

Smarter social housing: User perspectives on technology adoption for healthy homes

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Introduction

The Smartline Project

- Smartline is a six-year interdisciplinary research and innovation project involving researchers, organisations and businesses.
- The central aim of the project is to explore the role of digital technology in improving health, wellbeing and social connectedness in social housing tenants living in low socioeconomic status communities in Cornwall (Figure 1).



Figure 1: Smartline study area

The Sensing the Home study

- A poor home environment is a significant contributor to public health problems; issues include characteristics of the housing stock, the impact of occupant behaviours, and external factors such as climate and ambient air pollution (Sharpe et al. 2018).
- Detecting and responding to a poor home environment at an individual level is challenging, as the causes are often invisible and health impacts are typically cumulative, long-term and identified retrospectively (Boso et al. 2020; Faruqi et al. 2010).
- In our study, 221 social housing tenants were provided with home sensors to monitor temperature, humidity, air quality and utility usage. Tenants and Housing Association (HA) staff could access the sensor data via a digital dashboard (Figure 2).

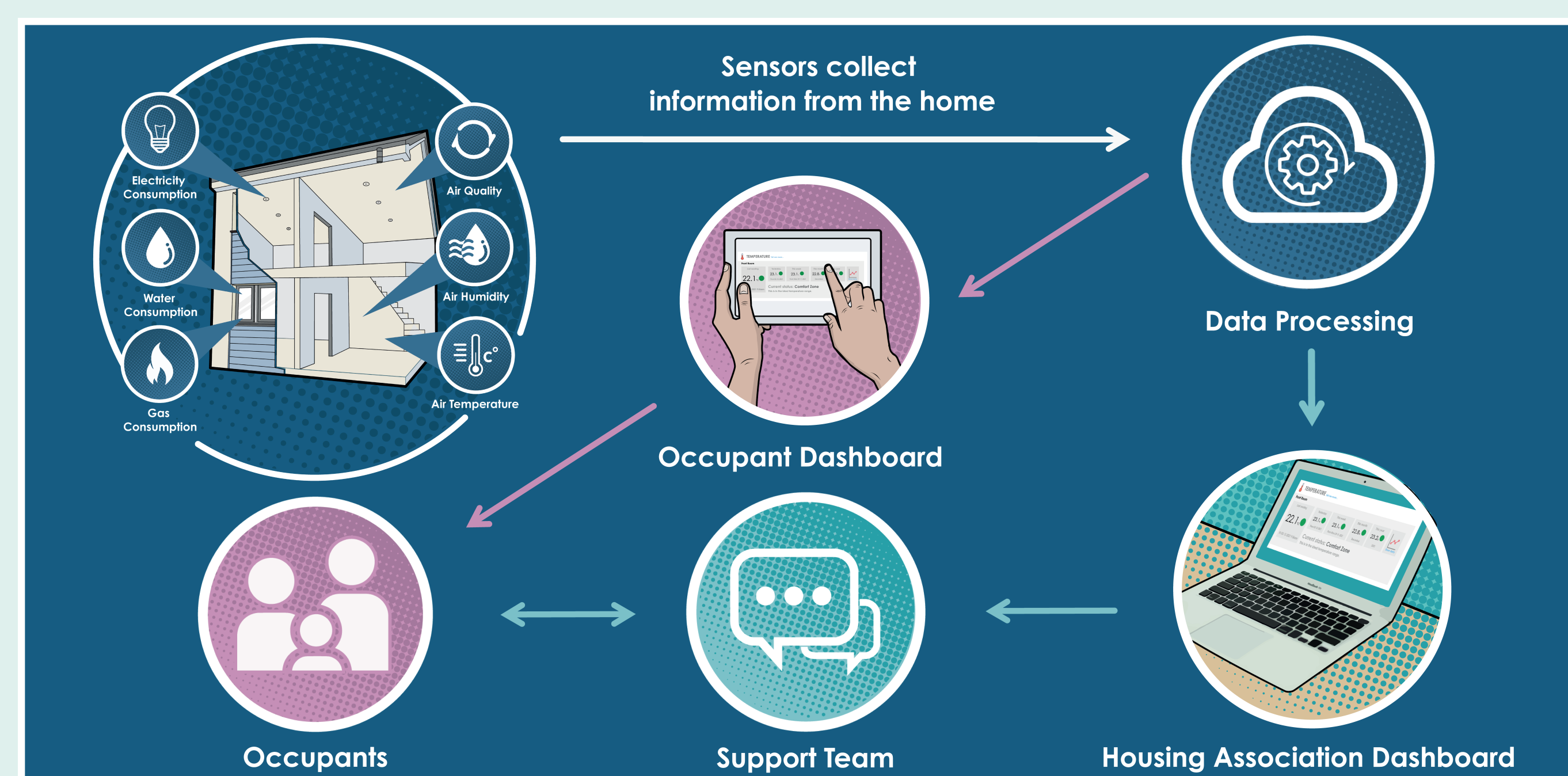


Figure 2: The home environment monitoring system

Aims

To explore the following in relation to the home environment monitoring system:

1. Use and engagement
2. Factors influencing adoption and engagement
3. User perspectives on feasibility and acceptability (including perceived usefulness)

Methods

Mixed methods sequential design involving:

- **Quantitative** methods were used to understand patterns of technology use, determinants of use, and changes in the home environment. Methods included descriptive statistics, regression and t-tests to analyse sensor and survey data.
- **Qualitative** interviews with a purposive sample of social housing tenants (n = 20, including high and low dashboard users) and HA staff (n = 7, including operational and executive staff) were used to understand factors influencing technology adoption and user perspectives on feasibility and acceptability.

Results

- **1. Use and engagement**
 - Usage of the sensor data by tenants was low; there was **little evidence of interaction with the data** and almost no evidence of changes in data as a result of viewing (i.e. **no indication of behaviour changes**). Only 30 participants logged in seven or more times and there were only 11 active dashboard users by 2020.
