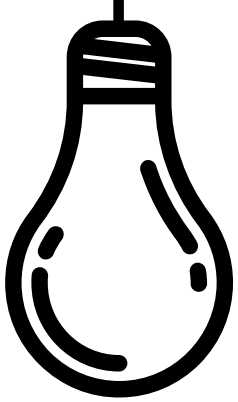


ANALYSIS OF THE POTENTIAL OF LOW-COST RADON METRES

M. Eng. JOANNA ALEKSANDRA KUBIAK

PhD DOMINIK GRZĄDZIEL

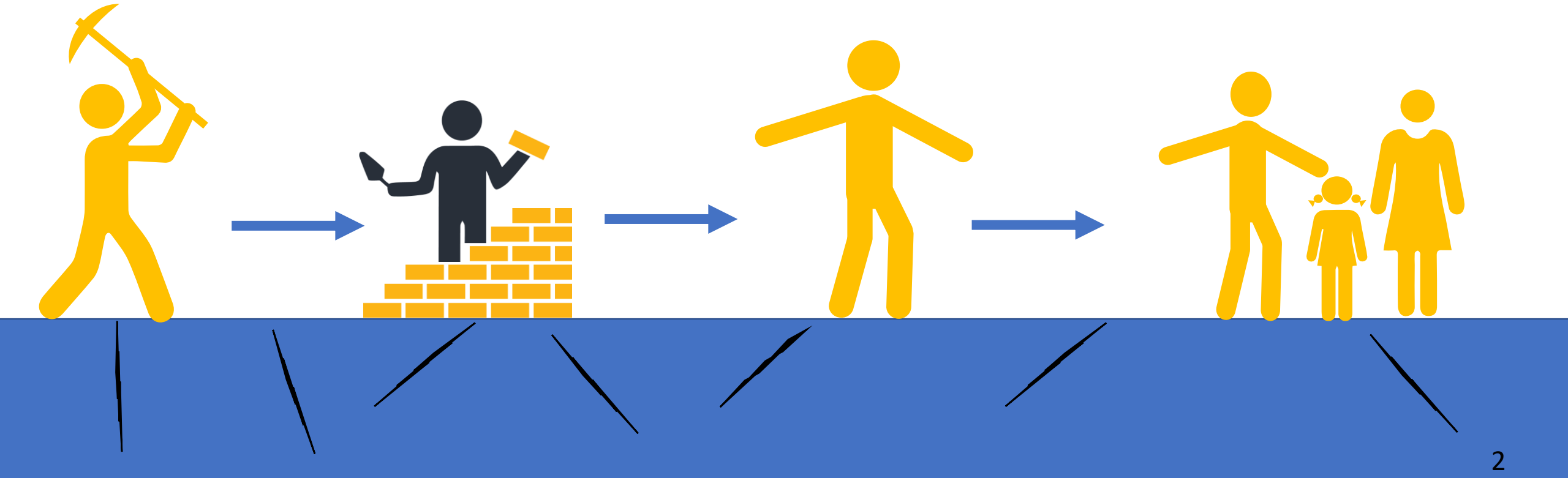
PhD MAŁGORZATA BASIŃSKA

KNOWLEDGE REVIEW

DEVICE SEARCH

OUR EXPERIMENT

FUTURE



15th century

Mysterious deaths of miners in Joachimsthal.
People said caused by goblin.

1901 year

First radon measurements.
Radon is ubiquitous (Elster and Geitel)

ROBIN2-Radon Sensor

Corentium Pro

Corentium Plus

up to 1000 €

Radon Scout Home

RadonEye Plus 2

PCE-RD 100

Radon Südwind

Aranet Radon Plus

Wave (2nd Gen)

Milerd Aero Q4

up to 400 €

EcoBlu

Airthings View Radon

EcoQube

PCE-RD 75

Corentium Home Radon

LifeBasis

Algade AER

PCE-RD 50

RadonEye RD200

RADEX MR107+

HOW?

