

# The European Commission's science and knowledge service

## Joint Research Centre



# Results of analysis of MetroRADON questionnaire data on indoor radon surveys

*Cinelli G.<sup>1</sup>, Bochicchio F.<sup>2</sup>, Bossew P.<sup>3</sup>, Carpentieri C.<sup>2</sup>, Gruber V.<sup>4</sup>,  
Leonardi F.<sup>5</sup>, Tollefsen T.<sup>1</sup>, Trevisi R.<sup>5</sup>, Venoso G.<sup>2</sup>*

*1 European Commission, Joint Research Centre (JRC), Ispra, Italy*

*2 Italian National Institute of Health, National Center for Radiation Protection and Computational Physics, Rome, Italy*

*3 German Federal Office for Radiation Protection, Berlin*

*4 Austrian Agency for Health and Food Safety, Department for Radon and Radioecology, Linz*

*5 INAIL - Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro, Rome, Italy*

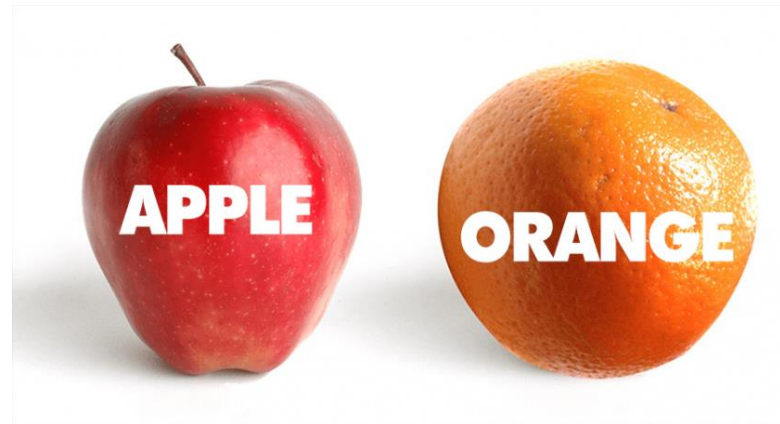
**III International Conference Radon in the Environment**

**27-31 May 2019, Krakow, Poland**

# Key question



**Are existing indoor radon measurement procedures\* in different surveys comparable in Europe?**



**\*include rationale, design, measurement methods, data analysis etc.**

# General Overview

For trying to answer this question, a **questionnaire** was developed in the framework of MetroRADON project (Valeria Gruber presentation)



**Main objective:** to get information from indoor radon surveys

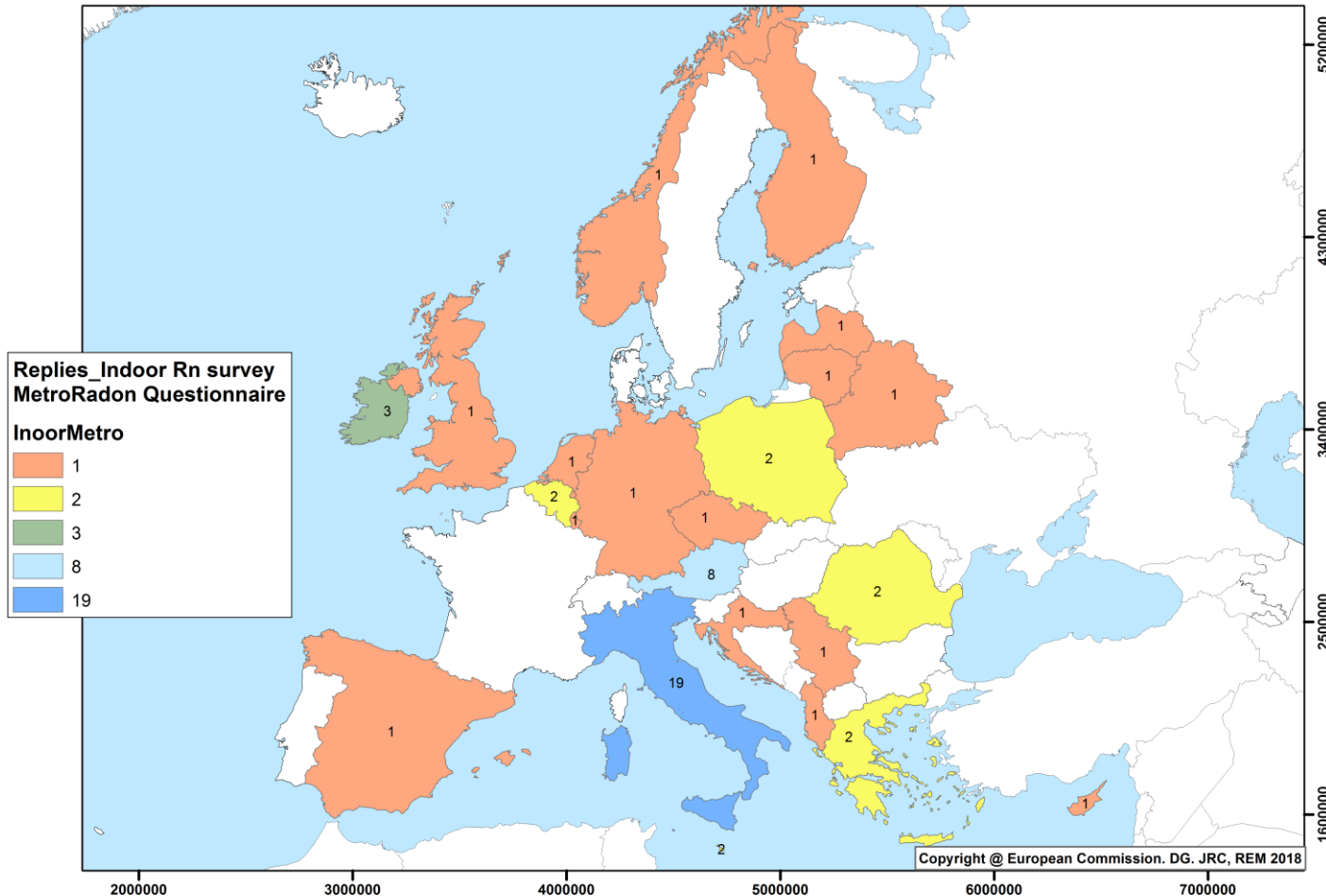
so it has been addressed to all European institutions working in this field:

