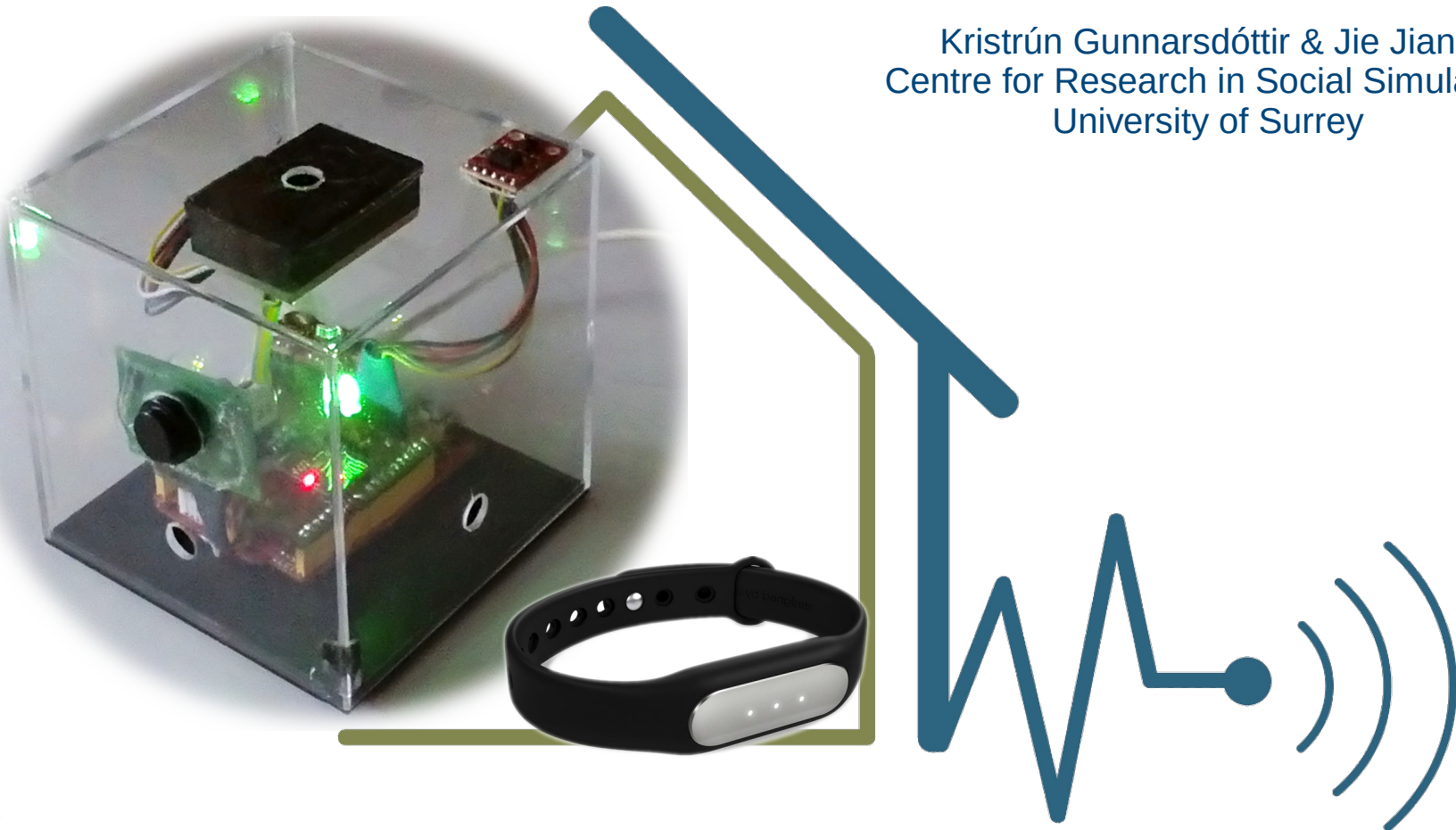


Making sense of the household

Using sensors in household research

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Centre for Research in Social Simulation
University of Surrey



Making sense of the household

Using sensors in household research

The HomeSense project (a mix of methods)

Developing and adapting sensors

Some issues in bringing sensors into social research

Learning to 'see': presence and activities

The case of households: what we expect to observe

The HomeSense project

To make it easier and more productive for social researchers to use sensors and make sense of that kind of data.

Demonstrate the use of sensors via household trial

Catalogue technical, methodological and ethical issues

Create guidelines for using sensors



Three research strands:

Adapt and develop devices

Develop data collection methods

Create tools for analysing sensor-generated data streams in reference to other data sources

The HomeSense people



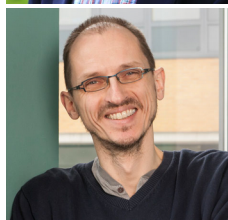
Nigel Gilbert, CRESS / Sociology

Klaus Moessner, 5G Innovation Centre

Kristrún Gunnarsdóttir, CRESS / Sociology

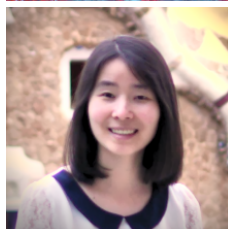
Jie Jiang, CRESS / Sociology

Ewa Luger, Microsoft Research Cambridge



Riccardo Pozza, 5G Innovation Centre

Bill Headley, 5G Innovation Centre



Development and adaptation

Issues of dependability

Ultra-thin 8mm battery

Battery capacity: 41 mAh
Battery type: lithium polymer
Input current: 25 mA(TYP)
Input voltage: DC 5.0 V



