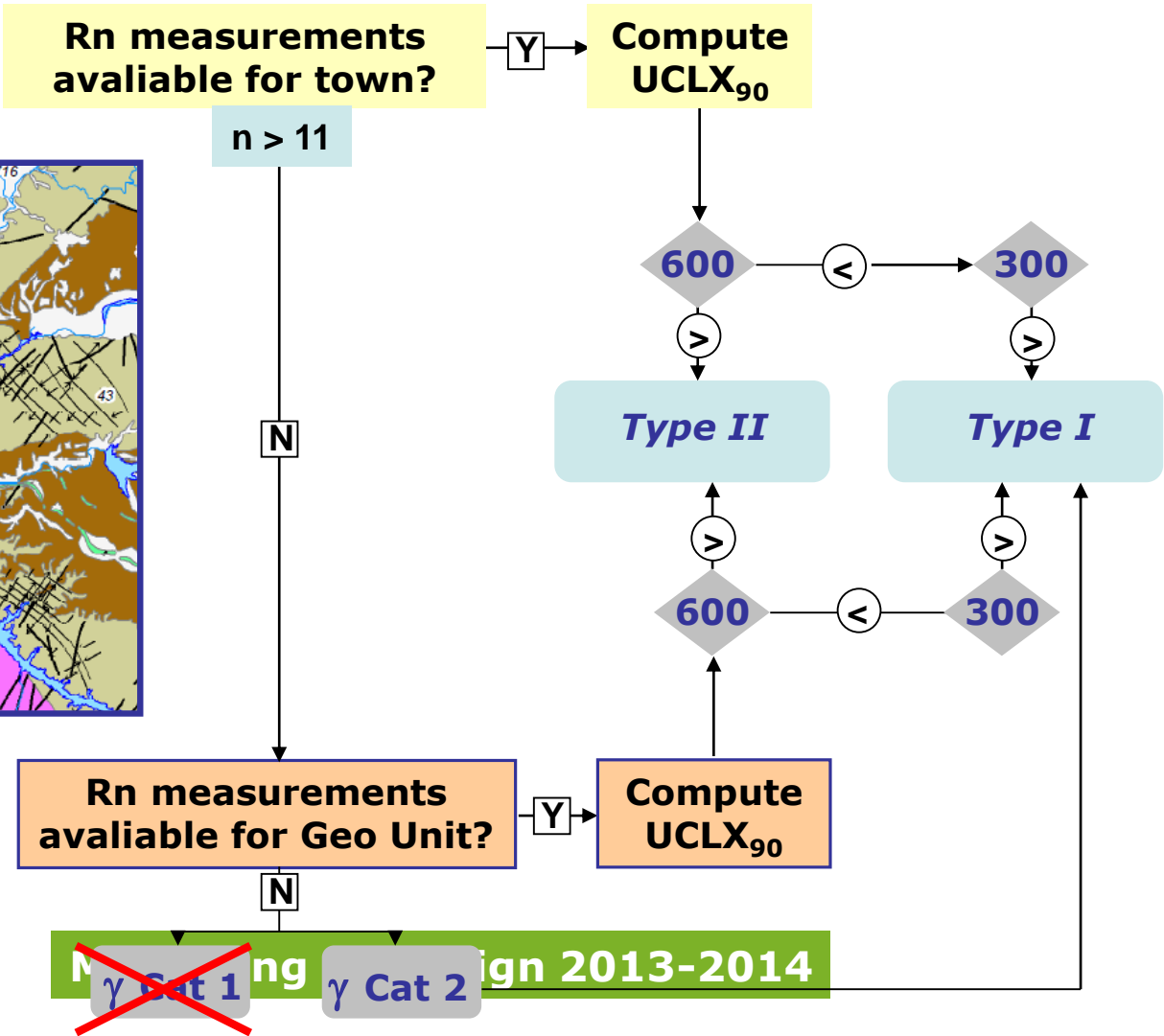
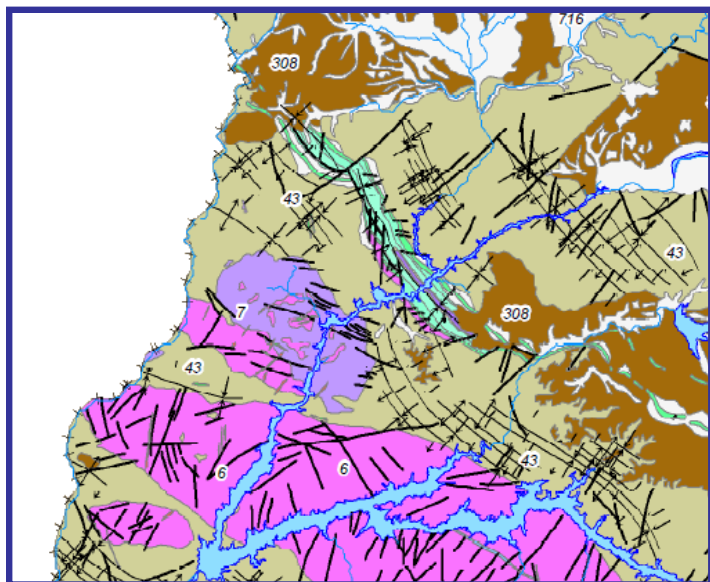


# 04 | RADON MAPPING



$$UCLx_{90} = \text{GM} \exp[g'_{1-\alpha, n-1} \ln(s_{\text{GM}})]$$

# 04 | RADON MAPPING



# 05 | FUTURE WORK

- Database maintenance and reassessment of radon-prone areas
- Public awareness and education programmes
- Institutional cooperation and stakeholder involvement
- Collaboration in TBC developments

