



# Utilizing the Experience Sampling Method for More Ecologically Valid Qualitative Data Collection

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# Assistant Professor

**RIT** | Rochester Institute  
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- I work in the School of Information
- I teach courses within Accessibility and Human-Computer Interaction
- I co-direct the En-Ability Lab with Dr. Roshan Peiris and Dr. Tae Oh



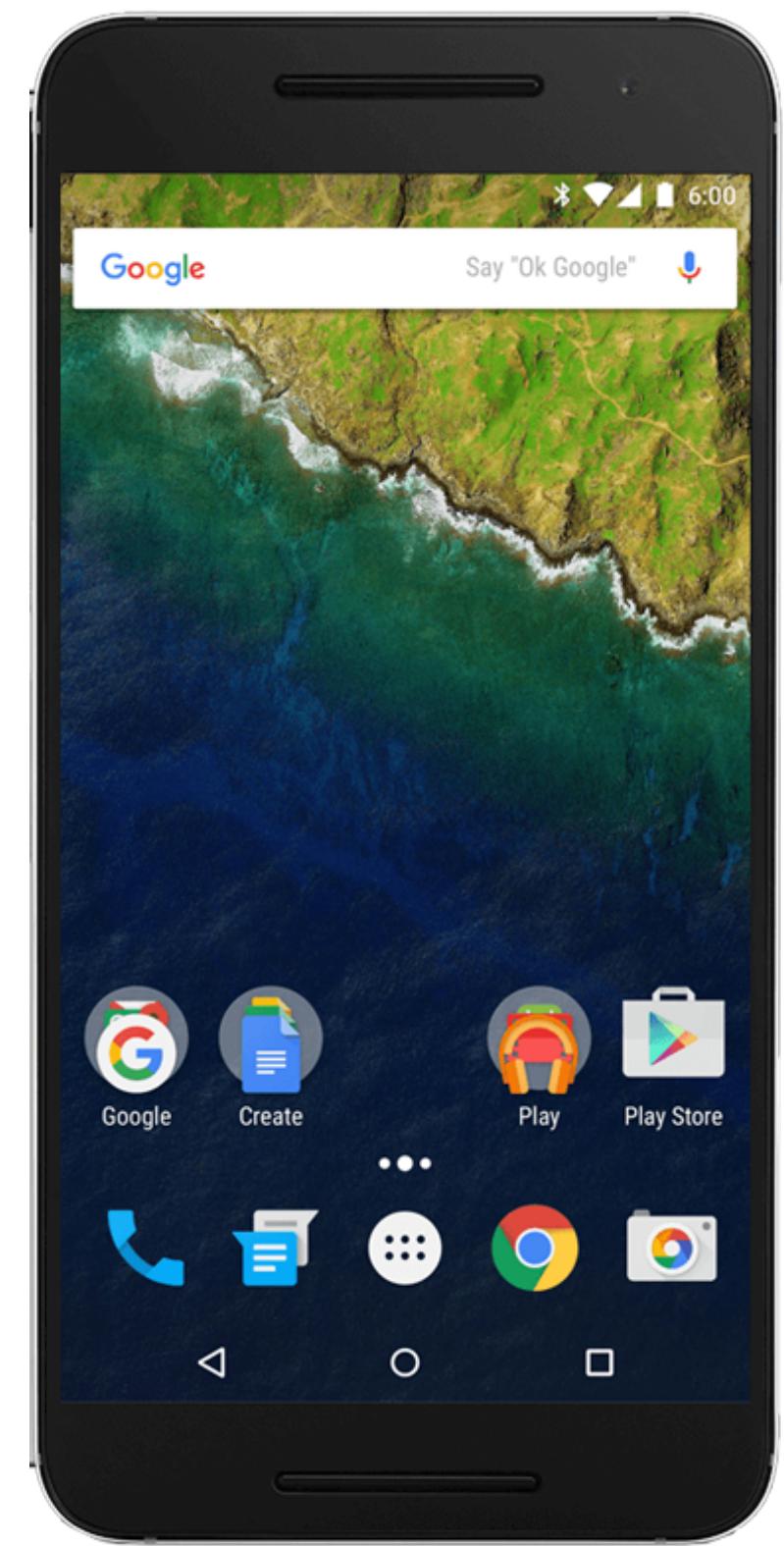
**ENABILITY**

Enable, Enhance, and Empower Abilities

***Raise your hand if you own any of these devices***



*Tablets*



*Smartphones*

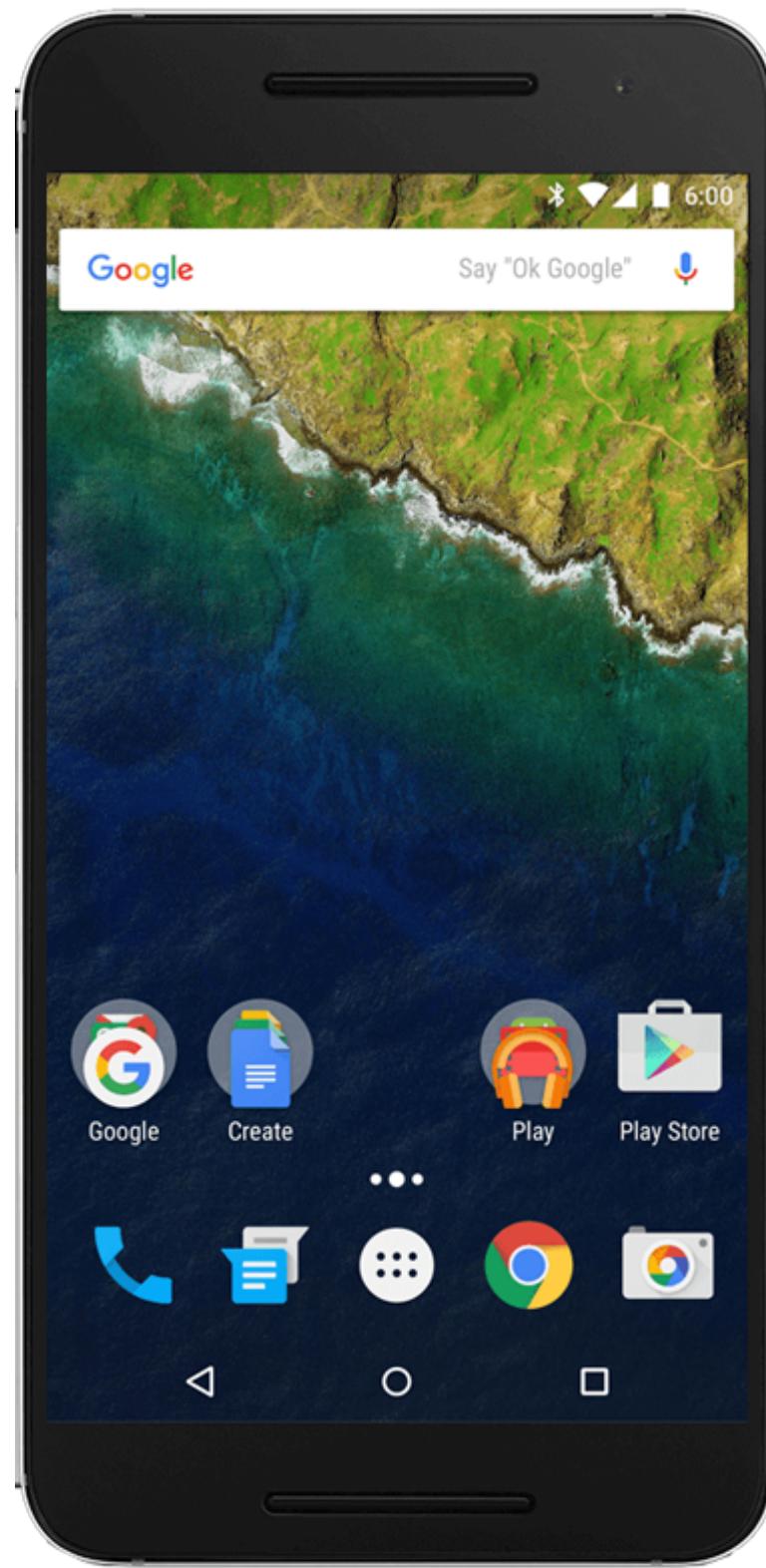