Military-grade
accelerometer by ADI

Premium-quality
Bluetooth® chip by
Dialog

Bluetooth® version: 4.0



Microphone

Ranging sensor

Particulate sensor

Temperature & humidity

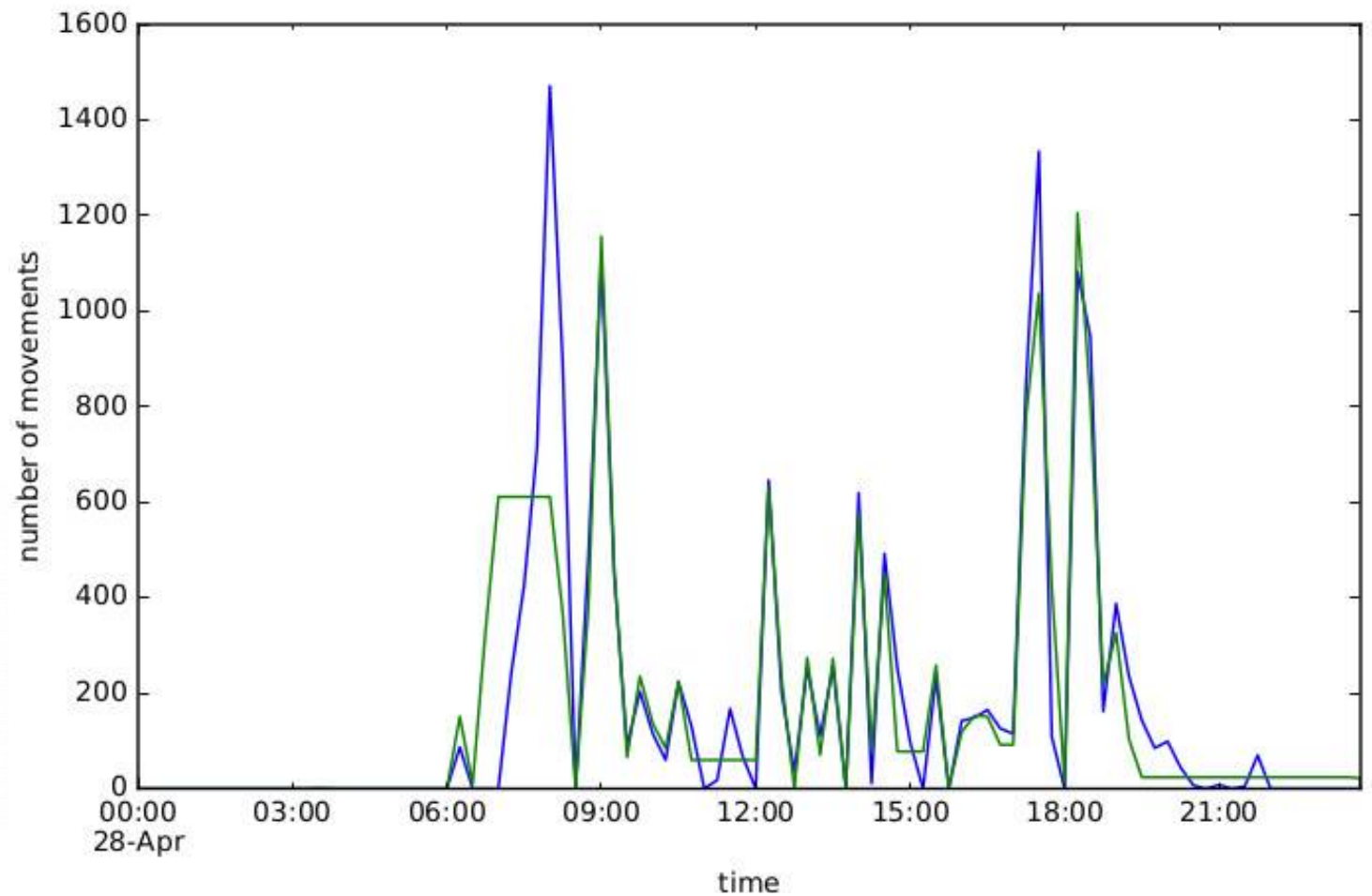
RGBC Light & gesture sensor



WiFi™

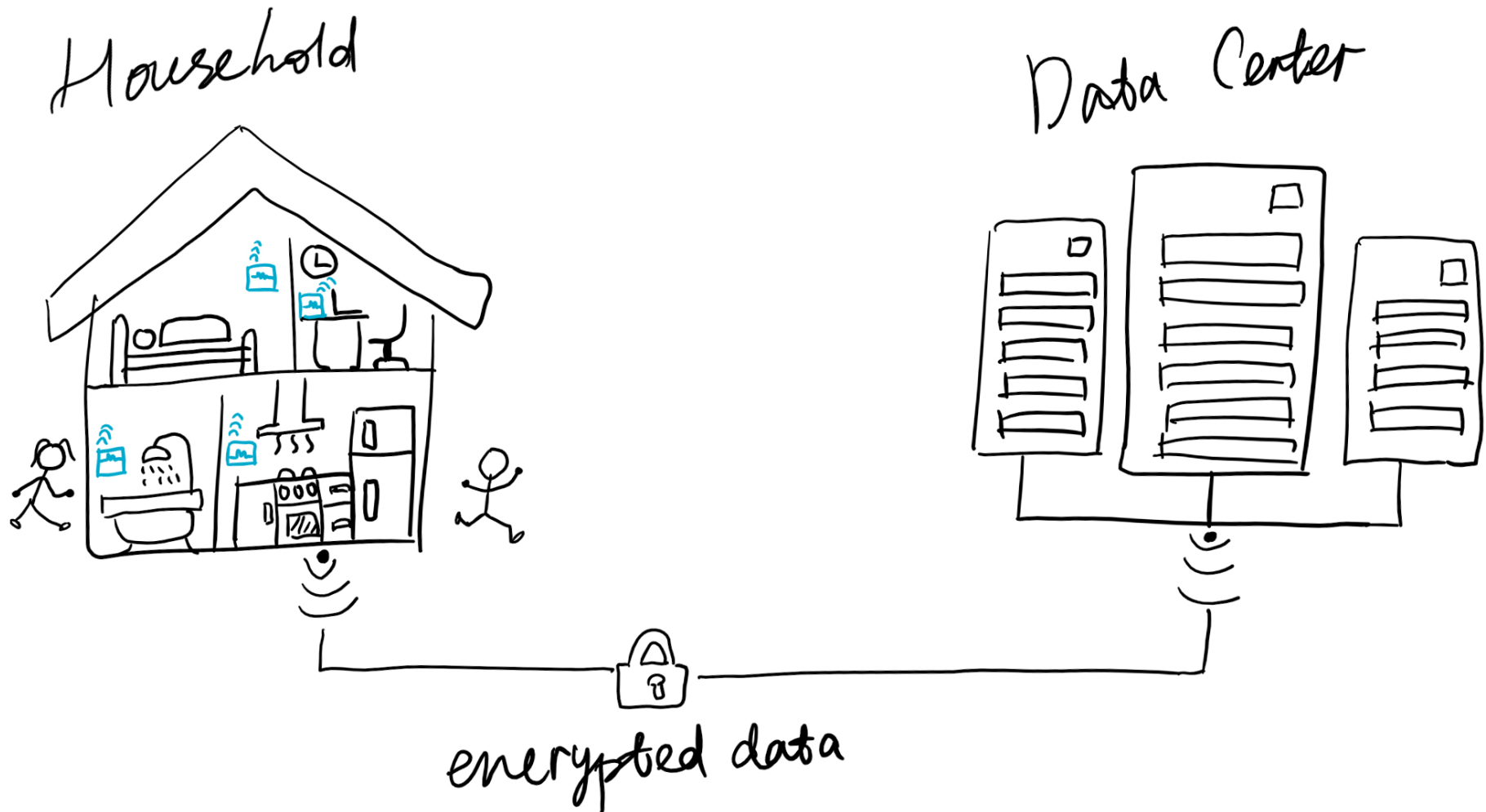
Development and adaptation

Testing for quality



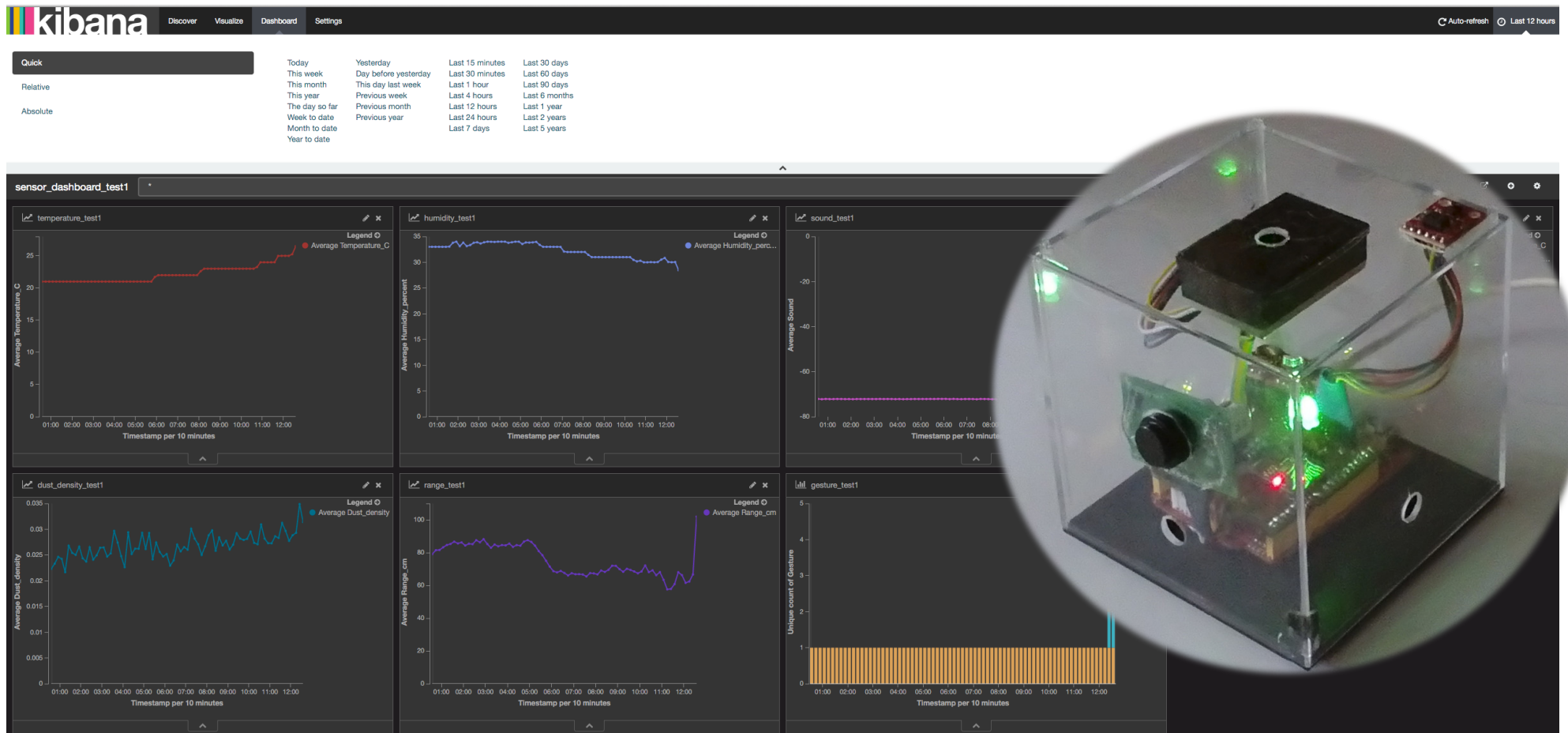
Development and adaptation

Issues of data transmission and security



Development and adaptation

Visualization of data streams in real time



Using sensors in households

Testing the instruments and sorting out some questions

Assuming sociological interest:

- Work, chores, hobbies, entertainment
- Meals: practices surrounding food and drink
- Sleep: when households sleep
- Care: healthcare, self care, family care

Technical / methodological considerations:

- Overcome practical problems of installing sensors
- Simplify assembly and configurations of sensor suites
- Overcome uncertainty in sensor measurements

