

The background features a line chart with a light green line representing radon levels over time. The y-axis is labeled 'Radon levels [Bq/m3]' and ranges from 0 to 800. The chart is overlaid with the title text. To the right of the chart, there are several colorful hot air balloons floating at different heights.

Not every measurement should be treated the same

Visualising Air Quality

Marco-Felipe King, James McGrath and Thomas Cooper



Sustainability at Leeds




OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

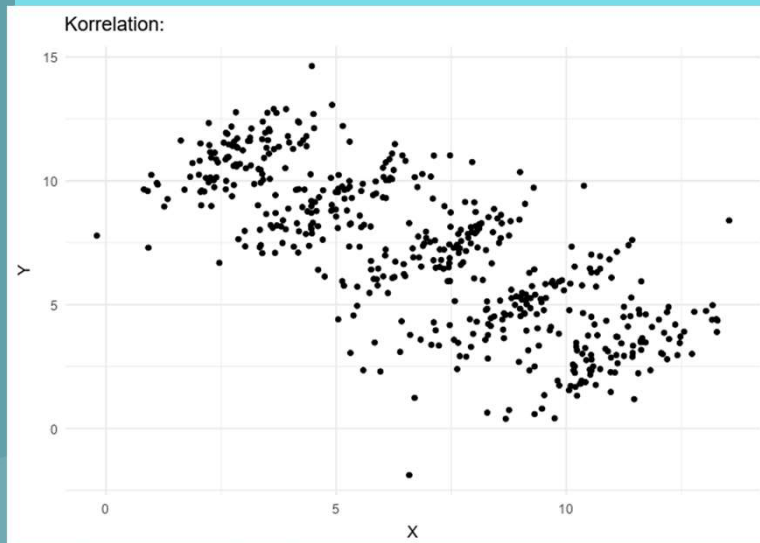


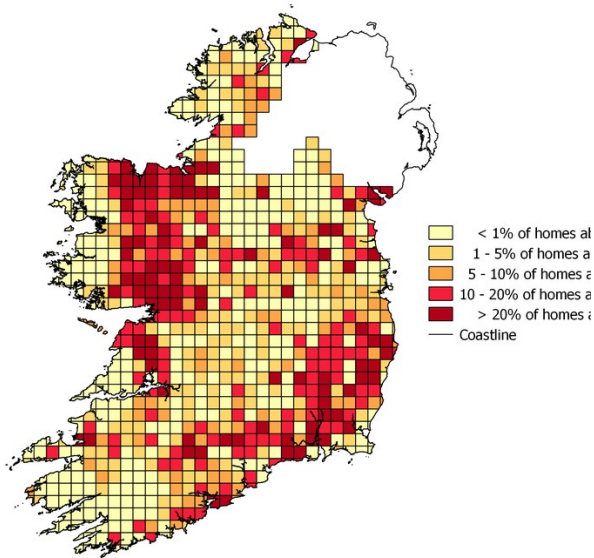
UNIVERSITY OF LEEDS

Objectives

- 
- Create an R-Shiny cloud-based an interactive platform for visualising IAQ
 - Create a documented GitHub repository with the R files for users to download and user within the Breathing City Network for your own needs.
 - Convene a workshop to co-create “standards” for visualisations and summary statistics of air quality sensor measurements and
 - create a protocol for communication of results of measurement campaigns for these different stakeholder groups: researchers, estates management and end-users.

