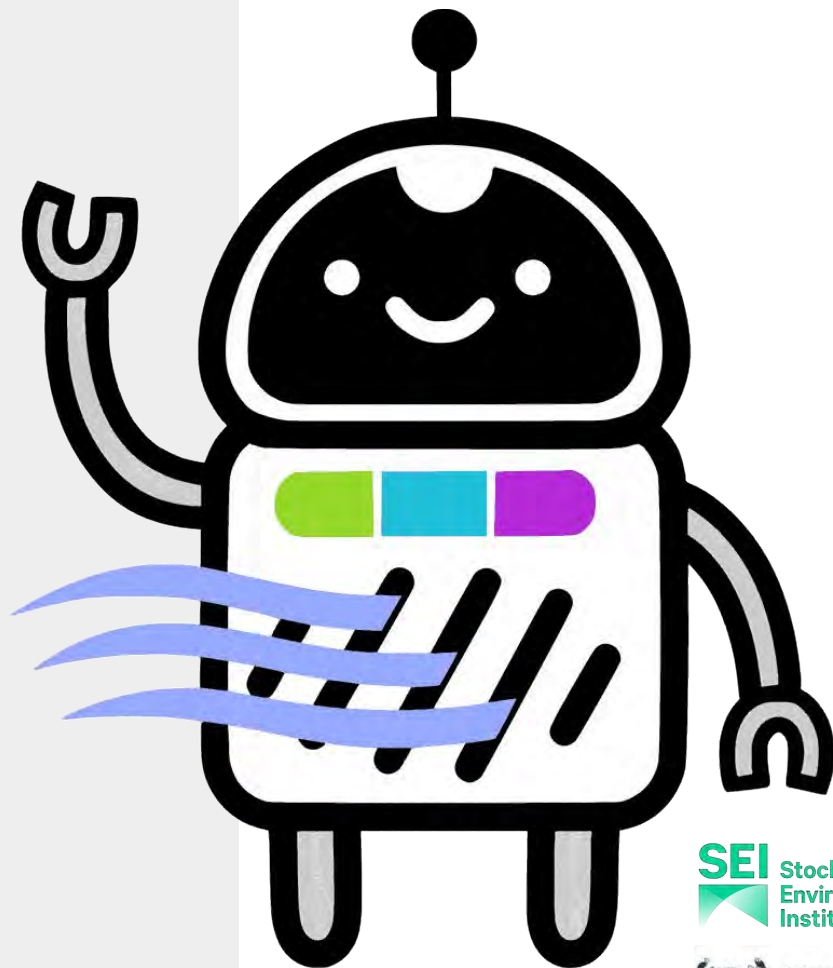


SAMHE: Our collaborative Citizen Science approach to air quality data in the UK

Dr. Rhys Archer &
Professor Sarah West



Outline

- About SAMHE
- The Web App
- Monitor data
- Challenges
- Legacy



Who are we?

- SEI York, University of York
- Imperial College London
- University of Cambridge
- UK Health and Security Agency
- University of Leeds
- University of Surrey