 - However, the **data were used by the HA staff** who logged in once or twice a week to identify high-risk properties and intervene where necessary (e.g. providing maintenance and wellbeing support).

Results continued:

- **2. Factors influencing adoption and engagement**
 - **Limited perceived usefulness** and **low ease of use** were the most important barriers to initial adoption and sustained engagement with the home environment monitoring system.
 - **Good communication** and **trust** between the HA and tenants were identified by both groups as important for the success of the system.
 - **Digital support from family, friends and neighbours** was a facilitator for tenants.
 - **Cost** was important for tenants; they were happy that the system was provided by the HA at no cost to themselves.

“You’re quite welcome to share my data with Coastline [the HA]; Coastline’s been good to me.”
(Male tenant, age 66-70, high dashboard user)

- **3. User perspectives on feasibility and acceptability**

Tenants

- To improve acceptability for tenants, co-design workshops were used. As a result the tenant dashboard was **modified to improve perceived usefulness and usability**, with clarification of information, the addition of a traffic light system, and provision of guidance (Figure 3).

“What you really want [to know] is if your humidity, for instance, it’s either too low, too high or just about right. So, if it’s too low, then you can try and do something to make it right.”
(Male tenant, age 51-55, high dashboard user)

- **Housing Association (HA) staff**

- The HA viewed the home environment monitoring system as feasible and very useful.
- Perceived benefits included:
 - **Earlier detection of issues** (e.g. high humidity, low temperature) and recognising problems before they become crises
 - **Enabling intervention** including for vulnerable tenants
 - Identifying **over-occupancy** and **non-occupancy**
 - Having more information for **planning and decision-making**, allowing more **efficient use of resources**
 - Improving **quality of housing**
 - Helping to improve **tenants’ health, wellbeing and quality of life**
 - **Staff wellbeing** benefits – reduced stress and complexity of work
- Use by other HAs was recommended.
- **Scalability, integration** with existing systems and processes, and **cost-effectiveness analysis** were seen as important next steps.

