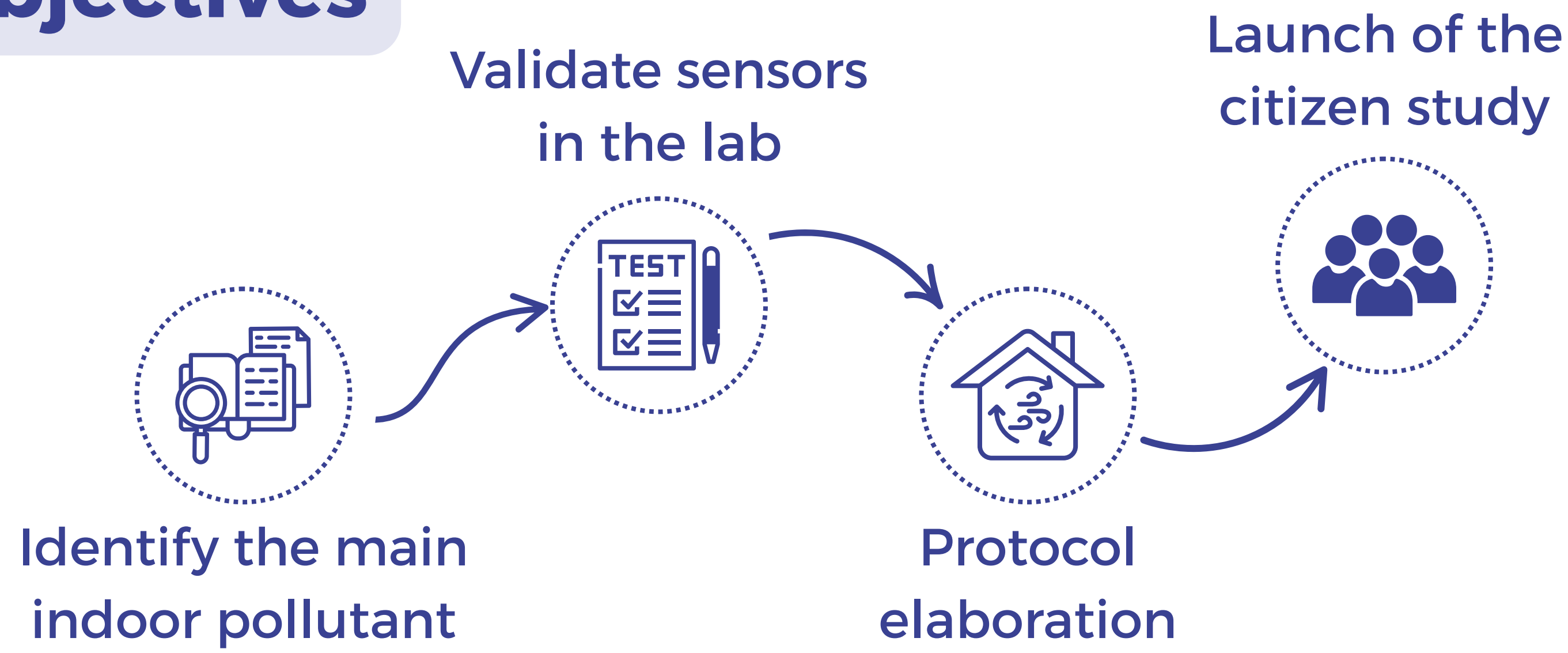


# Validating Sensors and Measuring Indoor Air Quality

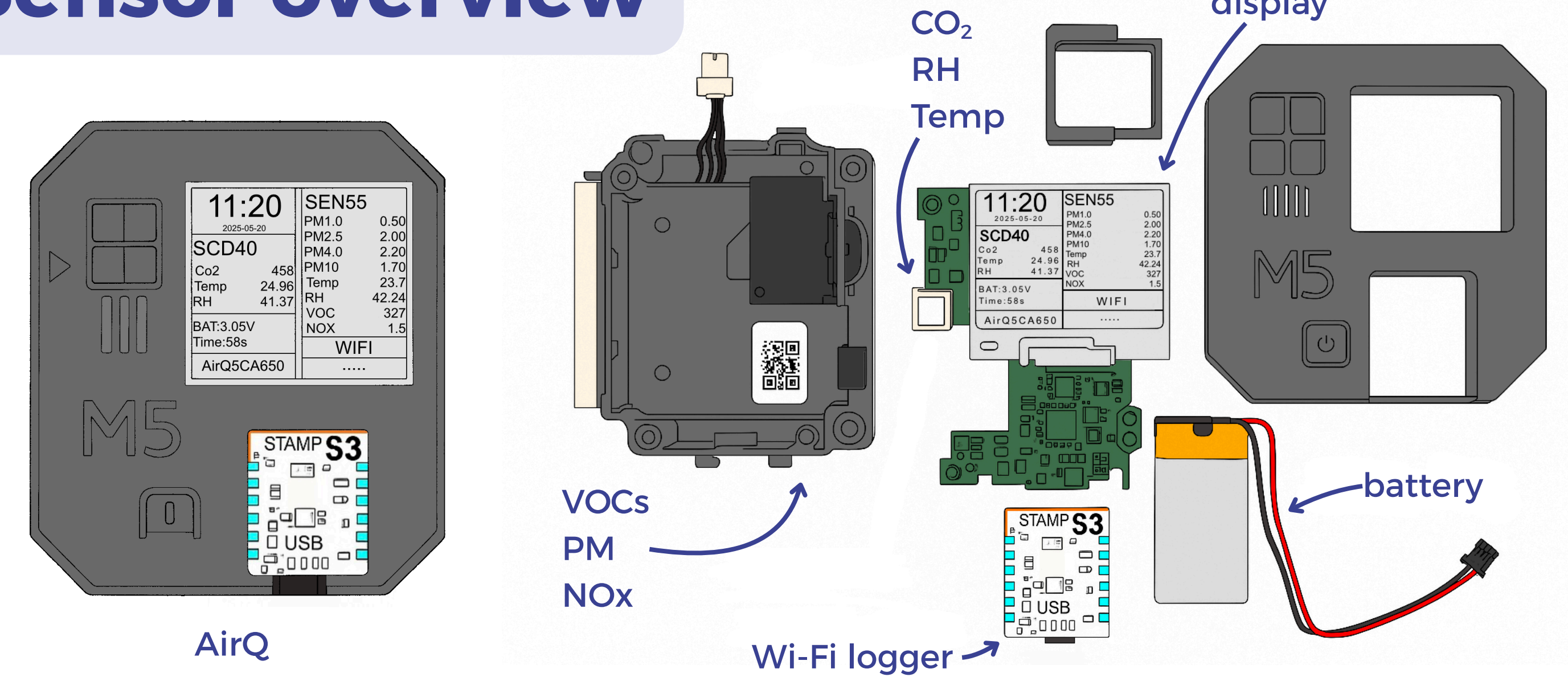
Students : Marion Calvo, Léo Dana  
EPFL Supervisor: Satoshi Takahama

Company : Unisanté  
Aurélié Berthet, Guillaume Suarez

## Objectives



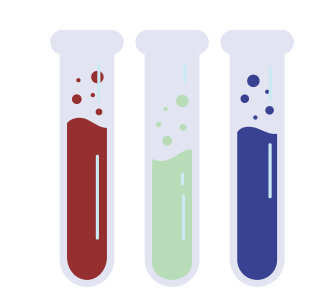
## Sensor overview



## Sensor validation

### Experimental approach

To assess the sensors, we used in an exposure chamber :