Wearability / acceptability:

- Comfort and easiness
- Assurances
- Motivation

Vulnerabilities:

- *Privacy concerns*
- *Who consents, and to what?*
- *Data and security protection*



Using sensors in households

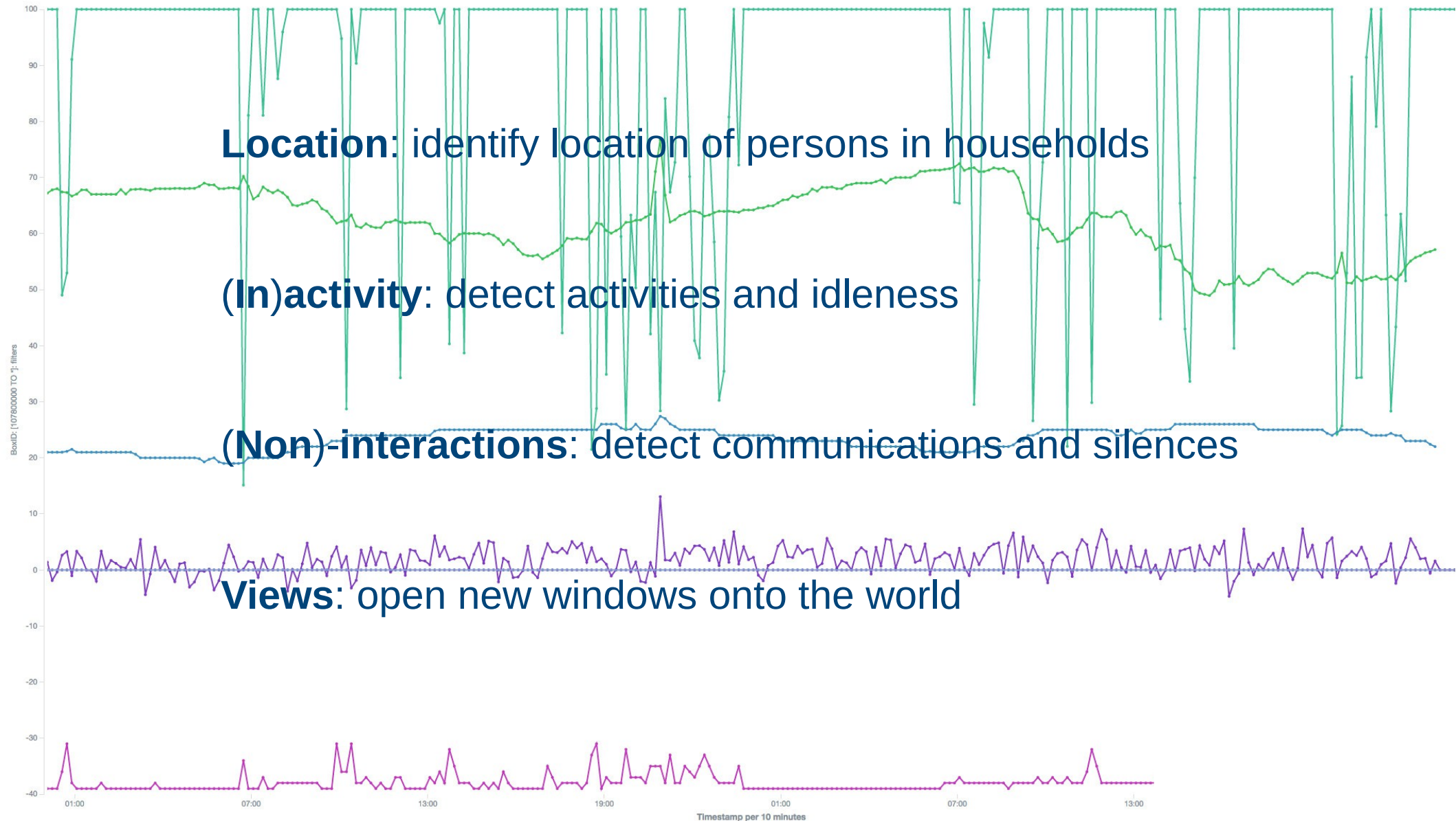
Persons and practices

Location: identify location of persons in households

(In)activity: detect activities and idleness

(Non)-interactions: detect communications and silences

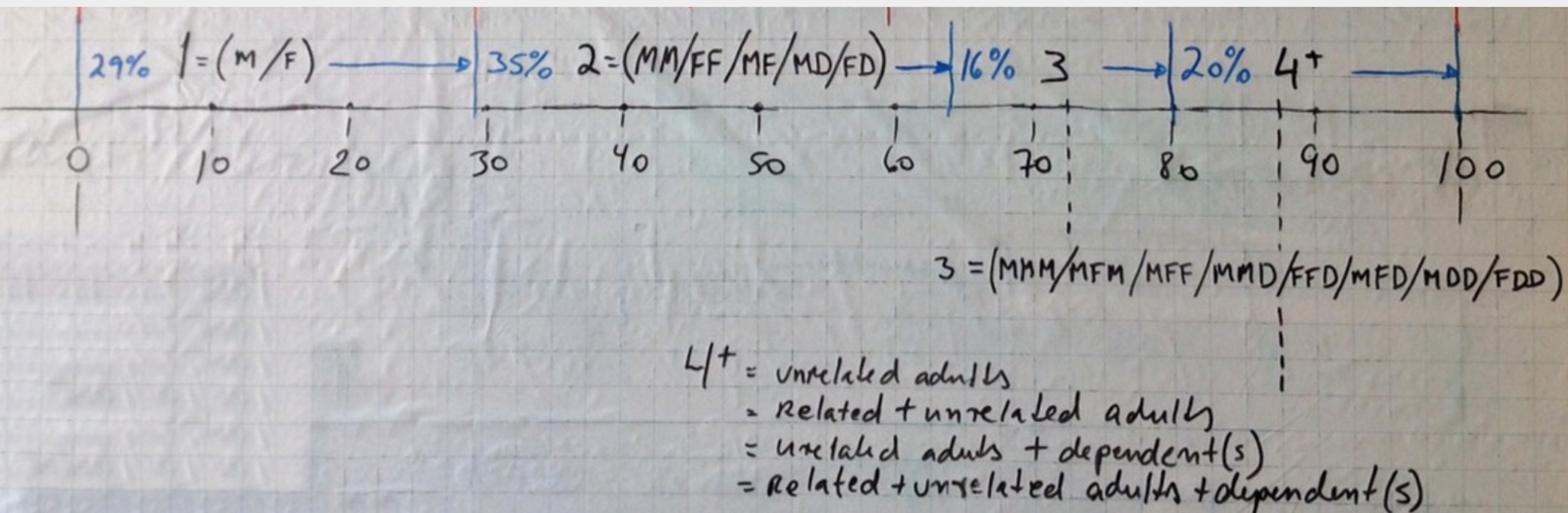
Views: open new windows onto the world



Households for HomeSense

The ONS on families and households in 2015 (Nov 2015):

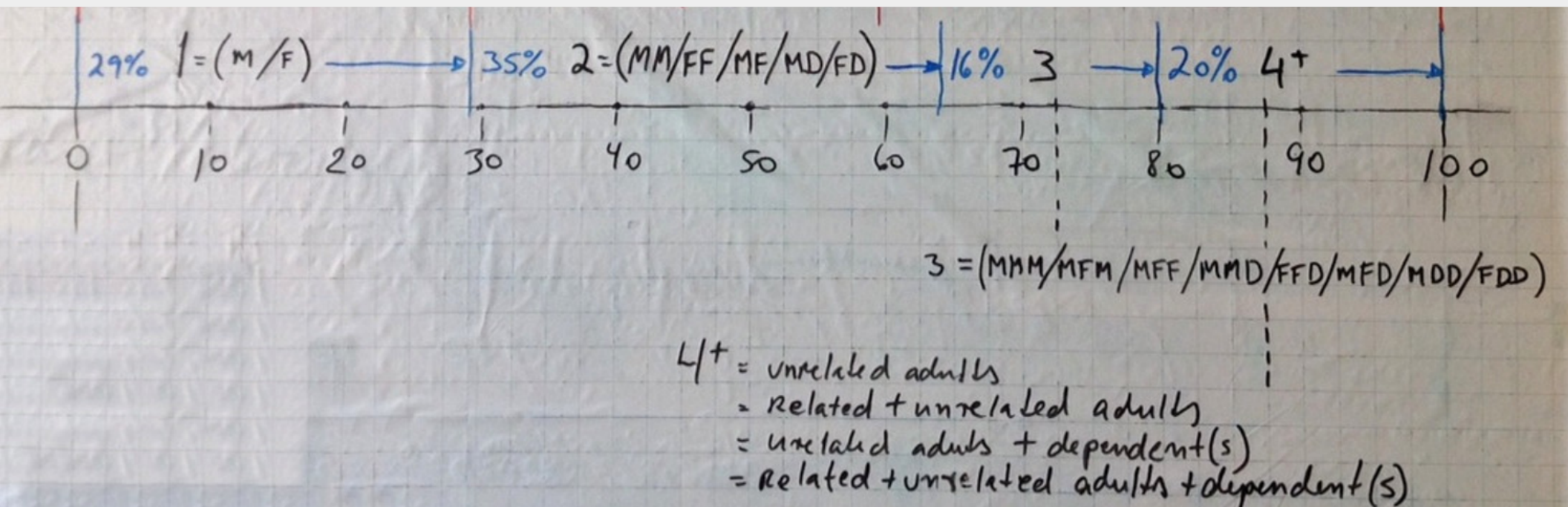
- 27.0 million households
 - 18.7 million families (69%)
 - 12.5 million married/civil partners with/without dependent children