“The system fits well with our organisational values... it helps us to put customers at the forefront and support them to improve their health and wellbeing.”
(Female HA executive staff member)

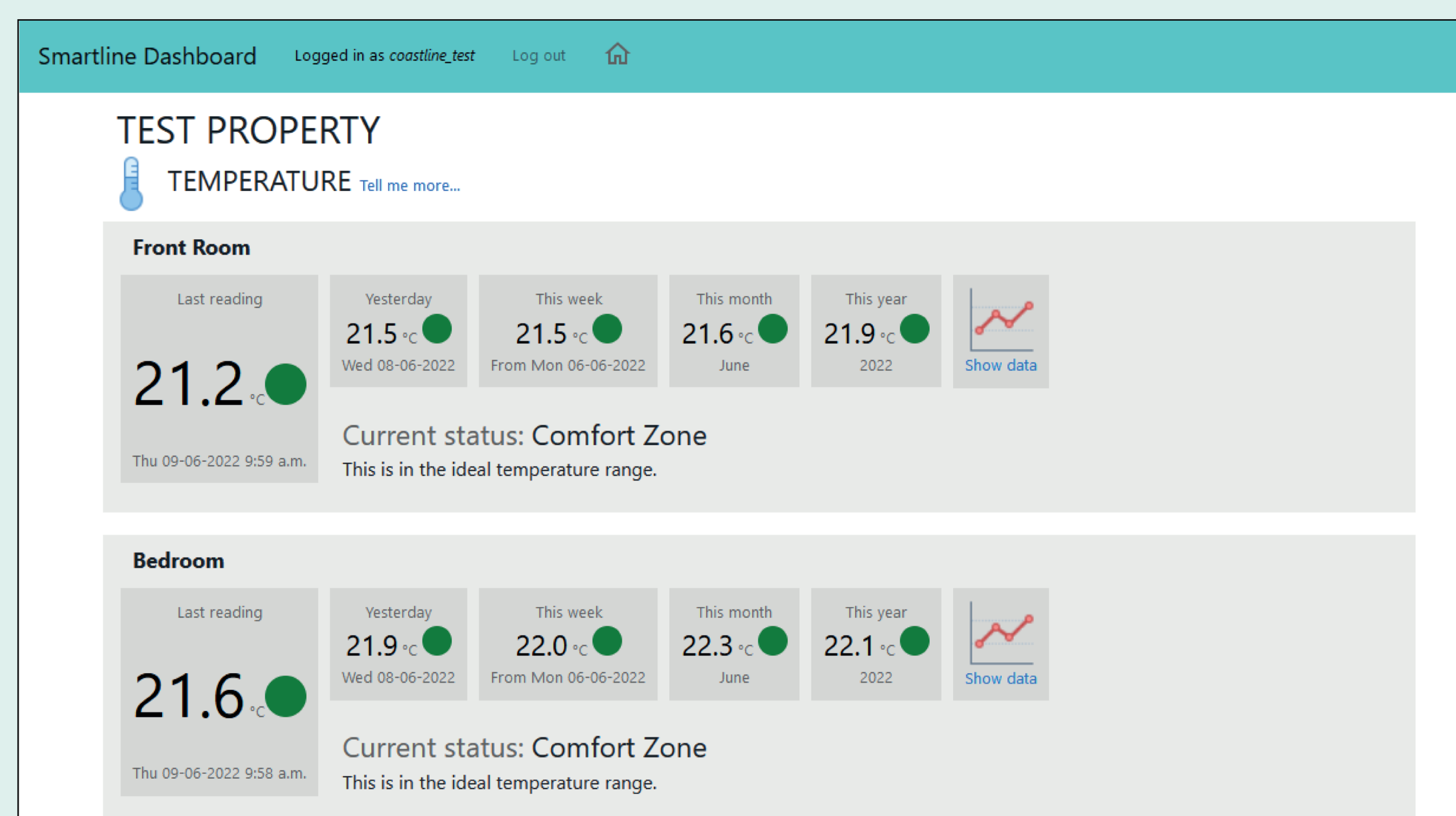


Figure 3: The new and improved tenant dashboard

Conclusions

- High potential for home environment monitoring systems to identify at-risk properties and enable early intervention.
- Generally seen as more useful by the HA rather than tenants (although tenants were happy for data to be collected).
- Co-design with tenants was effective in improving usability.
- Perceived usefulness, communication, trust, and cost were also key factors influencing adoption and engagement.

References

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