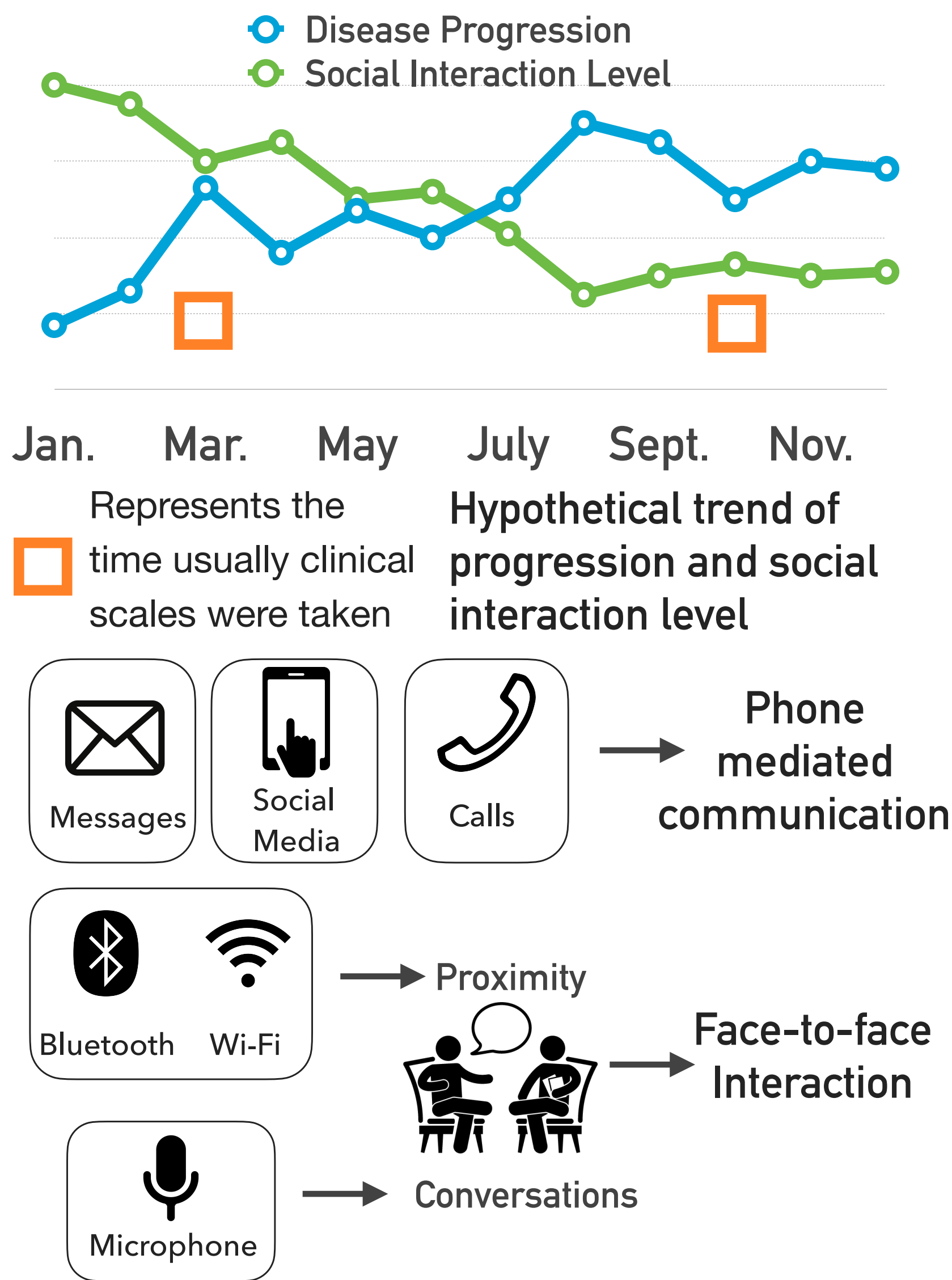


## Smartphone social measures — the original plan

- As the disease progresses, people with Parkinson's typically show a decreased amount of social interaction
- Parkinson's can cause social withdrawal**
- Snapshots questionnaires-based clinical scales are short, subjective and biased which can not reflect the actual fluctuated progression
- Smartphones:
  - hub of personal communication
  - embedded with multiple and powerful sensors
  - can capture both behavioural and environmental information
- It is feasible use smartphones to measures social withdrawal in terms of Parkinson's progression**