 - 3.2 million cohabiting couples with/without dependent children
 - 3 million lone parents with/without dependent children
 - 7.7 million households with one person
 - 1 million households with two or more unrelated adults



Households for HomeSense

The ONS on families and households in 2015 (Nov 2015):

- 27.0 million households
 - 18.7 million families (69%)
 - 12.5 million married/civil partners (without dependent children, 7.8)
 - 3.2 million cohabiting couples (without dependent children, 1.95)
 - 3 million lone parents (without dependent children, 1.05)
 - 7.7 million households with one person
 - 1 million households with two or more unrelated adults

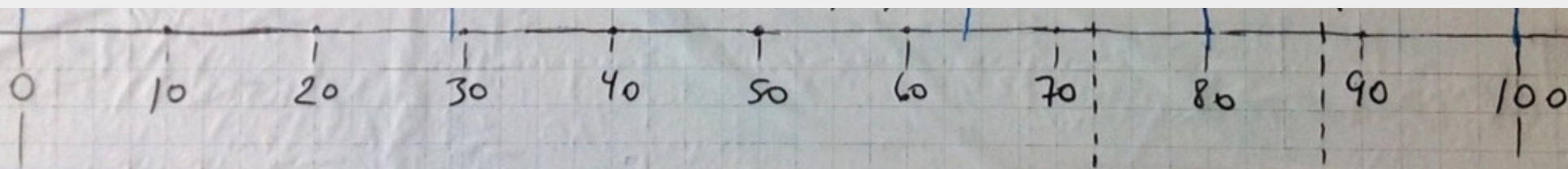
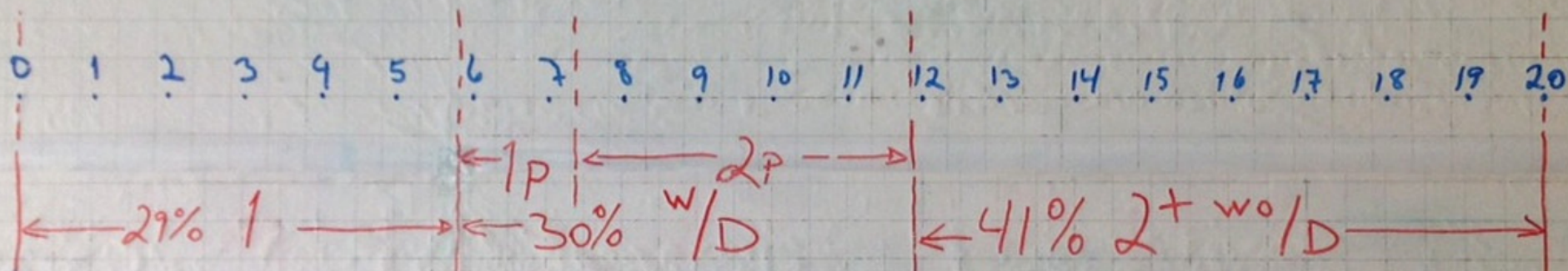