- national authorities;
- regional administrations;
- universities;
- research centres;

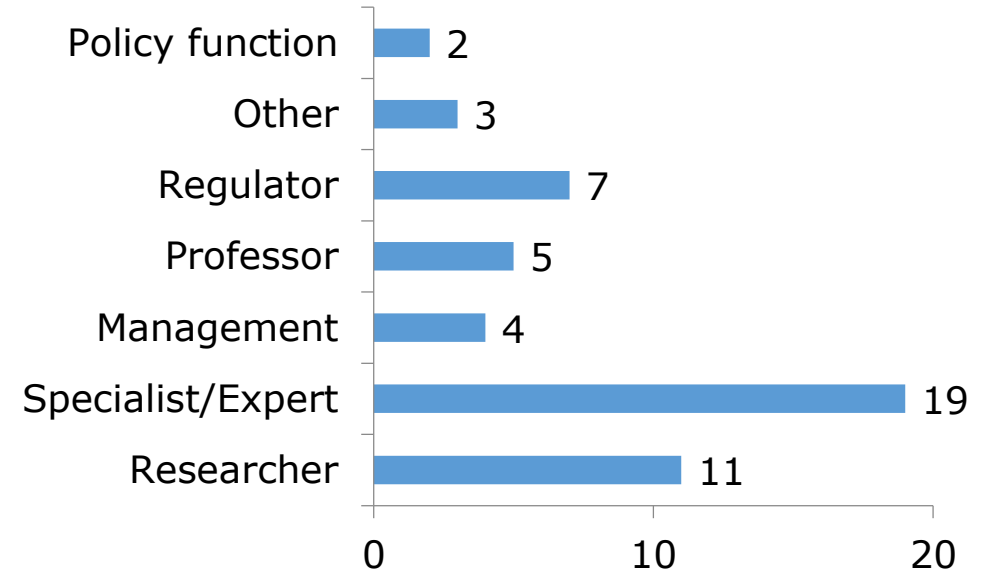
To have a questionnaire filled for each survey

# General Overview

- December 2017 and July 2018
- 56 replies from 24 countries



## Role of the respondent



Source:  
European Commission, Joint Research Centre (JRC),  
Directorate G - Nuclear Safety & Security, REM project

# For answering...

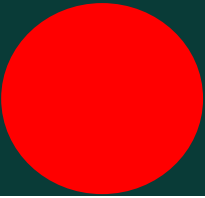
Focus on **3 main topics (sections of the questionnaires)** for answering our key question:

## Introduction

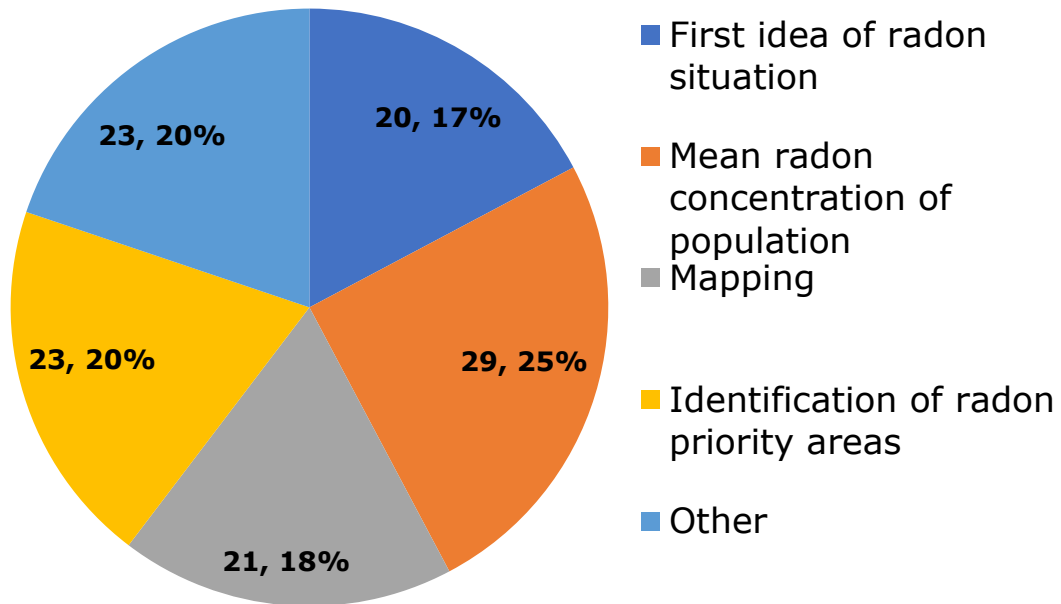
- 1) Characteristics of indoor radon surveys - design
- 2) Measurements methods
- 3) Data management, statistical treatment, aggregate and mapping