Known indoor air pollutants using chemicals<sup>[1]</sup>

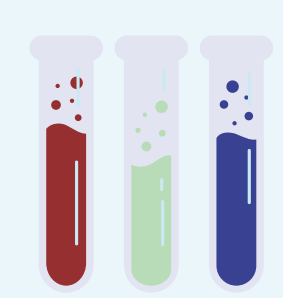


Consumer products that might emit pollutants<sup>[2]</sup>

Exposure chamber setup with AirQ sensors



### PMs

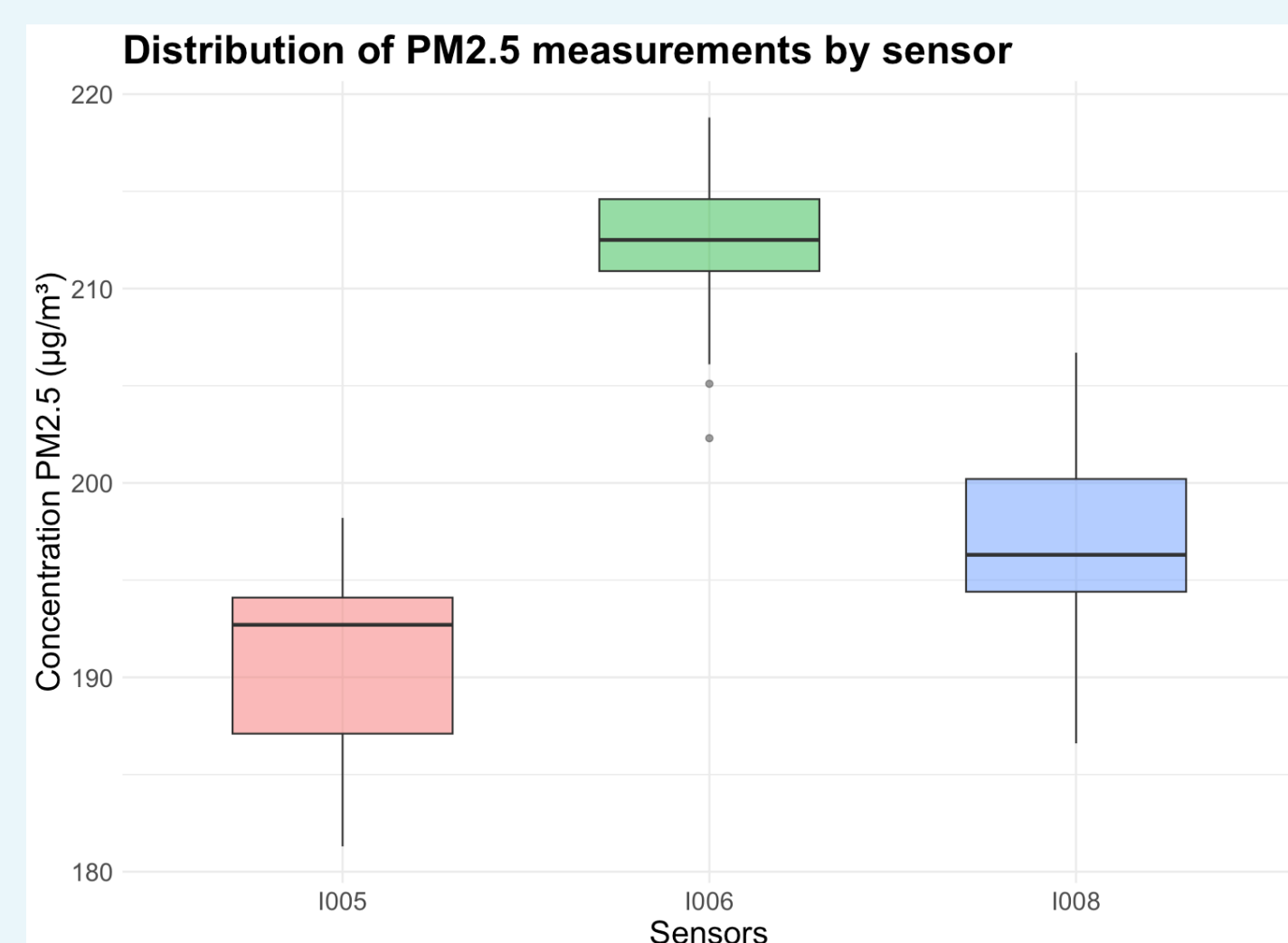


Generation of lactose particles

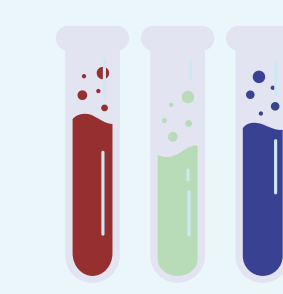


Candle, deodorant, diffuser & vaporizer

High variability between sensors and underestimation