Funded by UKRI and UK Department of Education



IMPERIAL

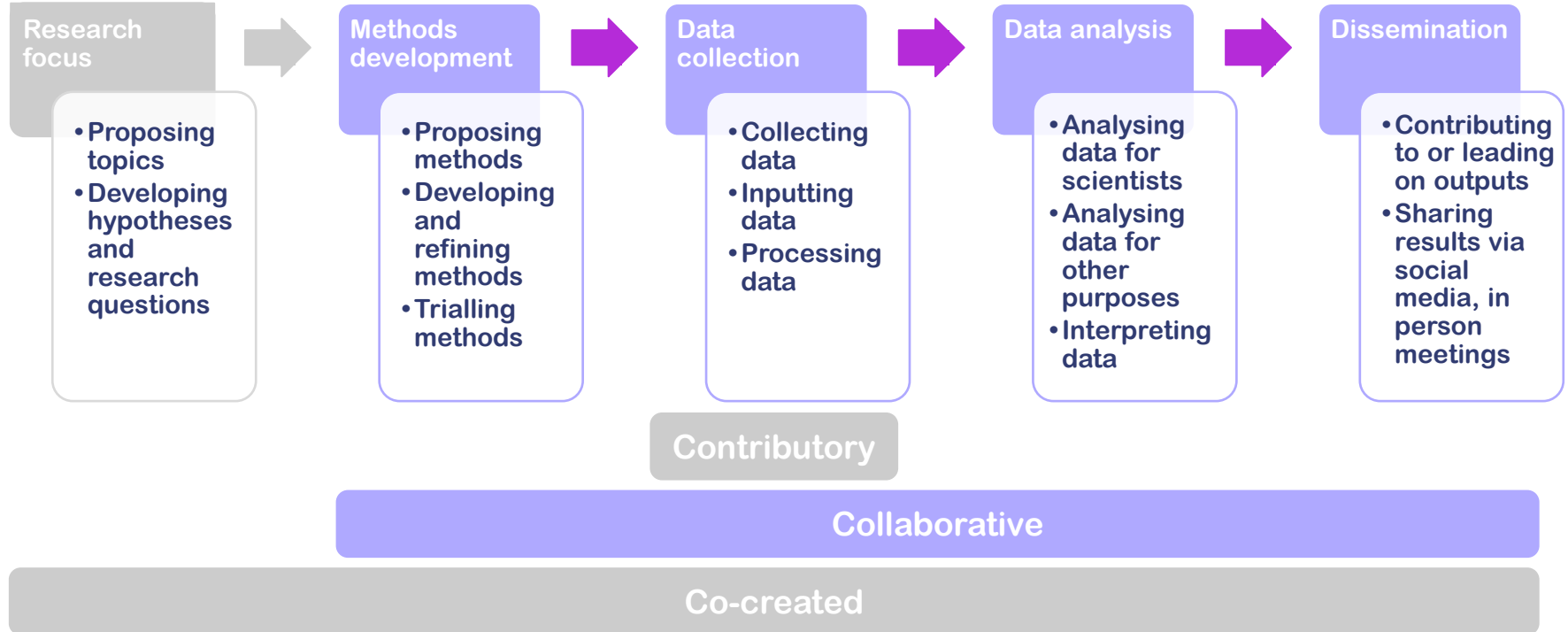




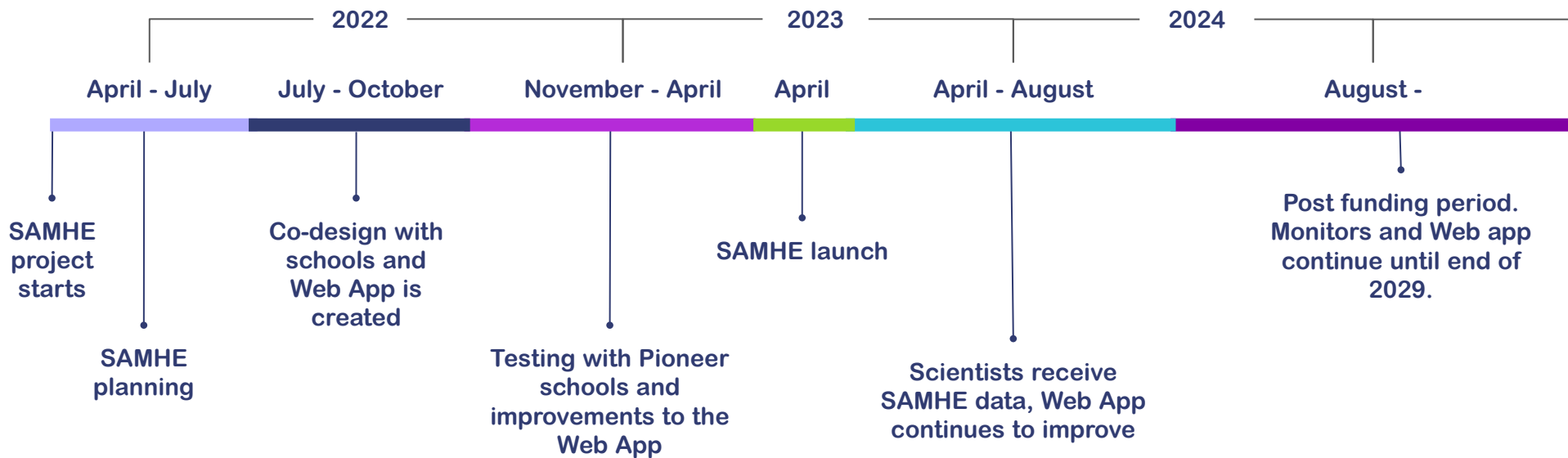
What is SAMHE?

- SAMHE stands for Schools' Air quality Monitoring for Health and Education.
- SAMHE is a research project working with UK schools to improve understanding of indoor air quality.
- SAMHE uses Citizen Science methods to work with teachers and pupils to contribute to this research by providing contextual data via the Web App.