## Policy on Indoor Radon

# 1) Characteristics of indoor radon surveys -design

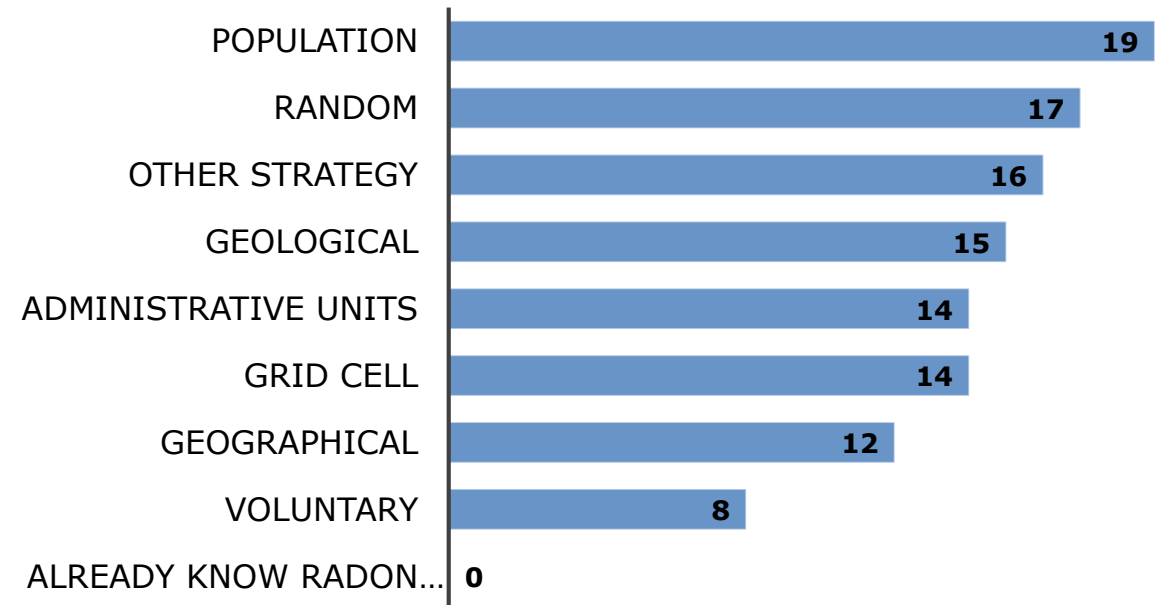


Please select the main purpose of the survey:

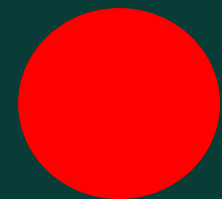


- More than 60% of surveys have more than one purpose
- Among *other*: risk assessment of workers and limited target population

Please select the main sampling strategy on which the survey was based:

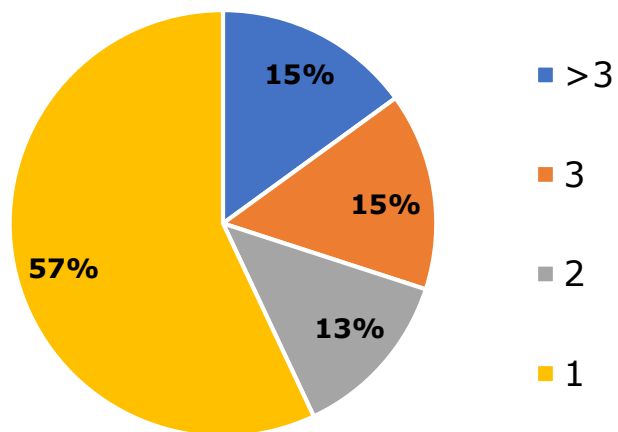


# 1) Characteristics of indoor radon surveys - design

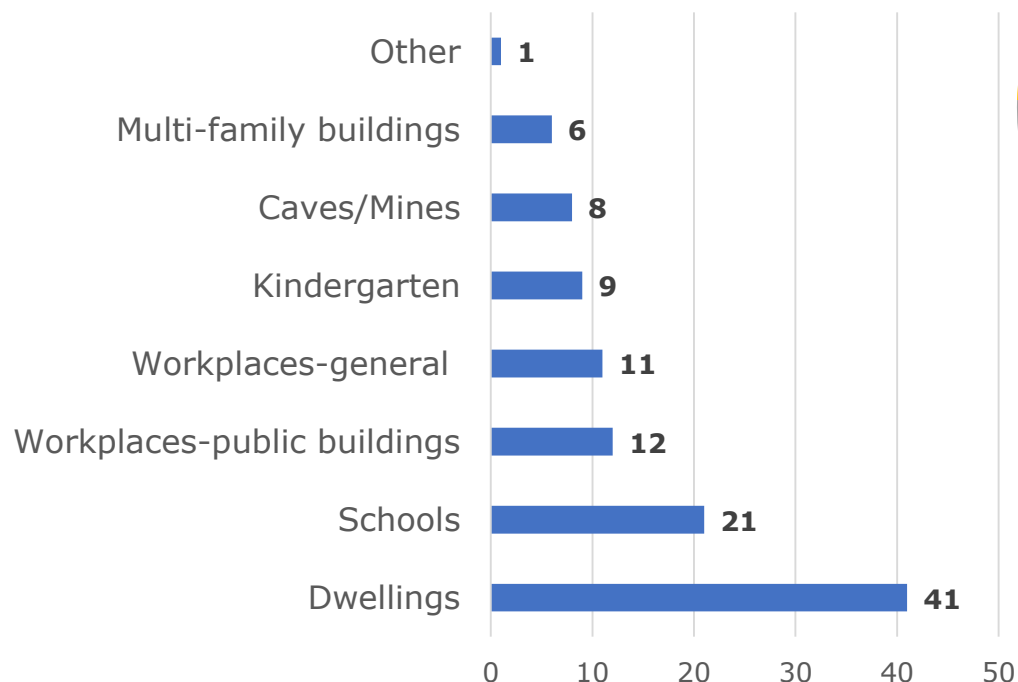


Which building types have you considered in your survey:

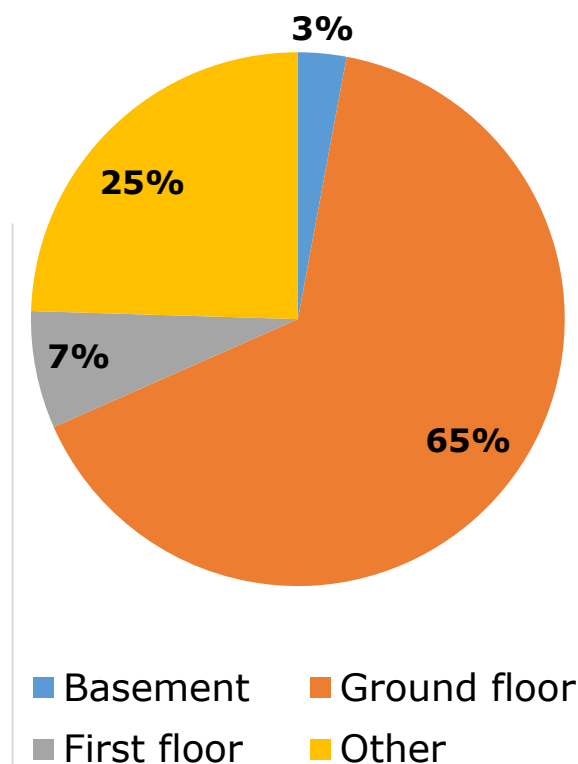
Number of building types considered in surveys



Surveys in which the following building types were considered:



Preferred measurements location in dwellings

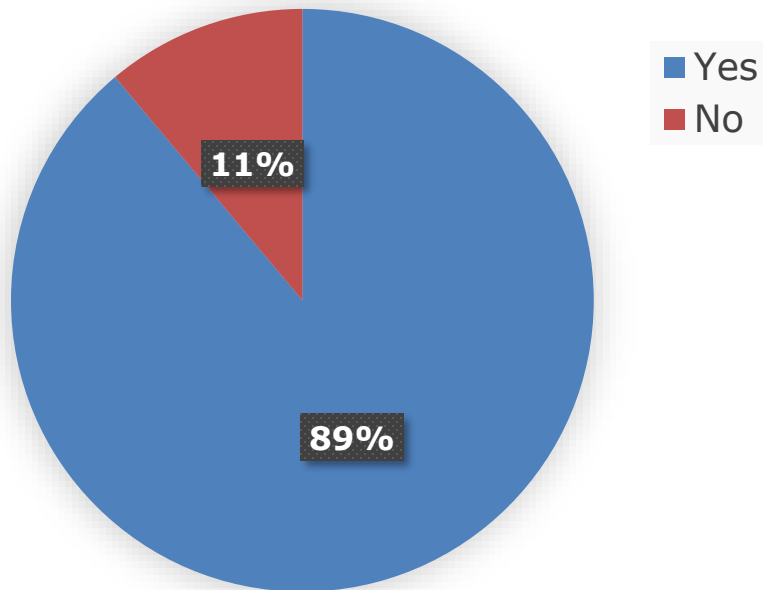




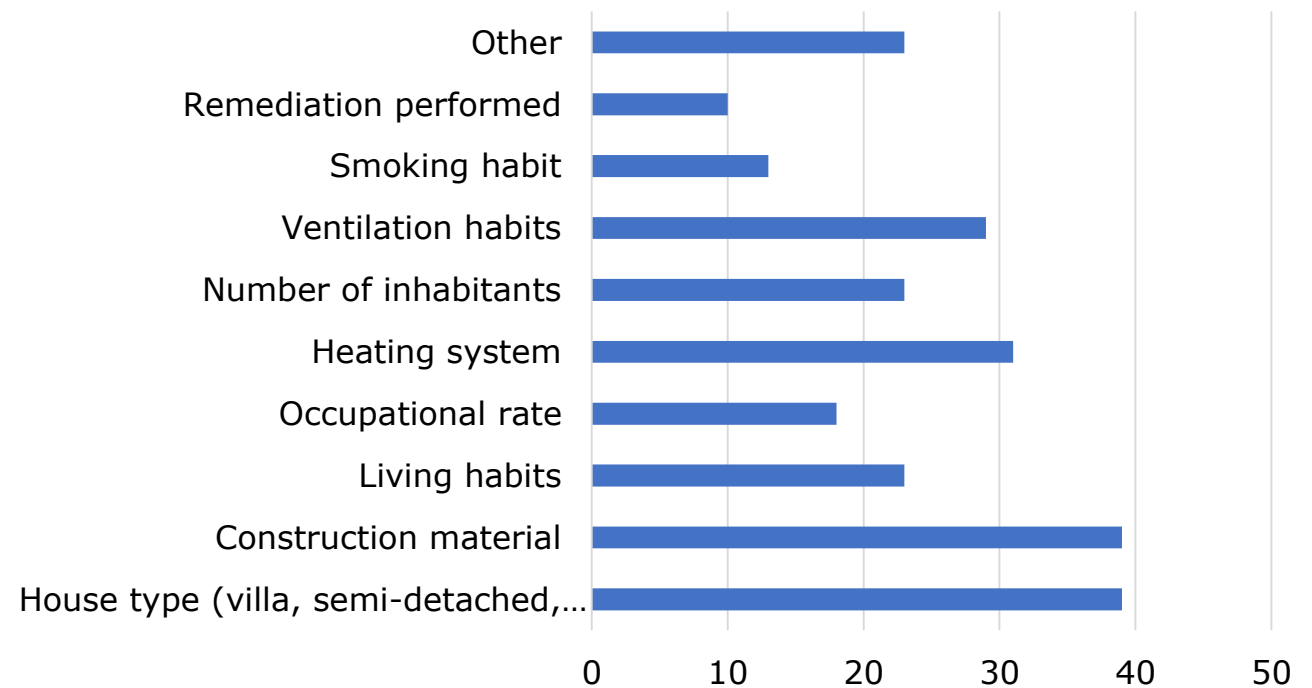
# 1) Characteristics of indoor radon surveys - design