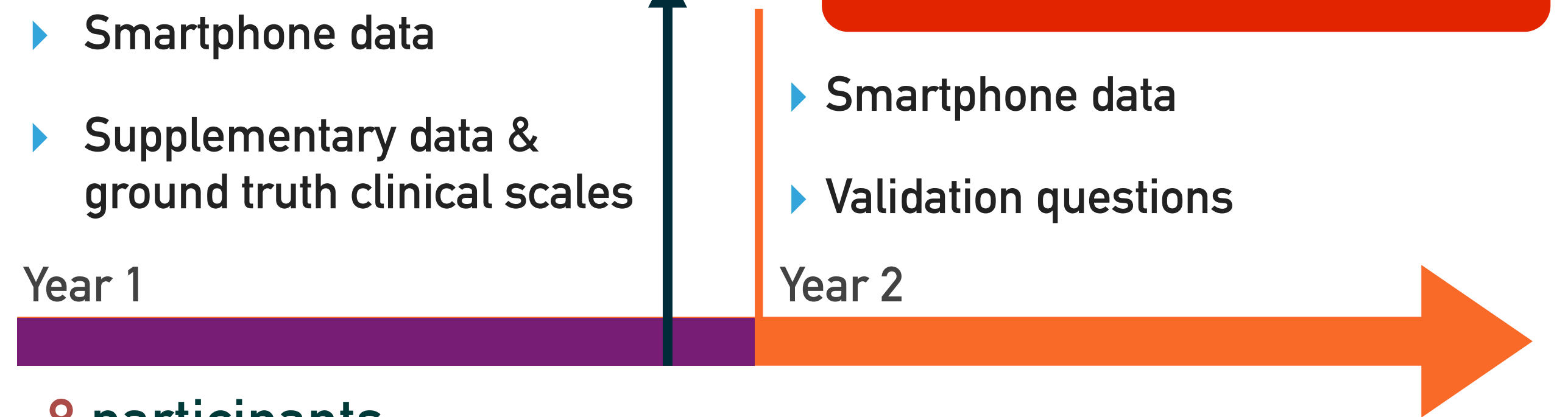


## COVID19 impact — but an opportunity