Households for HomeSense

6
(1/2)
(5/4)
8

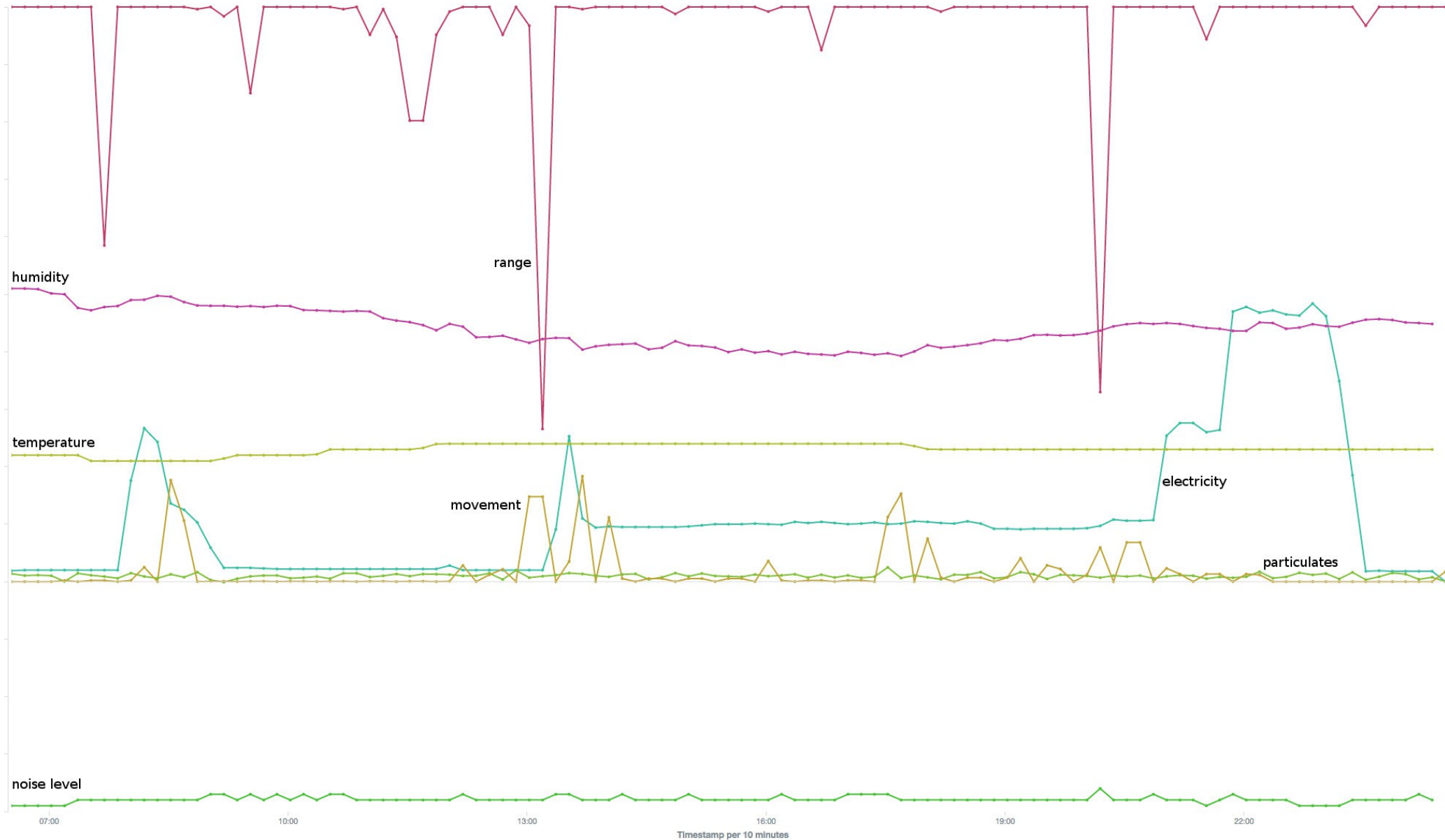
5-6 w/ 1 person
1-2 w/ lone parent + dependent(s)
4-5 w/ 2 parents + dependent(s)
8-9 w/ 2+ adults of any configuration