**Have you collected information about the measurement site through a questionnaire?**



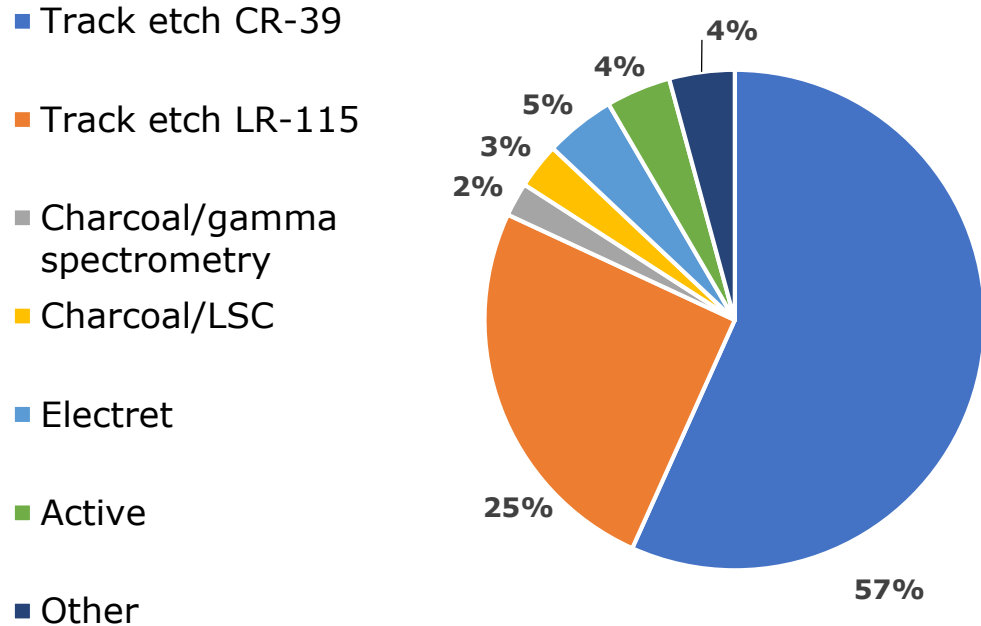
**Description of the content of questionnaire**



# 2) Measurements methods



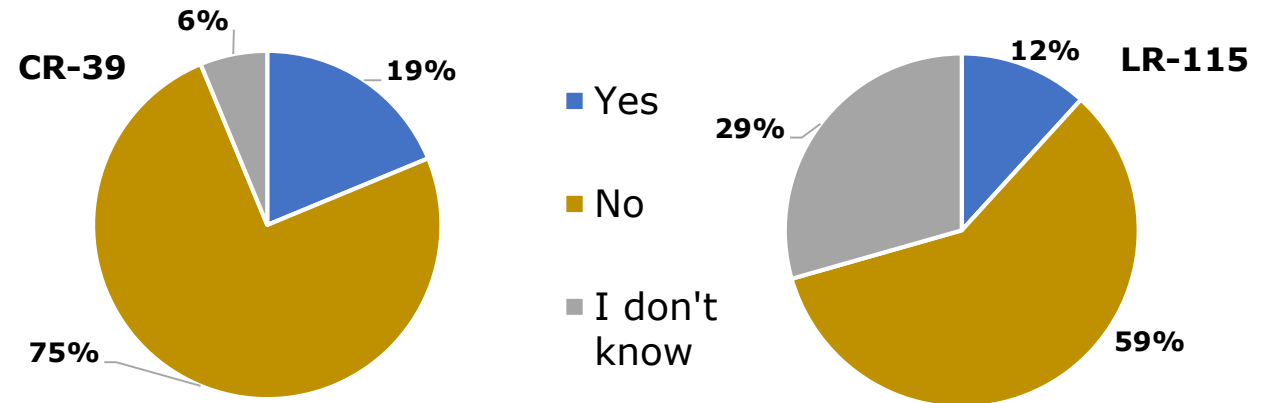
**Detectors used in the surveys**



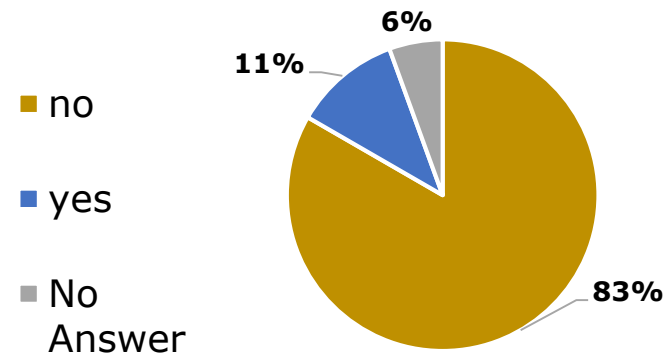
- Track etch CR-39
- Track etch LR-115
- Charcoal/gamma spectrometry
- Charcoal/LSC
- Electret
- Active
- Other