### VOCs



Ethanol, acetone & formaldehyde



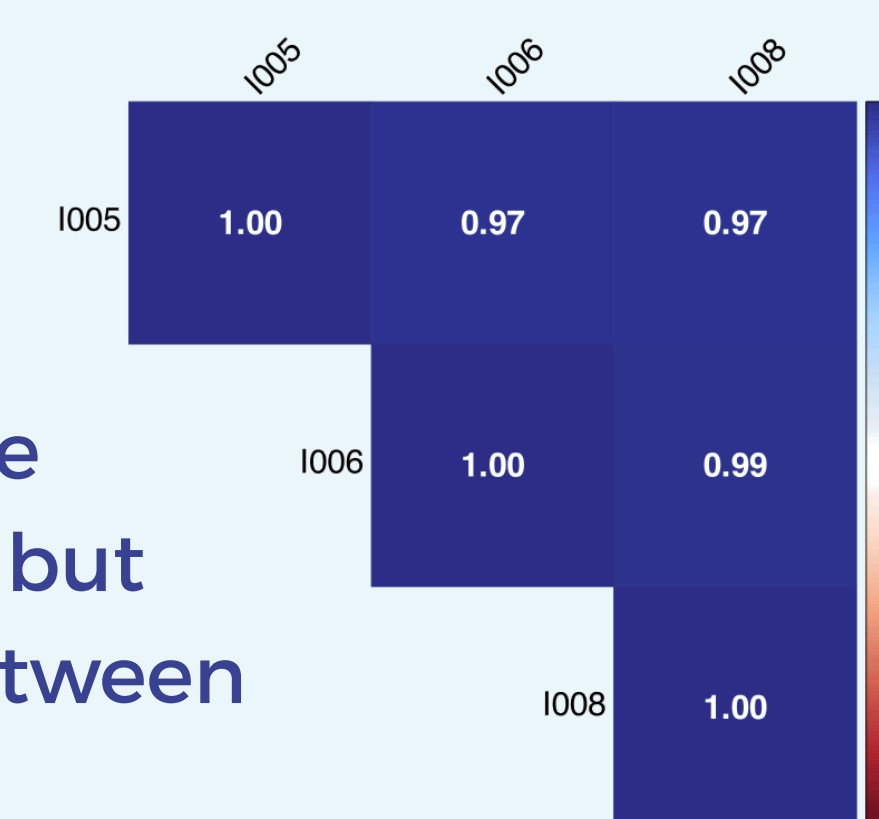
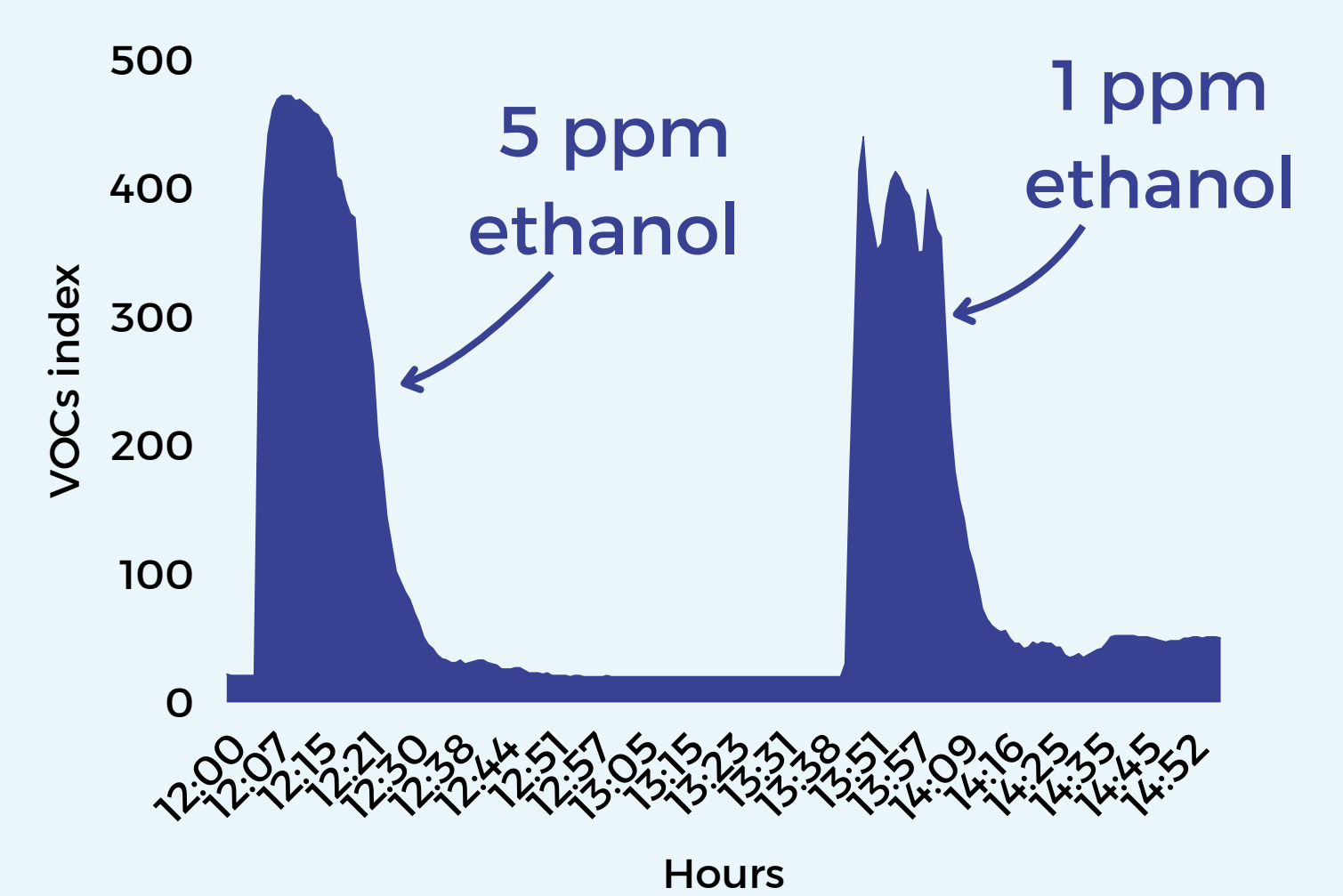
Deodorant, nail polish, candle & surface cleaner