Conflicting Readings

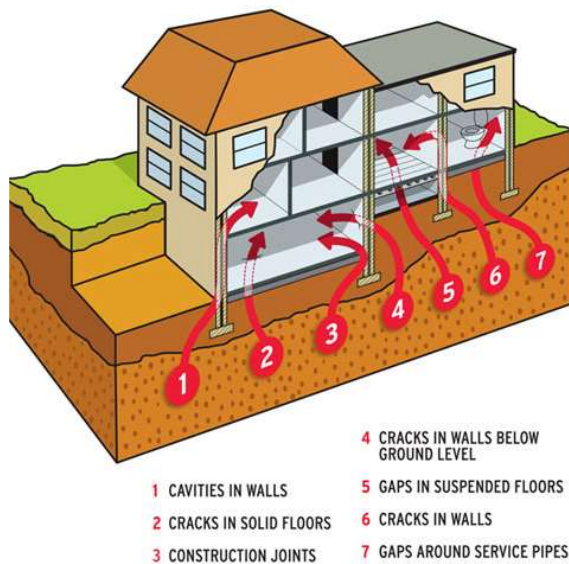




Ireland Radon Measurement Campaign

100 high energy efficient homes (A BER rating), 4 rooms, 18 months

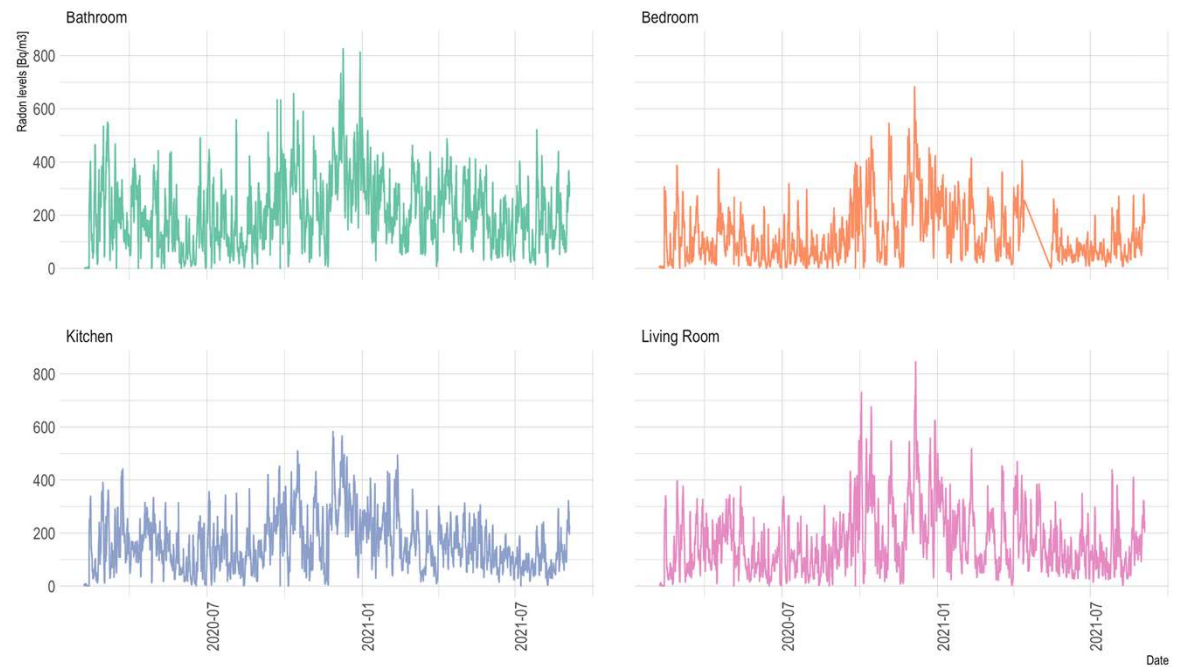
- Volatile Organic Compounds
- Radon - hourly
- Thermal comfort parameters (Temperature, Humidity and Pressure)
- Carbon Dioxide – every 5 minutes