Citizen science and SAMHE



Timeline



The SAMHE monitor and app have provided our Y4/5 science group with a wealth of data to interrogate and analyse. The children's enthusiasm has been infectious and there is tangible excitement at being able to access the data in real time...We are now determined to continue, working towards earning all the achievement badges

Teacher, SAMHE Co-Design school



SAMHE Web App: home page



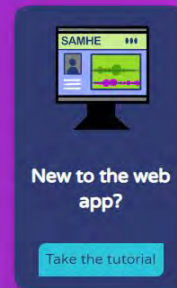
Data Activities Achievements Library User ID:140



Hello User 140

Welcome to the SAMHE Web App! Thank you for investigating your school's air quality with us.

With the SAMHE Web App you can explore data from your SAMHE monitor, complete activities to investigate your data and learn more about the air quality of your classroom.



Live Data



Use these data views to explore data from your SAMHE monitor in more detail. To understand what the numbers mean, take a look at our [guidance on interpreting monitor readings](#).




Activities

Below you will find activities to help you to explore and understand your air quality using your SAMHE monitor

Locked Ready In Progress Complete Equipment needed


SAMHE Web App: Activities





Data Activities Achievements Library User ID:140 

Data Entry

Move your monitor


This is an activity to report movement of your SAMHE Monitor and to help keep an accurate record of where the monitor was, and when.





5mins

Data Entry

Describe your room


Use this Data Entry activity to describe the characteristics of the classroom where the SAMHE monitor is currently being kept. This activity will give important contextual data to help scientists analyse the data from your SAMHE monitor.




30mins

People

CO₂ levels before and after exercise


This People activity involves you and your classmates moving around in your classroom with the windows and doors shut to investigate how the CO₂ level in your classroom changes when you and your classmates exercise.




15mins

Quiz

Understanding your SAMHE monitor: CO₂





This Quiz activity involves answering questions on carbon dioxide (CO₂). Completing this activity will improve your knowledge on what can affect the CO₂ readings in your classroom, and what changes in CO₂ readings can mean.

15mins

Data Detectives





Data Detectives

If you see patterns in your SAMHE data that you didn't expect, use this Data Detectives activity to further analyse this data and investigate potential causes. This will help scientists understand how changes in your classroom affect the data.

Quiz





End of term SAMHE Quiz

This Quiz activity involves answering questions on indoor air quality. Completing this fun activity will improve your knowledge and understanding of indoor air quality.

Data Entry

Describe your building

Use this Data Entry activity to describe the characteristics of your school building. This activity will give important contextual data to help scientists analyse the data from your SAMHE monitor.

Quiz

SAMHE careers activity

This Quiz activity involves reading our 'A Day in the Life of the SAMHE team' booklet and answering questions to discover more about science careers.

SAMHE Web App: Data Views



Data

Activities

Achievements

Library

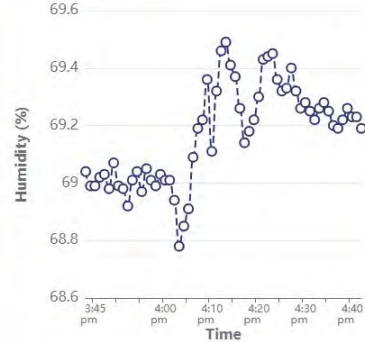
User ID:140



Line plot (Humidity)

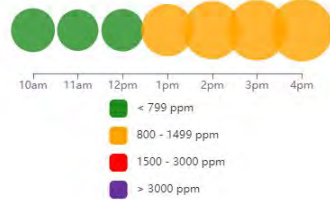
Simple Plot of: Humidity

Now: 69.19%



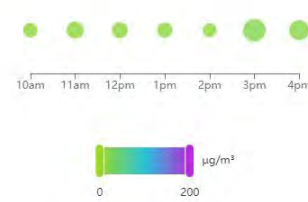
Single axis scatter plot (CO₂)

Monday



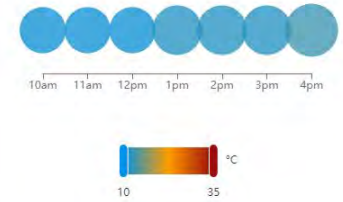
Single axis scatter plot (PM_{2.5})

Monday



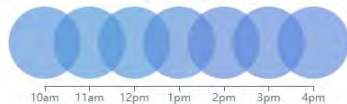
Single axis scatter plot (Temperature)

Monday



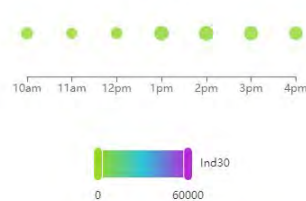
Single axis scatter plot (Humidity)