High sensitivity and reactivity BUT no quantitative data only qualitative

### CO<sub>2</sub>

Sometime little underestimation but good correlation between sensors

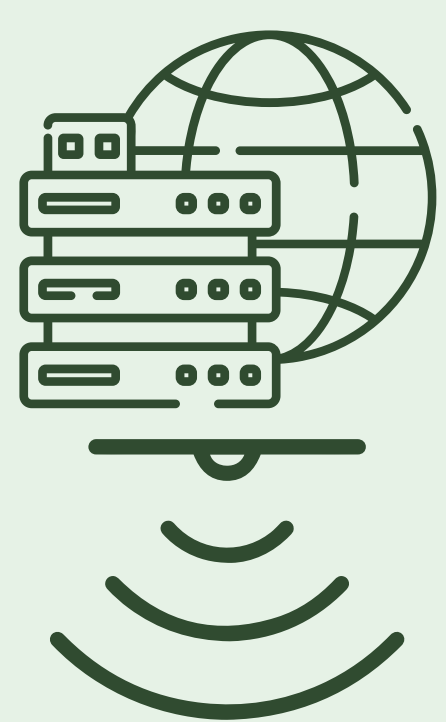
No possibility to see background emission  
No intensity relative peak but allow to see even very low concentration



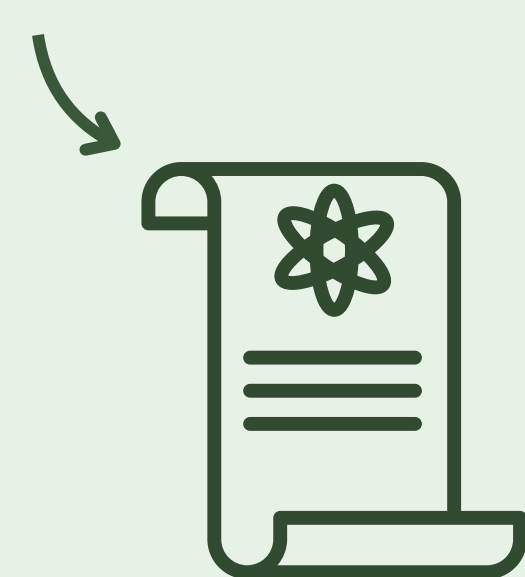
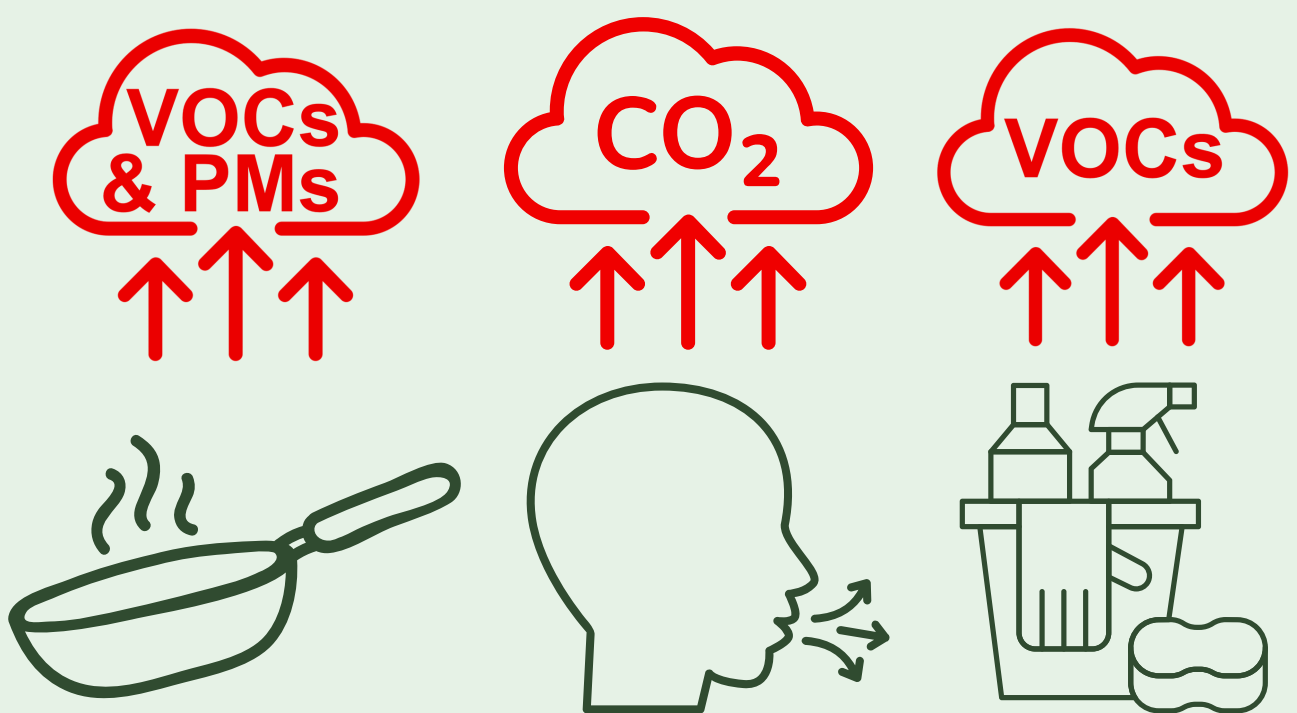
## Citizen science