End up with 100 Time- Series

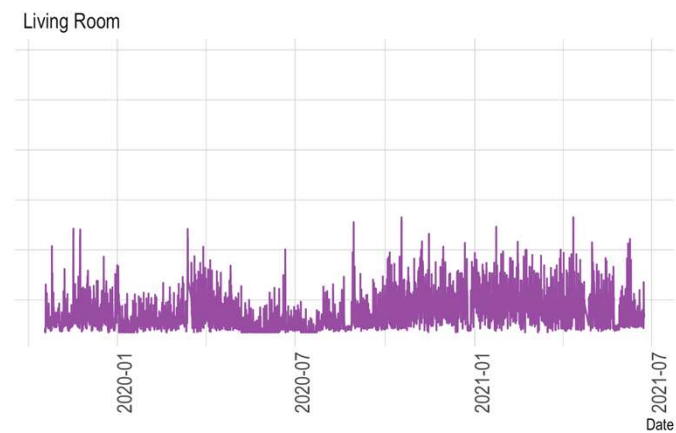
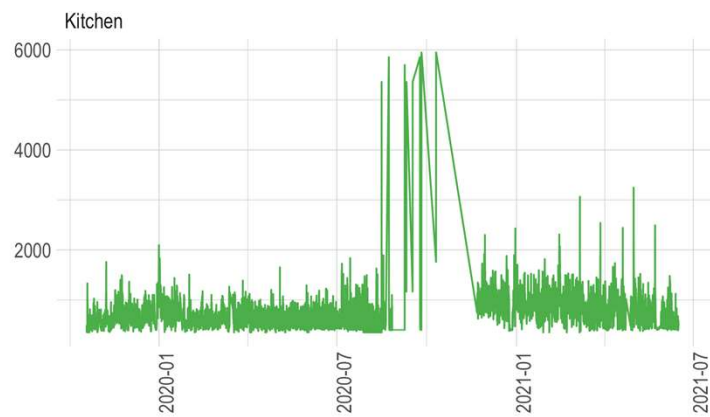
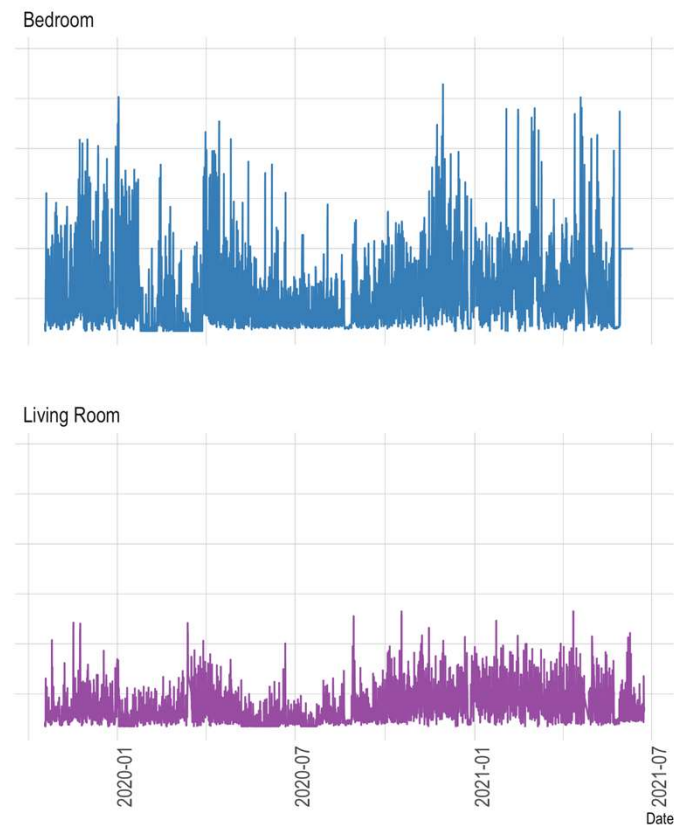
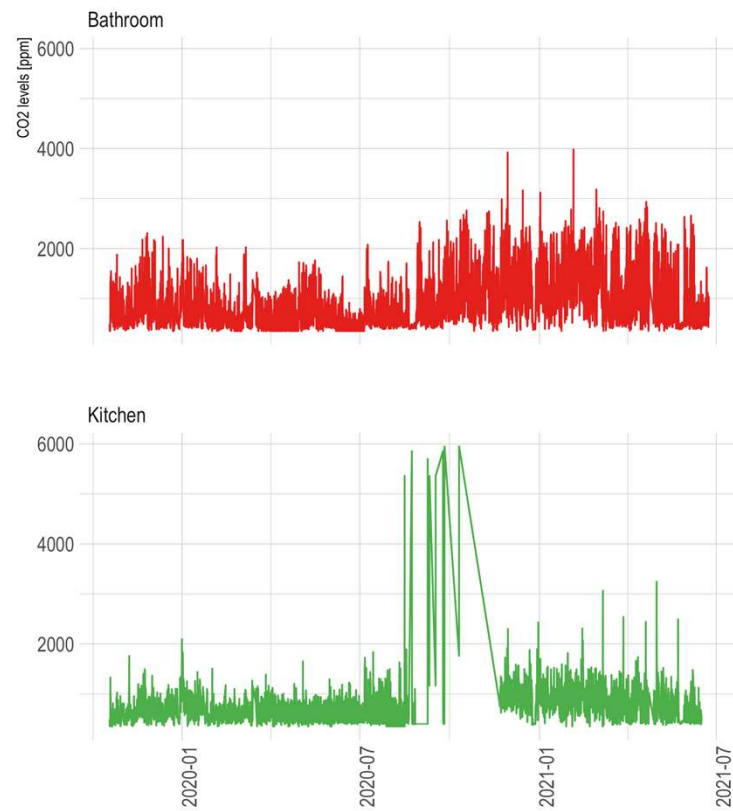
Time-series of Radon