Number of participants : 8

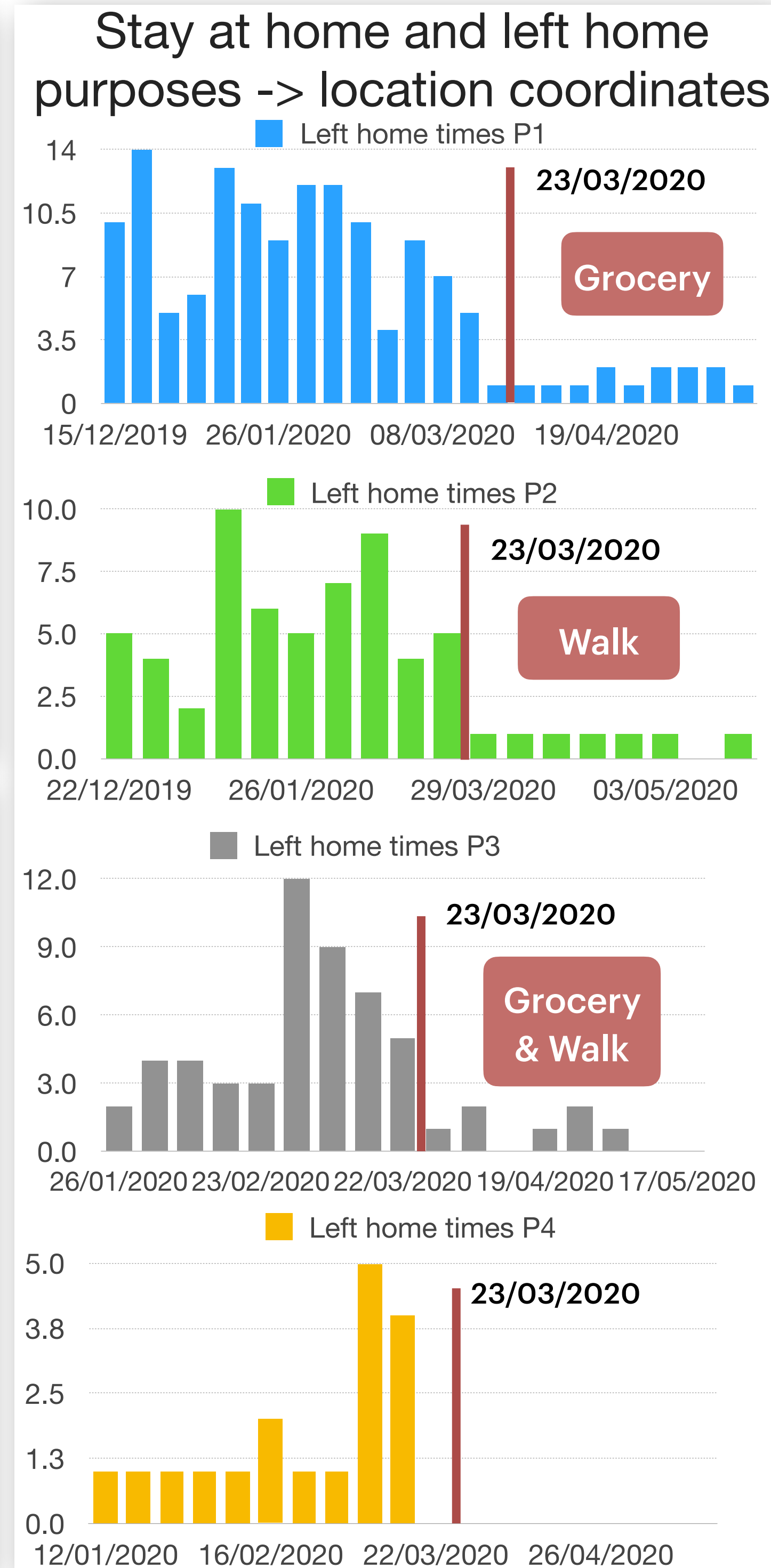