- 80% track etch passive detectors
- 68.5% reported the use of only one measurement method

**Are the detectors you used sensitive to thoron?**



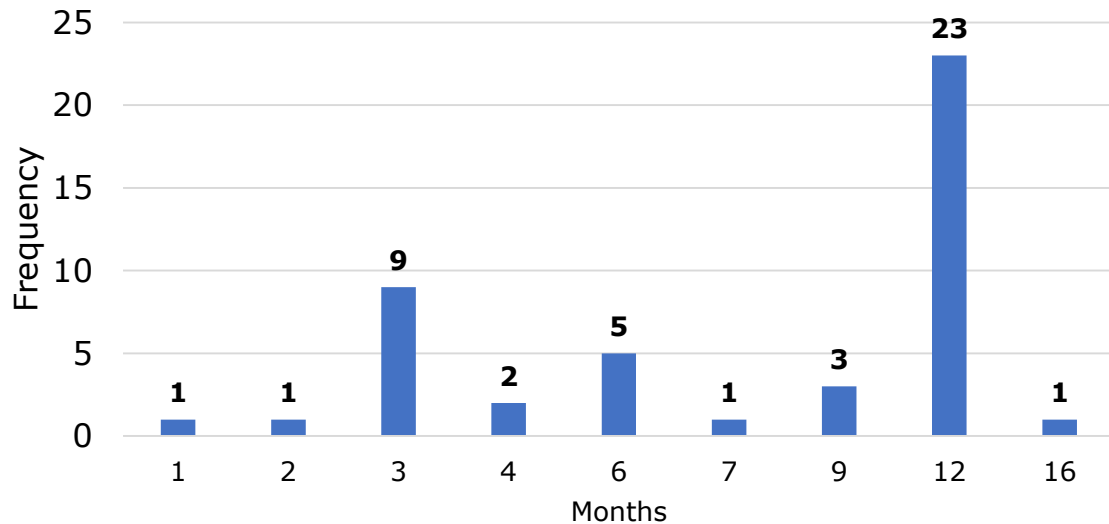
**Has thoron been measured**



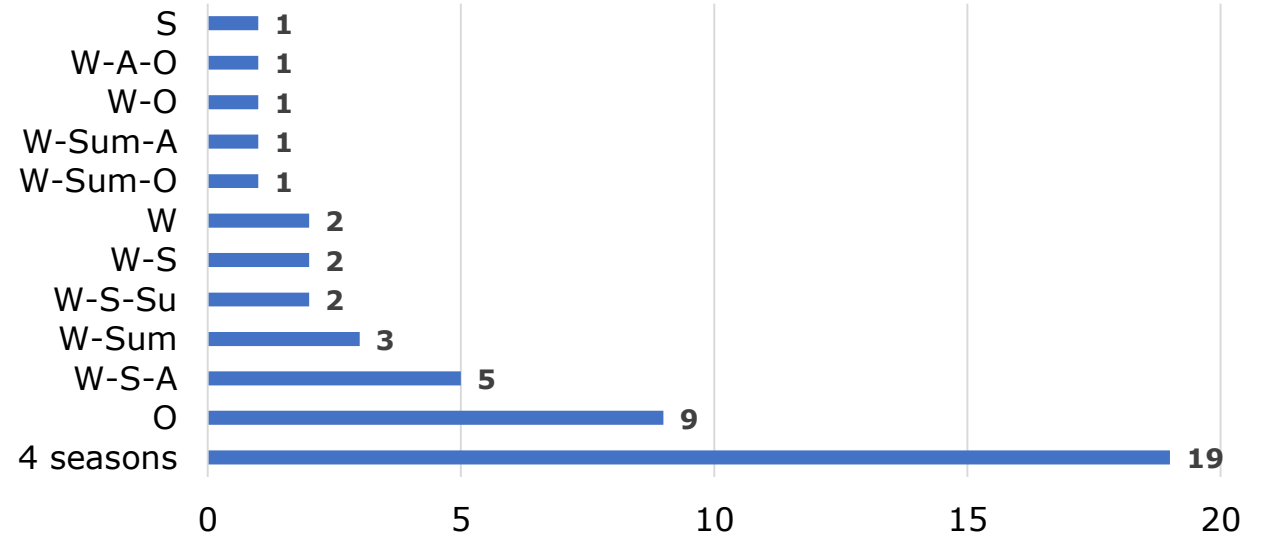
# 2) Measurements methods



**Duration of measurements performed with SSNTD (CR-39, LR-115 and Makrofol)**



**Measurement seasons**



25 respondents (44%) performed 1-year measurements (indicating the 4 seasons or specifying it in other).

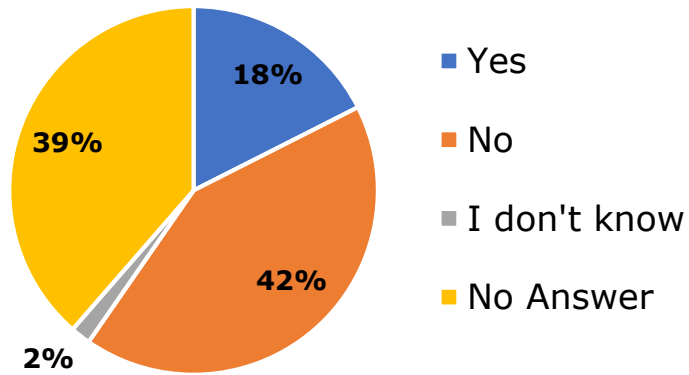
In the other cases, measurements were performed mostly during the winter but often covered more than one season.