### Measuring over 8 days

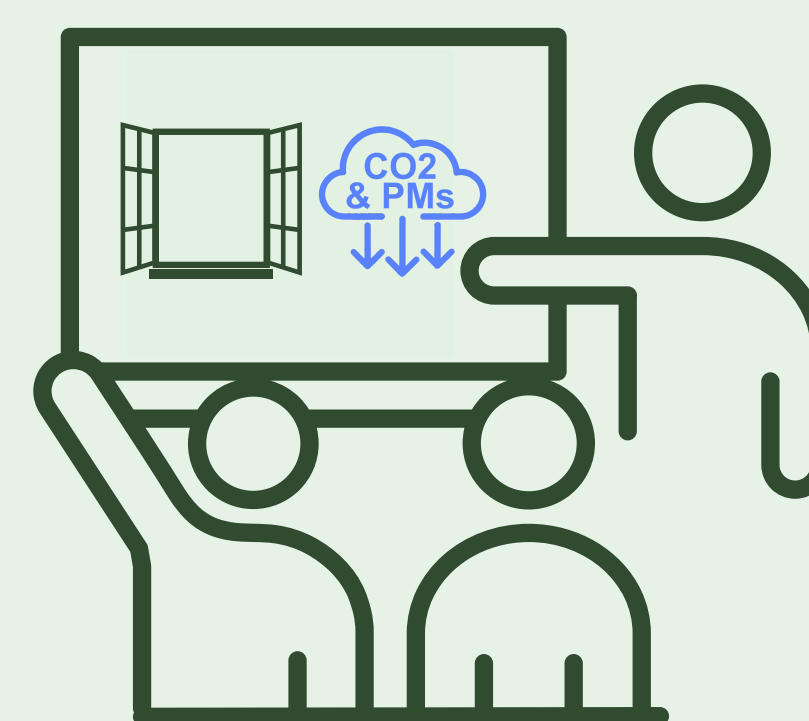
Wireless sensors allow a large acquisition of data from all the participants



Data analysis in R from sensors and questionnaires from REDCap filled out by volunteers to identify activities generating the most pollutants and potential mitigation strategies



### Empowering



During group workshops, participants are informed of key findings enabling them to understand scientific concepts and learn how to improve air quality in their homes

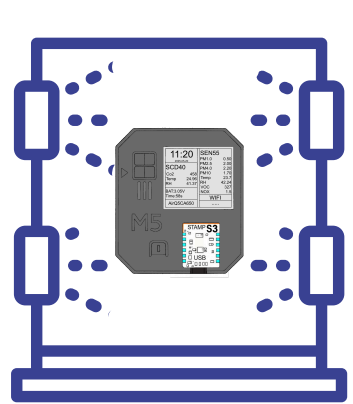
### Personal feedback

Each volunteer receives a personal report detailing their data, helping them understand their environment and habits, and how to improve them. This feedback fosters a deeper connection with the study's findings

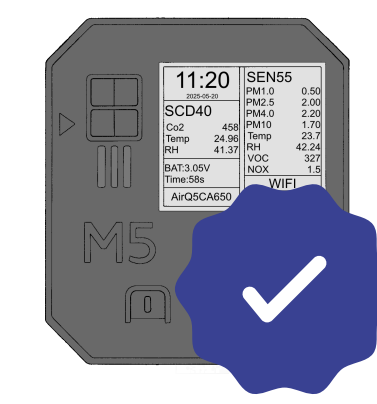


## Conclusion

The exposure chambers enabled testing of various compounds and consumer products on sensors



The tests confirmed sensors' ability to wirelessly collect qualitative data on CO<sub>2</sub> and VOC levels



19 volunteer families successfully monitored their indoor air quality at home for eight days using the sensors



Personal feedback was highly valued by participants, helping them connect abstract concepts to their daily lives