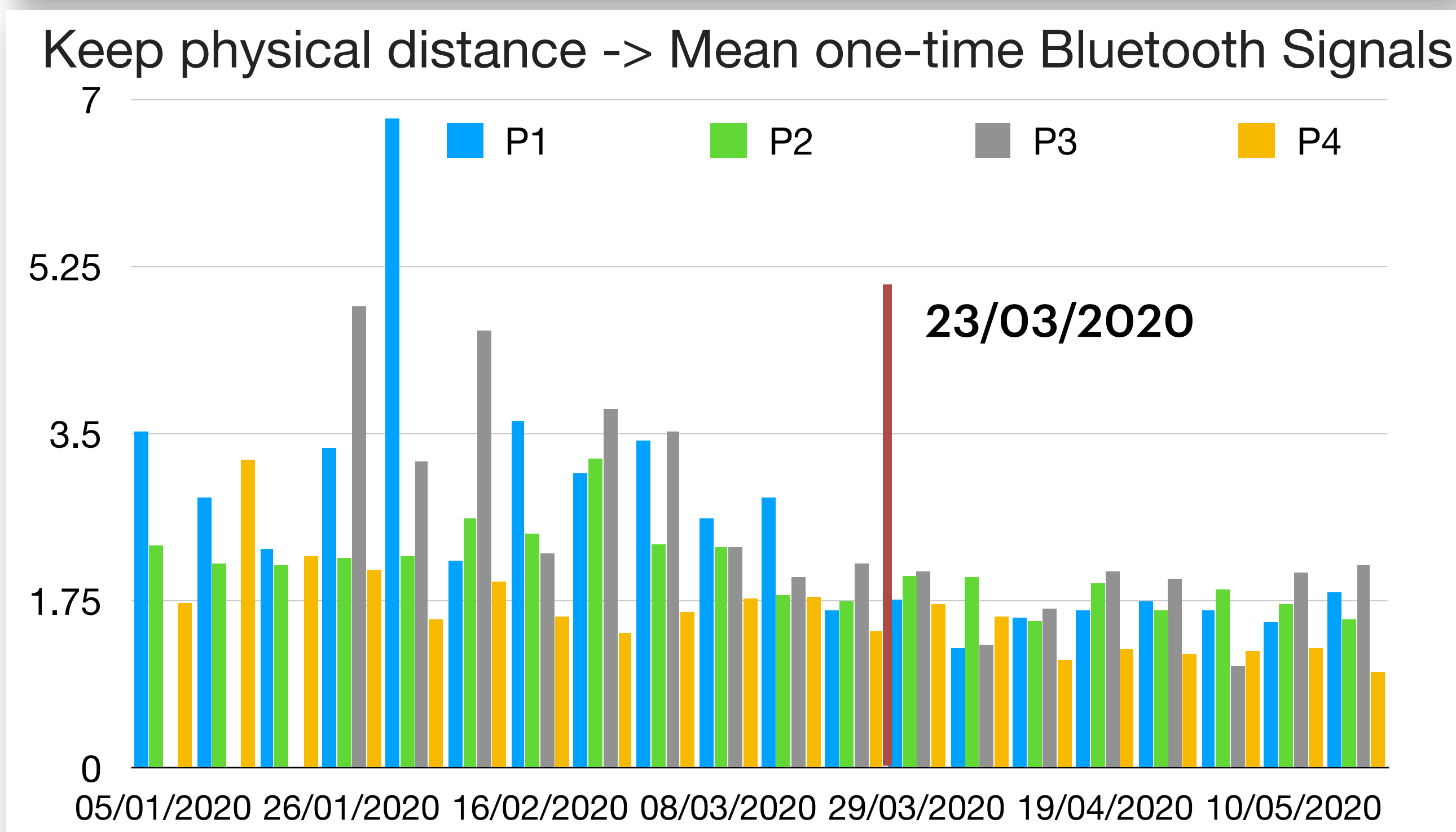
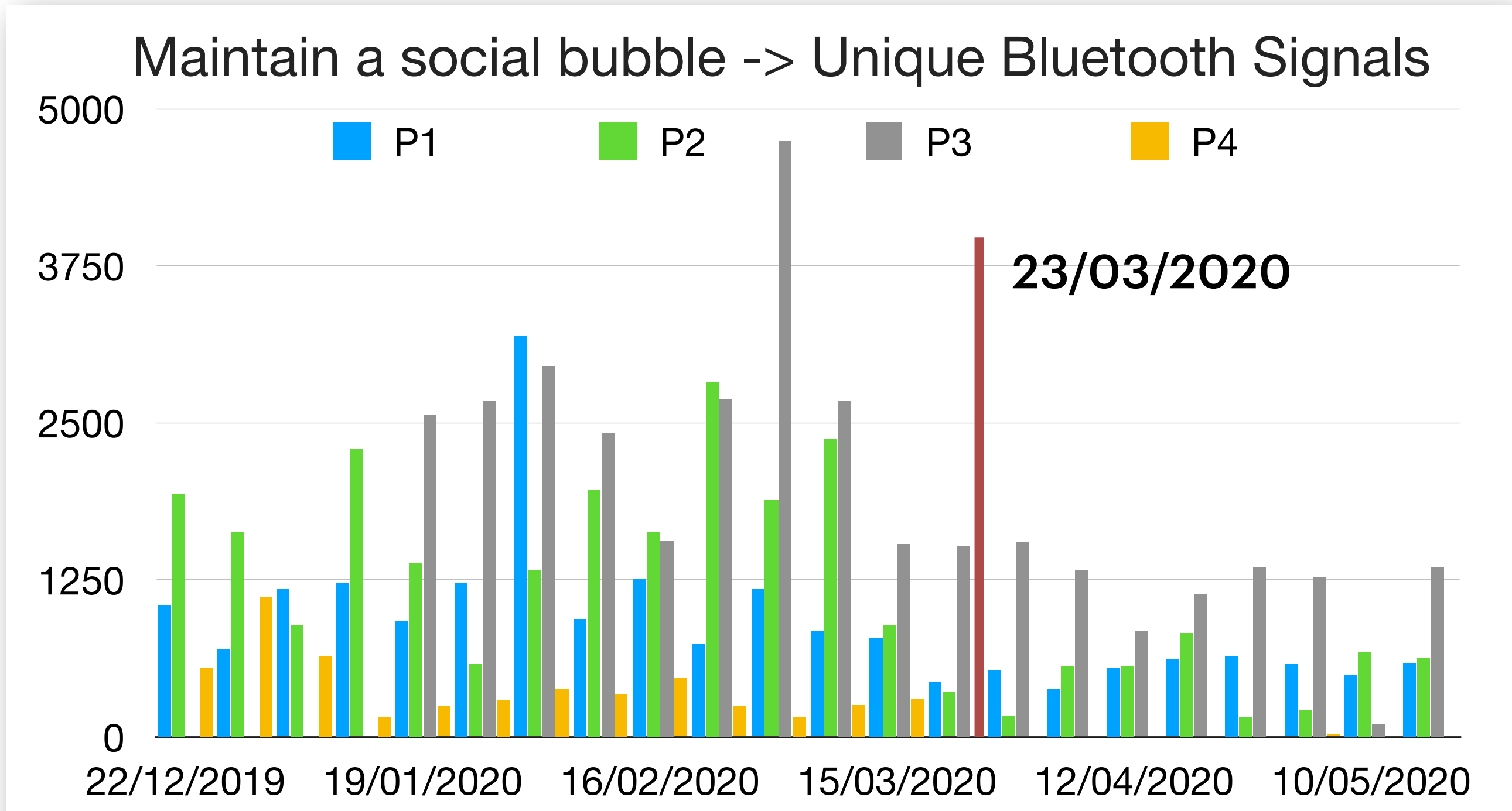