# 3) Data management, statistical treatment, aggregate and mapping



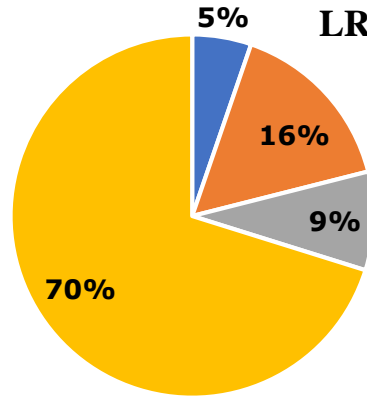
## Have you applied seasonal correction?

CR39

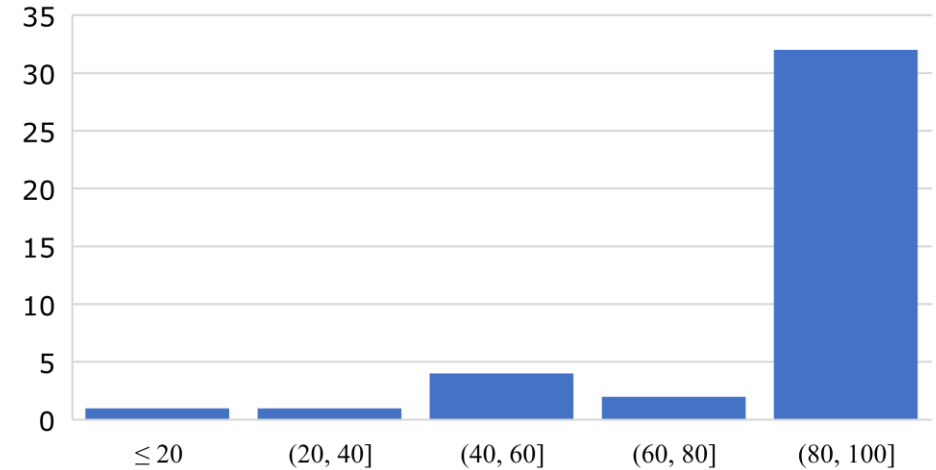


- Yes
- No
- I don't know
- No Answer

LR115

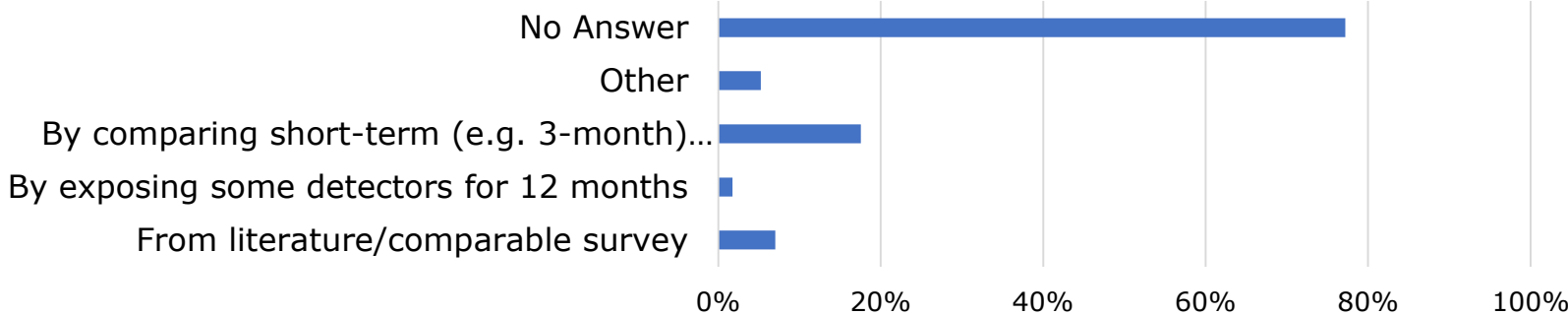


## Return rate %



Replies from more that 70% of respondents

## How the seasonal correction factor has been applied?

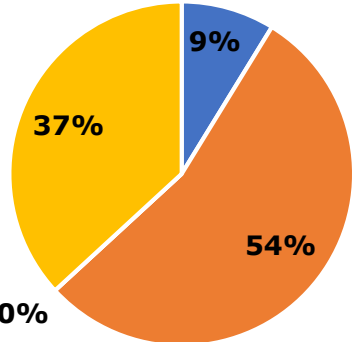


# 3) Data management, statistical treatment, aggregate and mapping



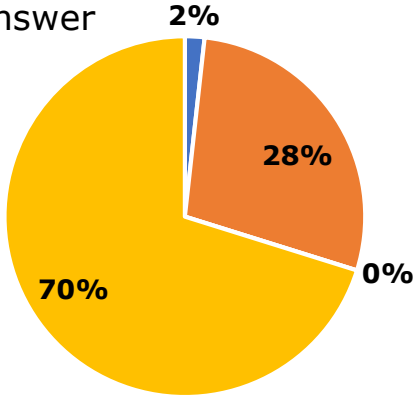
**Have you applied any correction linked to building characteristics, in particular floor level?**