71BW15 - Galway , Vent type: MVHR , BER: NA



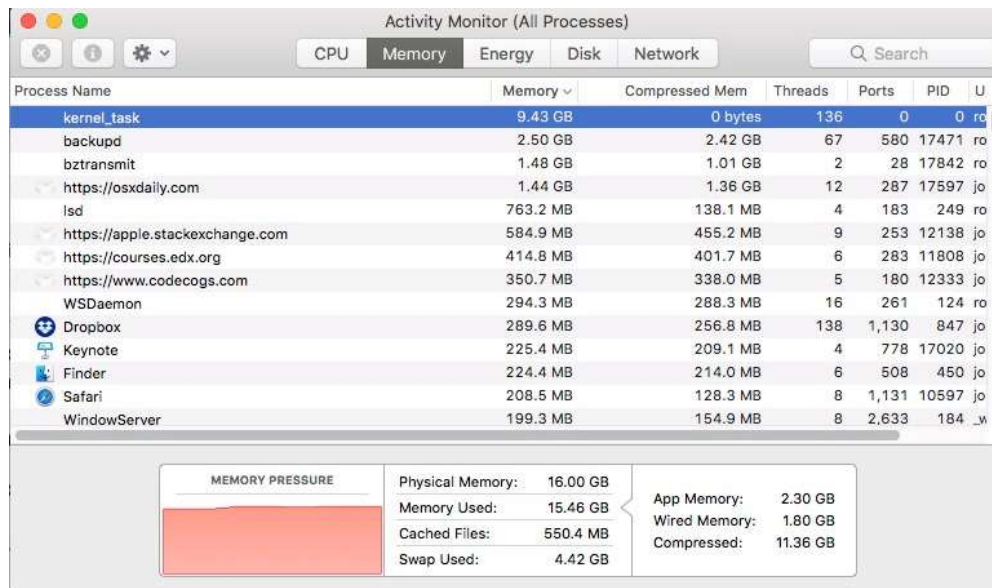
Time-series of CO2

05PI81 - Dublin , Vent type: Mixed , BER: A2



Issues Dealing with (Big) Data

- You have many (hundreds) of .csv files totalling over 10GB
- You want to query in close to real time
- And suddenly you learn about swap files



Duck DB



Super fast database instead of an in-memory approach

SQL cubical structure

Easy to set up and faster than SQL-lite

Faster than other time-series specific DB
(e.g. MongoDB)

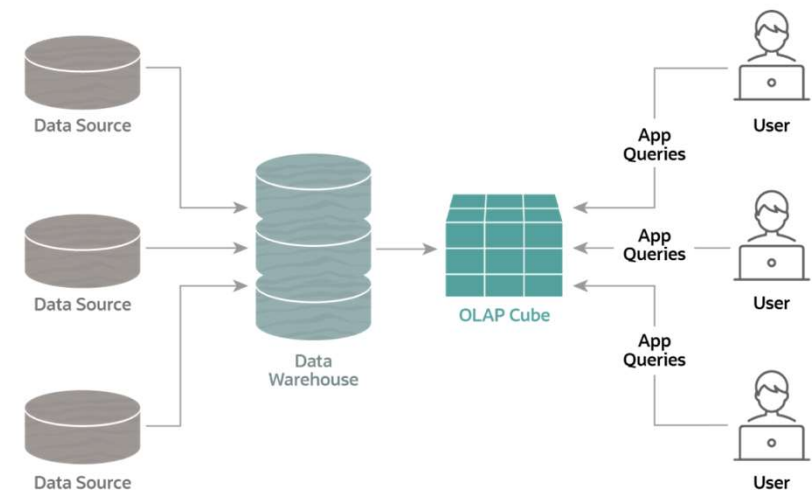
Can you afford to down-sample?