- Can our monitoring technology detect this big event?
- What happened to these vulnerable individuals under this situation?



- 8 participants
- earliest one started from 29/08/2019, latest one started from 11/03/2020
- 190 days of monitoring on average
- 69 days after official lockdown in the U.K. (Mar. 23rd)
- 3,396 calls
- 4,521 messages
- 116,435 location coordinates
- 142,497 application usage recordings
- 1,740,102 Bluetooth scans
- 28,257,878 audio fragments
- Until May 31st

## Behaviour compliance and social adaptation — the result (four participants as examples, divided weekly)



## Social changes and particular patterns

		P1	P2	P3	P4
Face-to-face conversations	Times	↓	↓	↓	↓
	Length	↓	↓	↓	↓
	Diversity	↓	↓	↓	↓
Calls	Times	↓	↓	≈	↓
	Length	≈	↓	≈	↓
	Diversity	↓	↓	≈	↓
Messages (incl. Whatsapp, email)	Times	↓	≈	↑	↓
	Length	↓	N/A	↓	↓
	Diversity	↓	N/A	≈	↓
Social media	Times	↑	N/A	N/A	↑

- Assumption:
- Short, frequent calls -> long, infrequent calls
  - Probably replace face-to-face by long calls: short calls to arrange meetings -> long calls only
- Assumption:
- long, infrequent messages -> short, frequent messages
  - Short frequent messages are a symbol of anxiety
  - Short frequent messages may help to alleviate loneliness?

"I made more long calls with friends and families I was able to meet often."

"They set up a family group chat so I always check in there."

- All results were confirmed by interviews with participants expect P4 disagreed that the social media usage increased

## Competence and personalisation

- Capability:** Our technology captured the impact of COVID19 on an individual. Behaviour changes were able to be detected from smartphone sensing.
- Participants behaviour:** Although differently, every participant minimised times they left home and obeyed social distancing policy. Their overall social interaction level decreased. And face-to-face interactions are not compromised by other channels.
- Customised care:**
  - Location data from smartphones can show which participants do essential shopping themselves. Quiet times to visit the shops or deliveries could be suggested from the smartphone data.
  - Although it could be different from perception of participants, smartphone data can suggest negative emotional state and extra attention or interventions could be offered to these individuals.

## Social impact on wider Parkinson's community

- Instrument:** A modified version of Social Withdrawal Scale [1]
- Participants:** 221 people with Parkinson's, age 36 – 85, 116 males, 104 females, 1 unknown
- Results:**