STABLE CONDITION

Precision error (PE):

$$PE=(\sigma/\bar{x})\cdot 100\%$$

where:
PE - precision error, %
σ- standard deviation of measurements, Bq/m³
x̄- arithmetic mean measurement from device, Bq/m³

Biased error (BE):

$$BE=((\bar{x}-\bar{x}_{ref})/\bar{x}_{ref})\cdot 100\%$$

where:
BE - biased error, %
$\bar{x}_{ref}$ - reference value, arithmetic mean measurement from reference device, Bq/m³

Measurement error (ME):

$$ME=\sqrt{PE^2 + BE^2}$$

ME - measurement error, %

[1]

UNSTABLE CONDITION

$$APD = 100\% \cdot |x_i/x_{ref} - 1|$$

where:
x_i – immediate measurement from the device under test
x_{ref} – instantaneous measurement from a reference device

$$MAPE = \frac{100\%}{n} \cdot \sum_{i=1}^{n} x_i - x_{ref}$$

where:
n – number of measurements

[2, 3]

OTHER

zeta

Z_{score}

[4, 5]

LIFEBUOY

Kruskal–Wallis
Corn Cox

[6, 7]

A

B

Fig. 1 Meters during measurements a) in the room b) in the radon chamber

RadonEye

Südwind

EcoQube

LifeBasis

Airthings

Ethera

Scout Home Basic

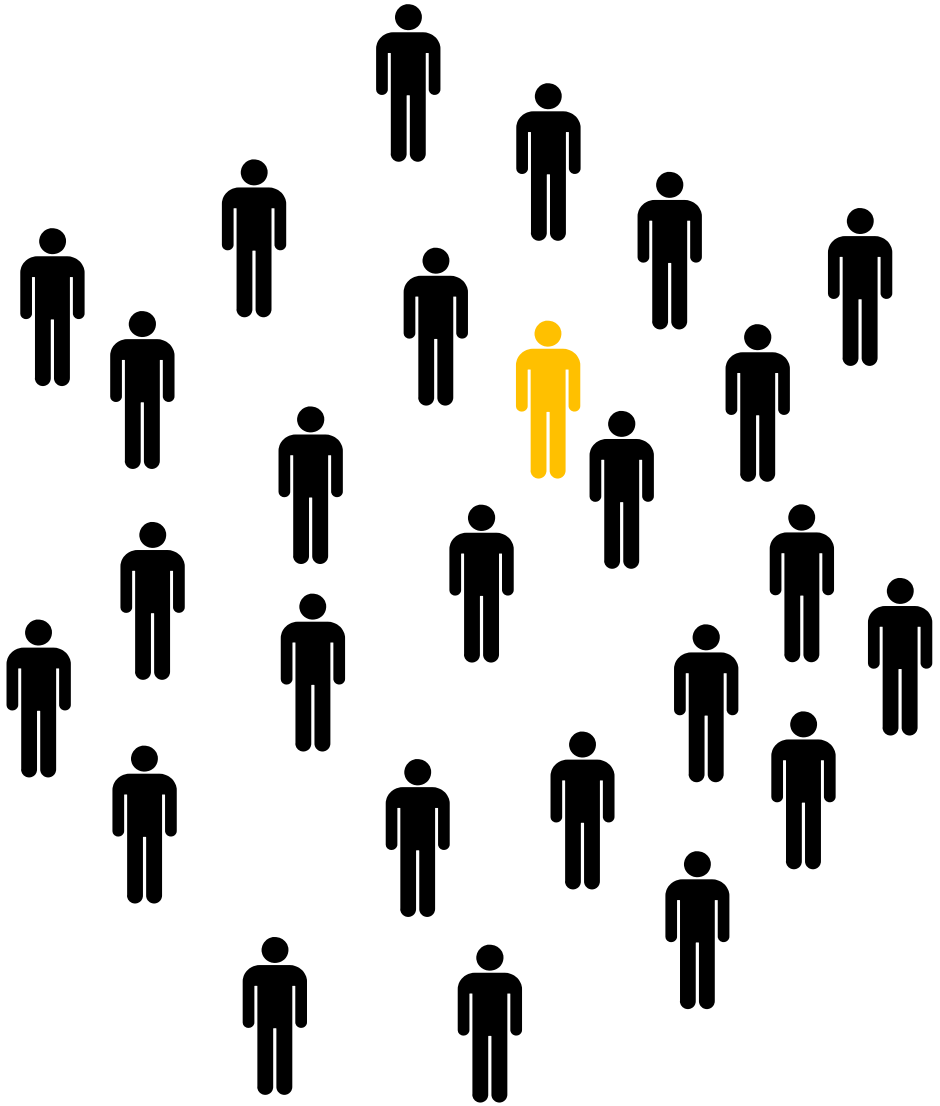
ELSEVIER

Building and Environment

Volume 277, 1 June 2025, 112940

A novel method for analysing indoor radon concentration measurements

Joanna Kubiak [a b], Małgorzata Basińska [a]