Monday

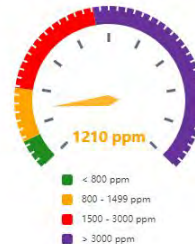


Single axis scatter plot (TVOCs)

Monday



Gauge chart (CO₂)



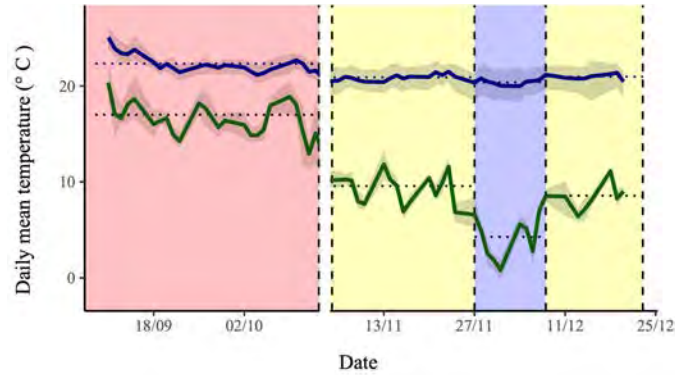
Gauge chart (PM_{2.5})



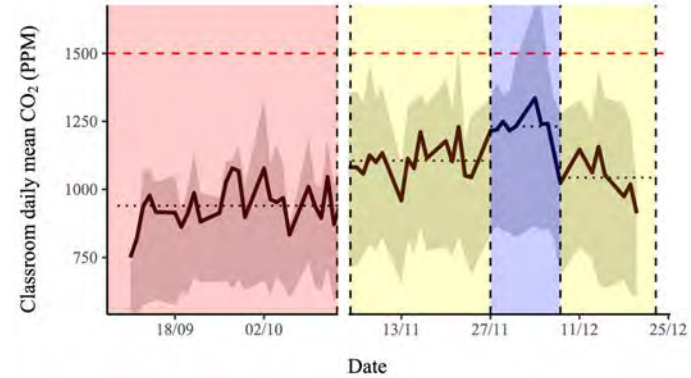
Autumn term data

Key: Warm Intermediate Cool Indoor Outdoor

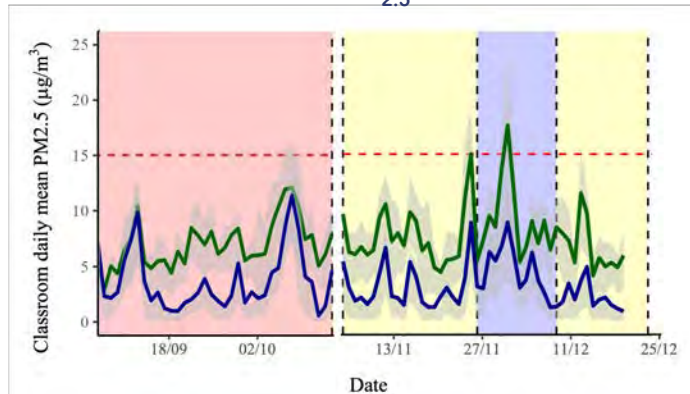
Temperature



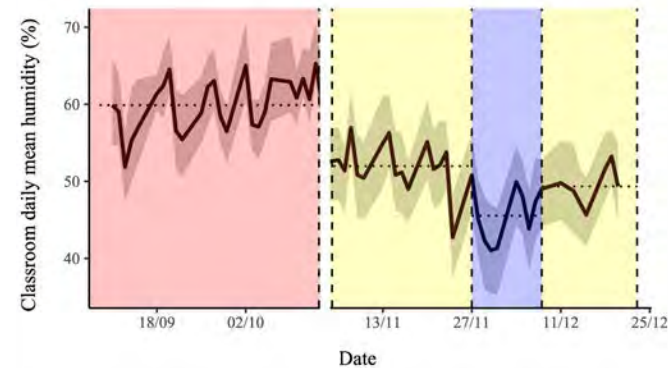
CO₂



PM_{2.5}



Relative humidity



Challenges for improving IAQ

- Air quality is largely invisible
- Children are particularly vulnerable
- Ventilation is very important - but challenges with rising energy costs
- Raising awareness is critical
- Tailored advice about actions is needed
- Schools/ teachers under resourced