**CR39**



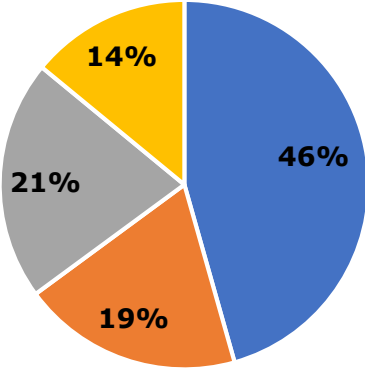
- Yes
- No
- I don't know
- No Answer

**LR115**



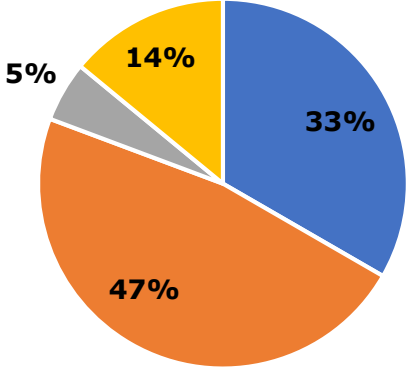
**Please indicate how data from the survey were aggregated:**

Simply target descriptive statistics of raw data



- Yes
- No
- I don't know
- No Answer

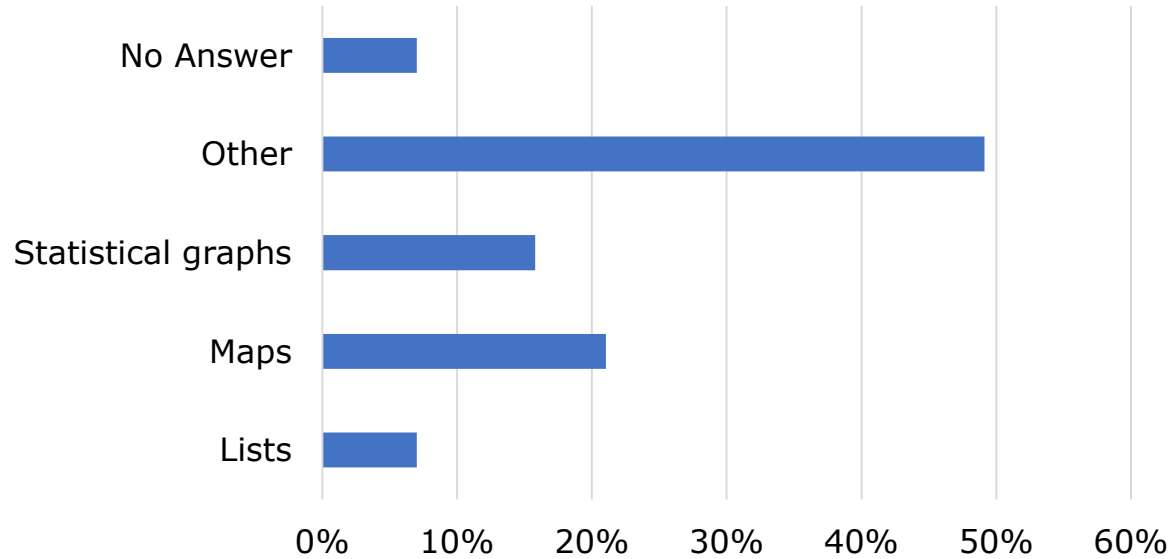
Modelling of raw data (standard house, spat models - kriging, average within municipalit etc.)



# 3) Data management, statistical treatment, aggregate and mapping



**Please indicate how data are presented to the population/authority**



## Other

- Direct communication (result letter) to the responsible of the administrative buildings, kindergartens, schools
- Result letter/single report to all households;
- Reports and scientific papers
- Reports for authorities
- Maps of web sites

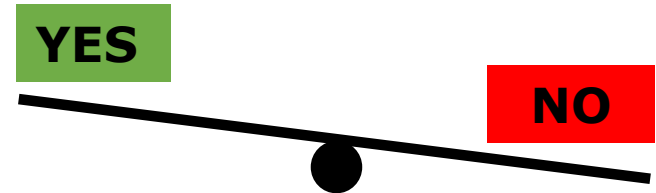
# Key question

**Are existing indoor radon measurement procedures\* in different surveys comparable in Europe?**

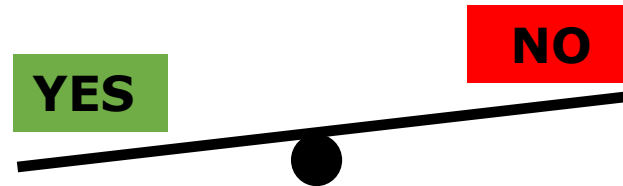
**\*include rationale, design, measurement methods, data analysis etc.**

# Conclusion

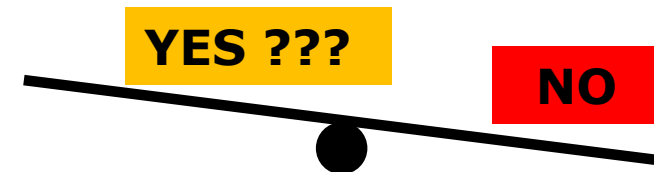
1) Characteristics of indoor radon surveys – design



2) Measurements methods



3) Data management, statistical treatment, aggregate and mapping





# Conclusion

**We are working on a document reporting a detailed analysis of all the replies.**

**Let's keep you informed on the status of the report on the MetroRADON website:  
[metroradon.eu](http://metroradon.eu)**





# Any questions?

Please contact us at

[giorgia.cinelli@ec.europa.eu](mailto:giorgia.cinelli@ec.europa.eu)