break up



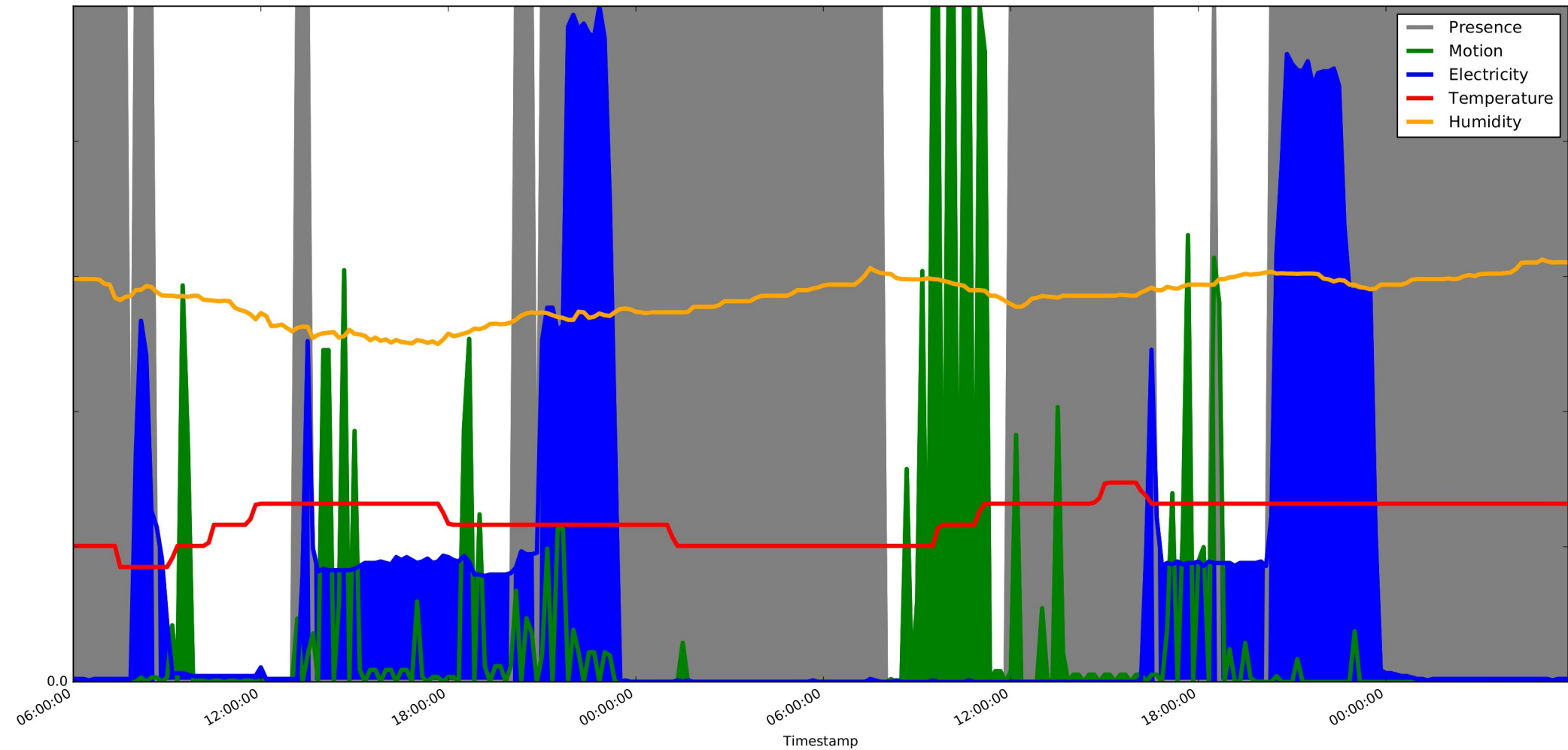
Testing: in a bedroom + study

From **23 Sept 6:30am** until **24 Sept 0:30am**



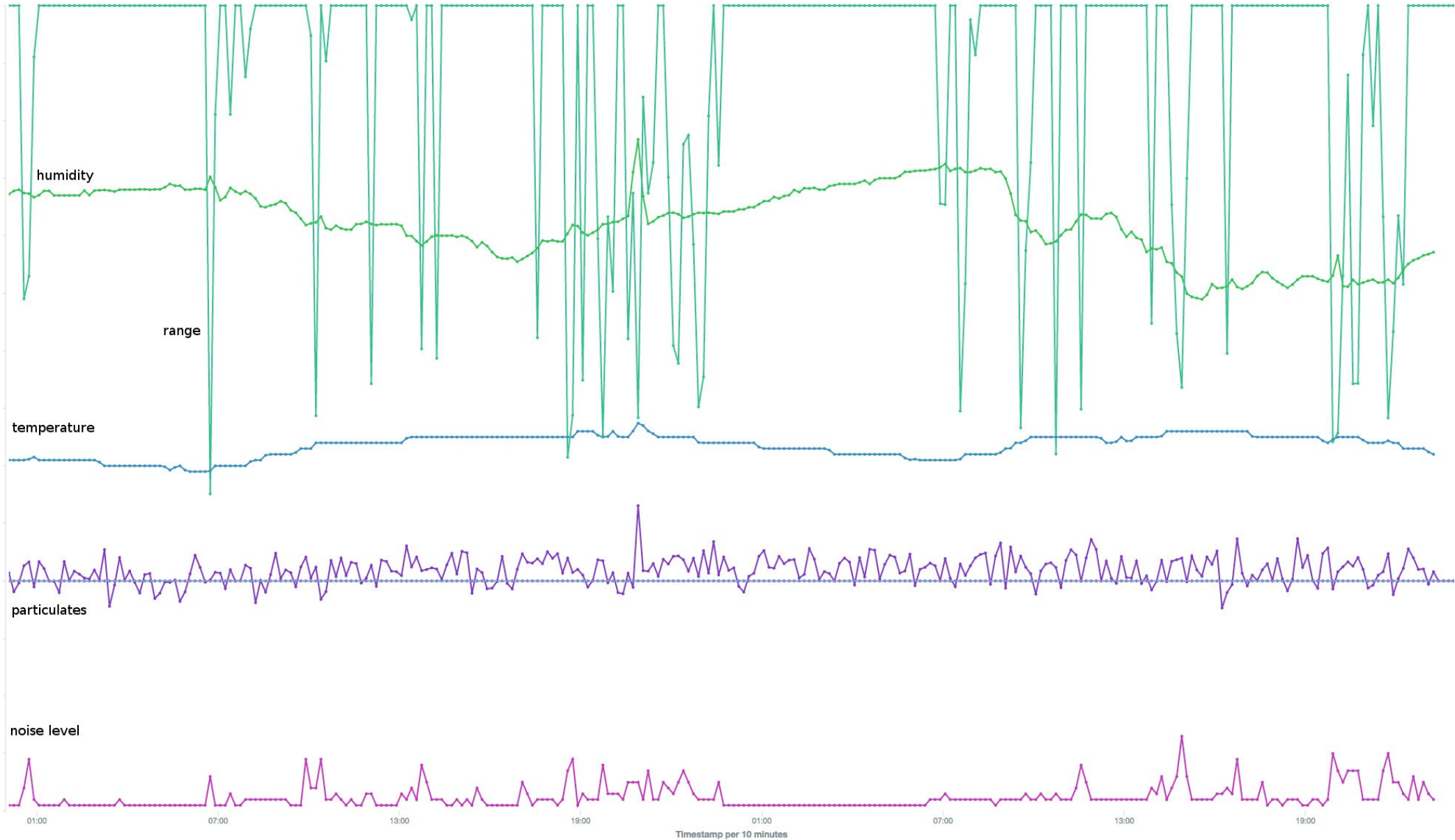
Testing: in a bedroom + study

From 23 Sept 6:00am until 25 Sept 6:00am



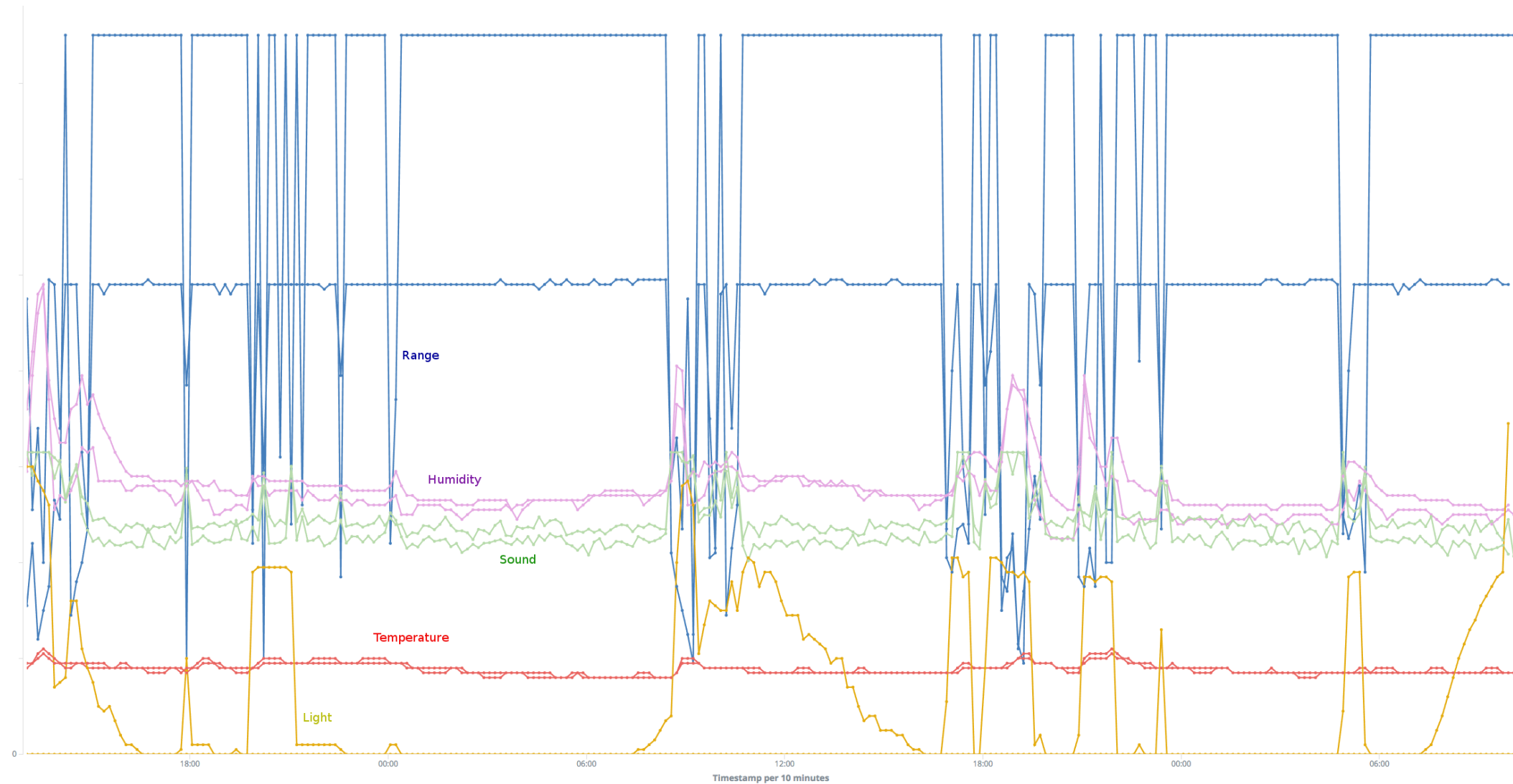
Testing: 48 hrs in the kitchen

13 & 14 Sept, midnight to midnight



Testing: 45 hrs in the kitchen

26 Nov, 1pm to 28 Nov 10am



Using sensors in social research

What next ?

Understanding the limitations of sensor-generated data

- Qualitative in-depth studies rely on the support of qualitative data
- The importance of time use records and walking interviews

Understanding the potential for sensor-generated data

- Enriching our understanding of household utility and home life
- Accessing trends and changes in everyday practices that are not otherwise reported.

Capacity building among researchers of social practice:

- Build supports to researchers in a modular fashion
- Continue the development of collection techniques, visualisation and analytic techniques
- Keep up with new products in the market
- Knowledge sharing, data sharing

Using sensors in social research

Beyond the house and the household



- Observe activities in neighbourhoods?
- Observe energy waste in neighbourhoods?
- Study shopping activities or commuter habits?
- Observe activities around major operations?

Using sensors in social research

Beyond the house and the household



Study group problem-solving activities?

Observe management/administration activities?

Observe communication and networking trends?



facebook.com/sensoresearch/



[@CRESS_HomeSense](https://twitter.com/CRESS_HomeSense)

HomeSense

digital sensors in social research