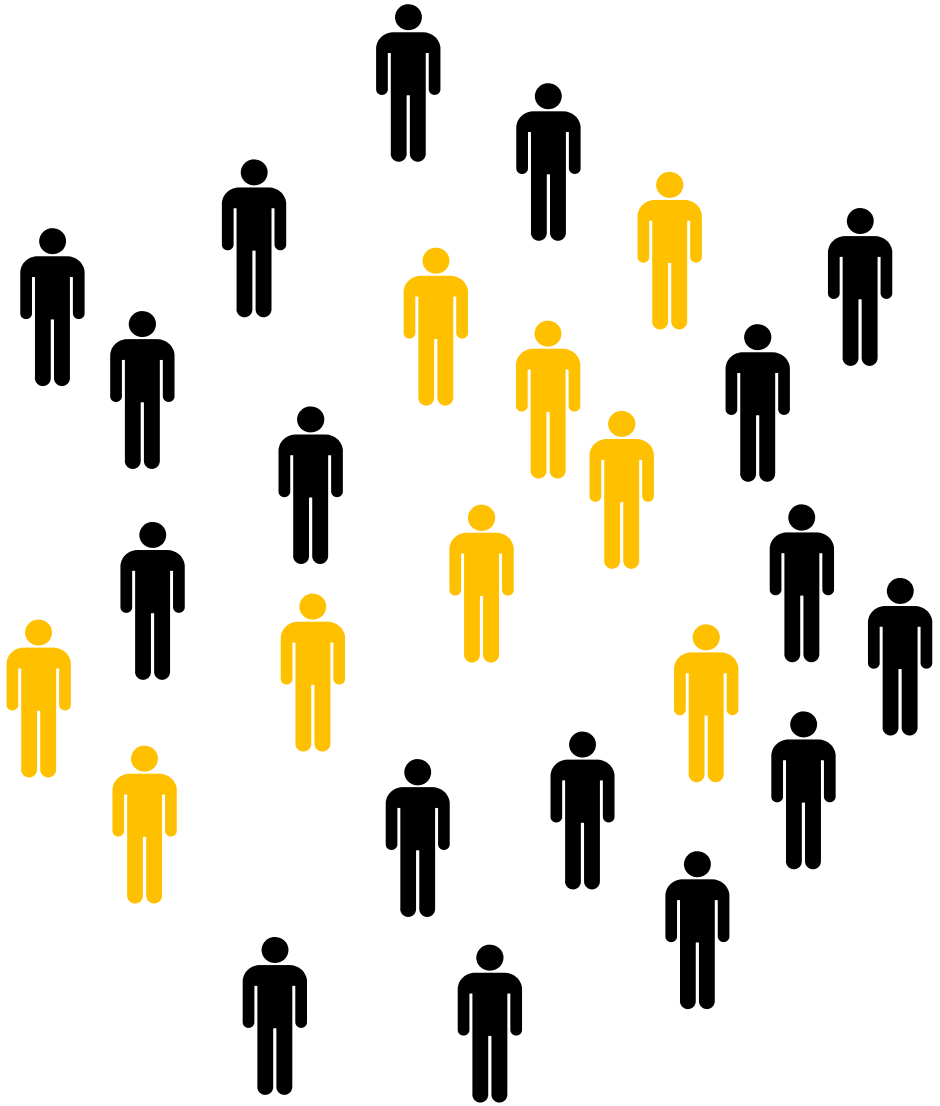
- checking the operation and resistance of meters under the influence of external factors such as humidity and temperature.

- analysis of meters other than RadonEye, RadonEye plus, Corentium Home, EcoQube

- analyses extended to controlled conditions in radon chambers, including application in real-life conditions

- standardisation and preparation of a calculation protocol for comparisons of low-cost meters

- checking the correct operation of devices over a period of several years



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Graphics: canva.com

„Prediction is very difficult, especially when it concerns the future.”

Niels Bohr

Kubiak, J., Grządziel, D., & Basińska, M. (2025). The market and comparison of low-cost radon meters in Europe with the example of Poland. (Manuscript in review).

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