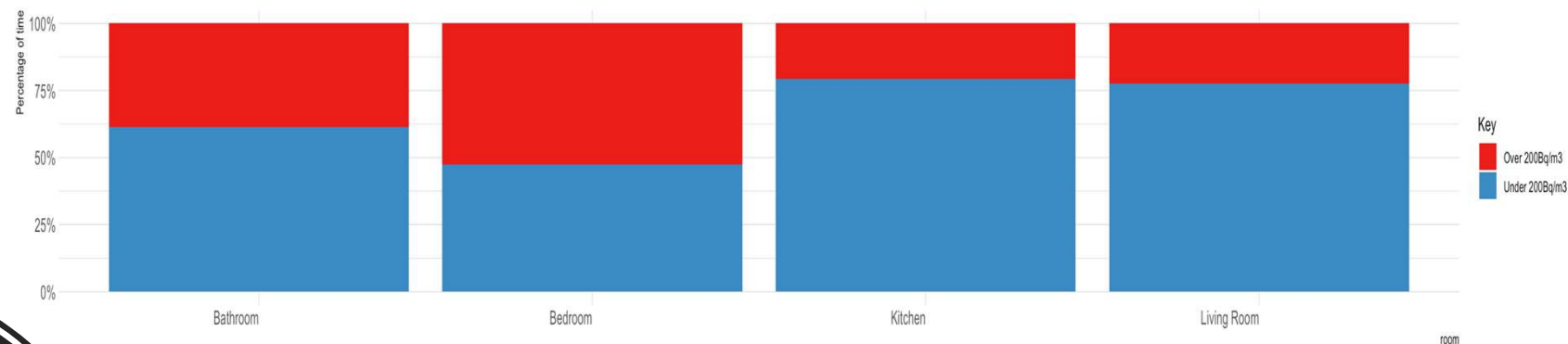
```
## # A tibble: 4 x 3
## format median_time mem_alloc
## 1 R (RDS)      1.34m 4.08GB
## 2 SQL(SQLite) 5.48s 6.17MB
## 3 SQL(DuckDB) 1.76s 104.66KB
```

Online Analytical Processing

The OLAP Process

How data is prepared for online analytical processing (OLAP)