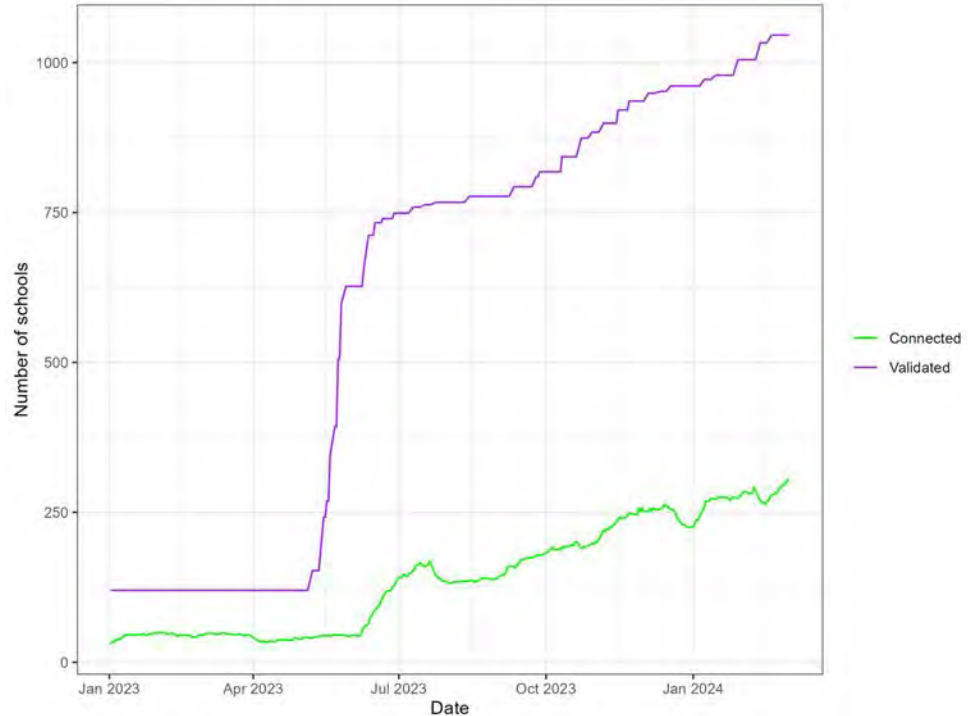
Challenges for improving IAQ

Connectivity challenges:

- Teachers have a lack of time
- Network issues

Connectivity initiatives:

- Connectivity sessions
- Comms: calling schools, emails, social media
- Connection competitions
- SAMHE champions



Legacy

A non-extractive method of Citizen Science will ensure that:

- The wants and needs of the citizen scientists post-project are considered
- Citizen scientists are informed on how to interpret and (if appropriate) act upon findings
- Communities formed through the project are translated into self-sustaining networks
- Citizen scientists can continue to access their contributions to the project for their benefit

To this end, it is important to consider ways in which our citizen scientists can continue to engage in this topic post-SAMHE:

Activities and guides hosted on other websites

External partners and mechanisms to bring schools together in their own air quality networks

Research findings are translated into school activities

Build capacity on independent methods to make change

Building capacity to affect change

Activities to promote action:

- Creative activities such as ‘Write to your MP’ and ‘Design a SAMHE poster’
- Environment action activities such as: ‘CO₂ levels of an empty classroom’ and ‘CO₂ levels before and after exercise’
- Quiz activities such as: ‘Understanding your SAMHE monitor’ and case study quizzes
- Careers activity and [booklet](#)



The screenshot displays four activity cards from the SAMHE website, each with a 'Printable activity instructions' link and a 'Back to Activities' button.

- Write to your MP:** A way that you can get your voice heard is to write to your MP (someone who is elected to serve people who live in your area). This Creative activity will help you write persuasively to encourage them to take action on air quality. **Air Quality**
- CO₂ levels of an empty classroom:** During this Environment Action activity, you can try out ways of reducing indoor CO₂ levels. This is a great one to try after measuring CO₂ levels before and after exercise. **Ventilation** **Carbon Dioxide**
- Understanding your SAMHE monitor: PM_{2.5}:** To help understand the air quality of your classroom, the SAMHE monitors measure the PM_{2.5} levels in your classroom. This quiz will test your **PM_{2.5}** **Combustion** **Data Event** **Gas** **Liquid** **Micron** **Particle** **Particulate Matter** **Solid** **Unit**
- SAMHE careers activity:** In this activity you will find out more about the careers of some members of the SAMHE team by answering questions based on the 'A Day in the Life of the SAMHE team' booklet. **Understanding your SAMHE monitor: temperature** **Understanding your SAMHE monitor: humidity**

Teacher resource pack

To be hosted on external sites accessible to those without Web App access

To include:

- Example monitor data and graphs
- Activities converted to offline lesson plans
- Guidance for producing research assignments
- Lay technical reports and paper summaries



Get in touch!

www.samhe.org.uk

hello@samhe.org.uk, rhys.archer@york.ac.uk



IMPERIAL