A

Mean radon concentration

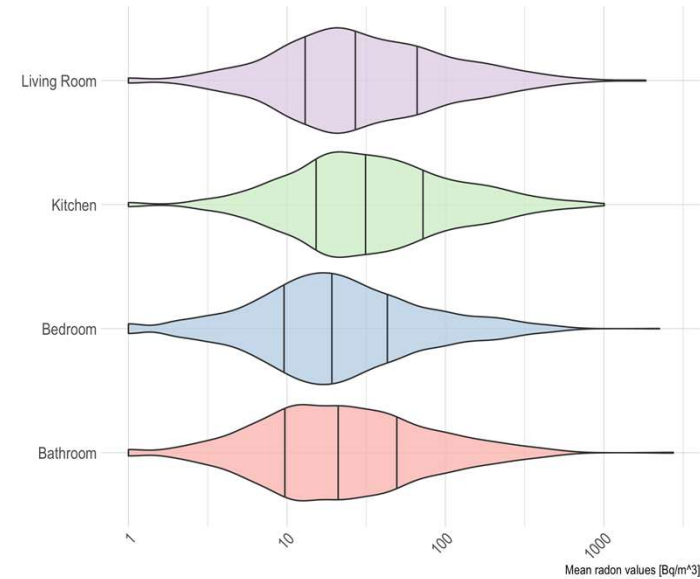
Monthly measurements



B

Mean radon concentration

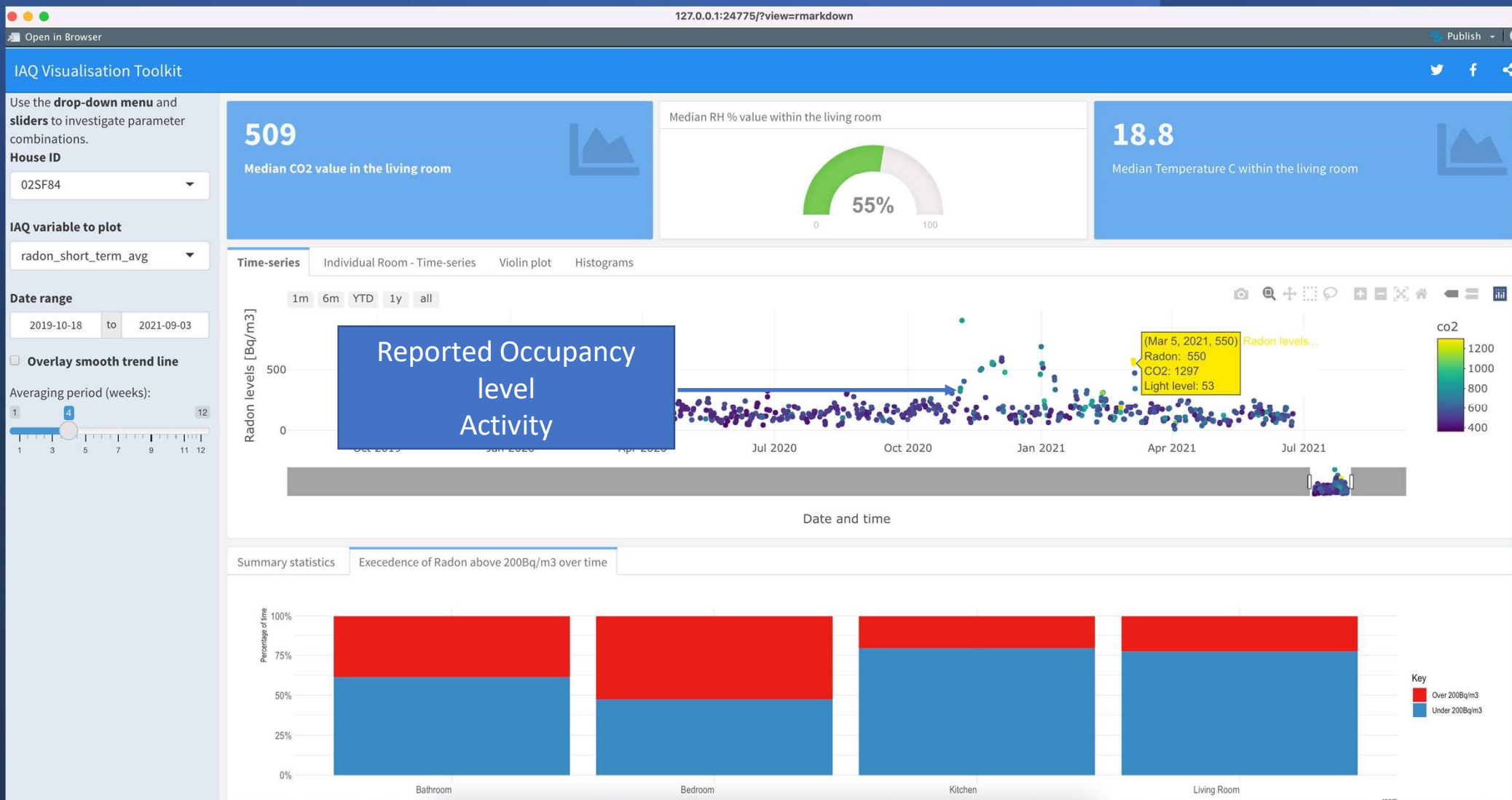
Monthly measurements

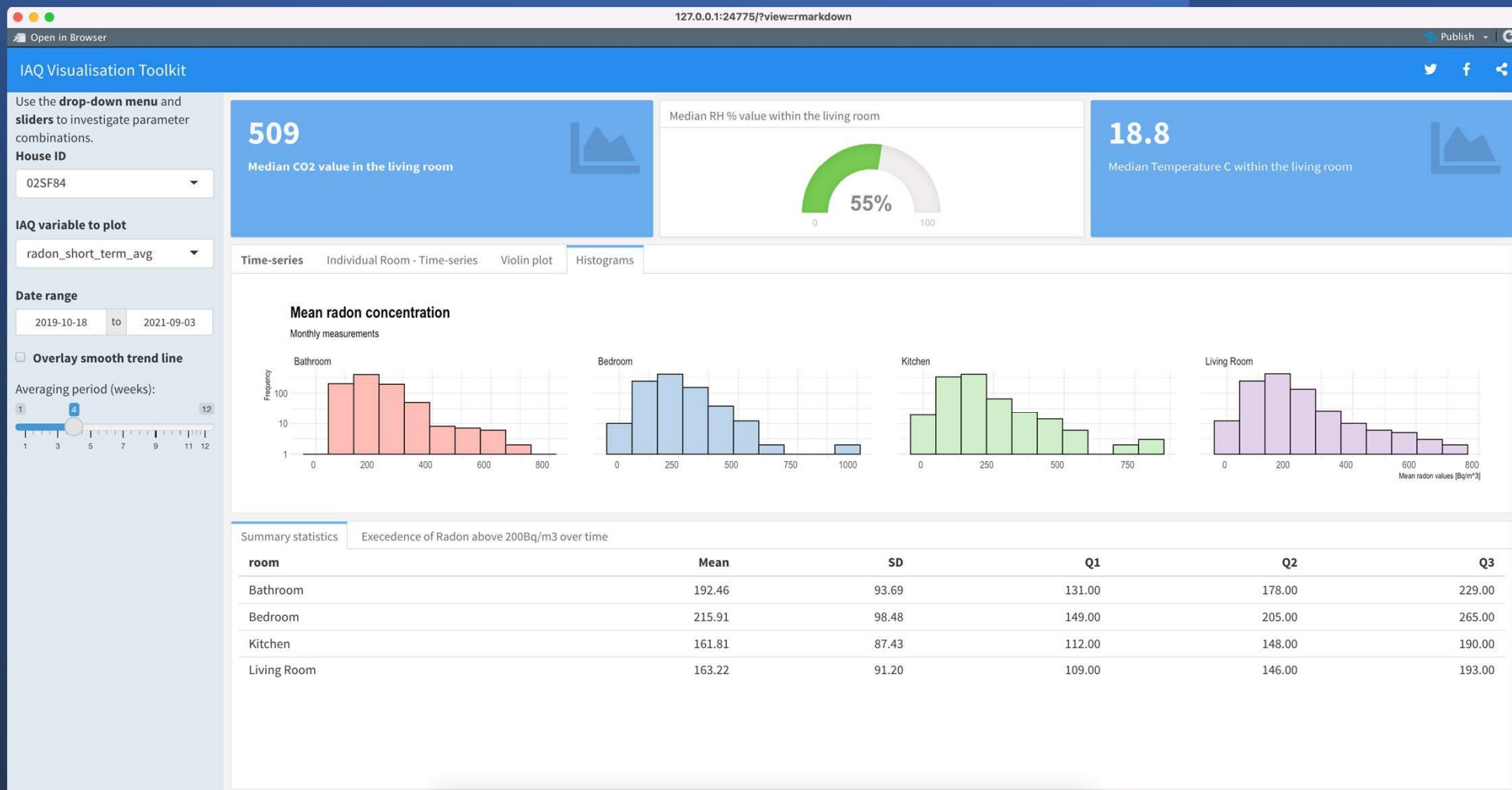


Interactive Tool

- Skeleton platform which will be freely-downloadable from GitHub
- Visualisation toolkit to explore relationships using test data
- Interactive rather than passive presentation







Visualisation Workshop

1. Aim to co-create/agree on **preferred visualisations** and summary statistics of air quality sensor measurements and
2. Create a **protocol** for **communication** of results of measurement campaigns for these different stakeholder groups: researchers, estates management and schools .



(Online) outline



Invited talks from visualization tools, risk communication experts, academic and industrial backgrounds – 1.5h



Interactive debate (2h) on

Future of visualization requirements

How to communicate

Level of detail / accuracy required



Hands on with the interactive tool
(1h)

Feedback and showcase of own usage