*Smartwatches*

*Keep your hand up if you have one with  
you in this room*



*Tablets*



*Smartphones*

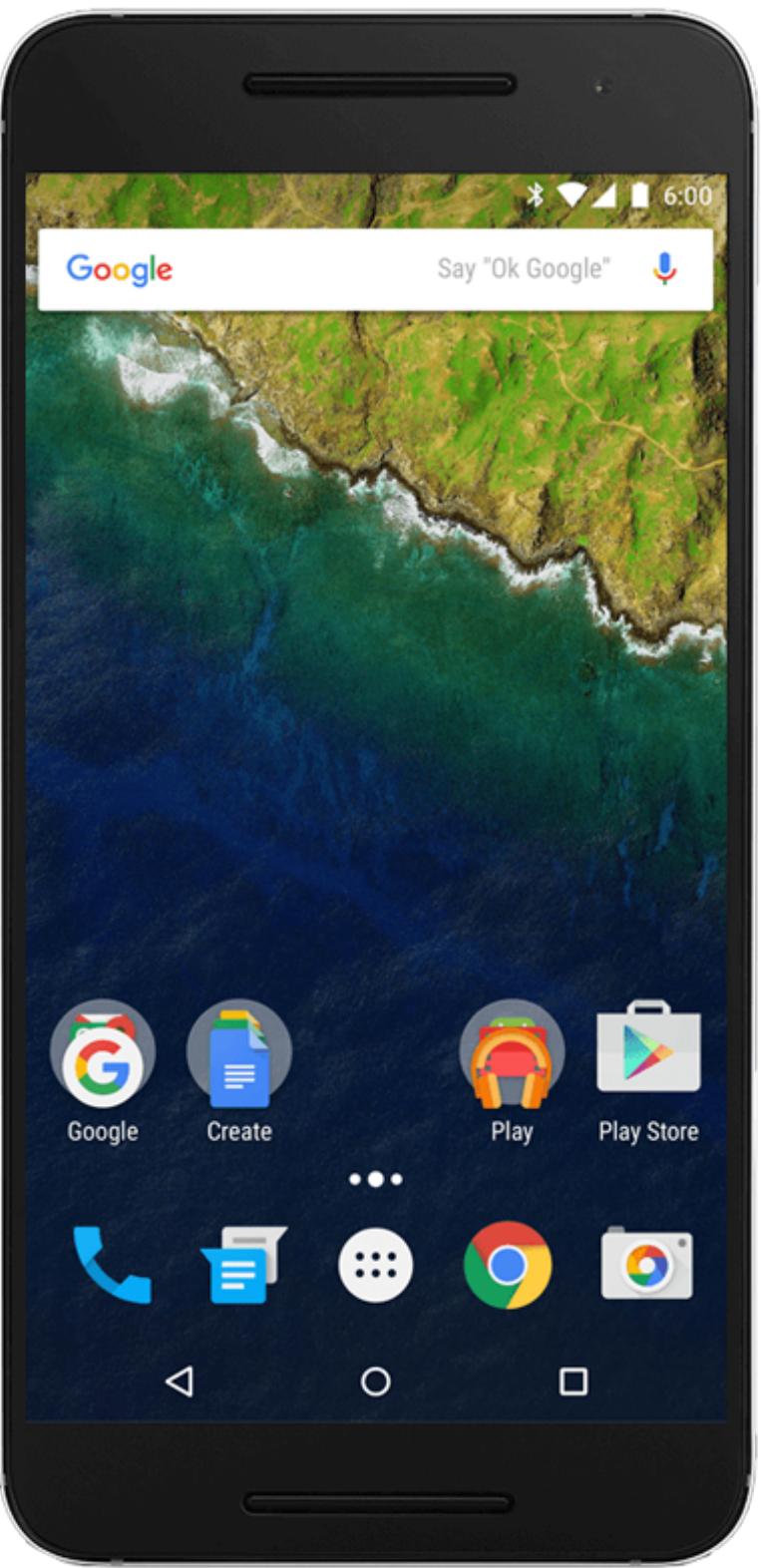


*Smartwatches*

*Keep your hand up if you have struggled  
using a device in very dark or bright  
environments*



*Tablets*



*Smartphones*



*Smartwatches*

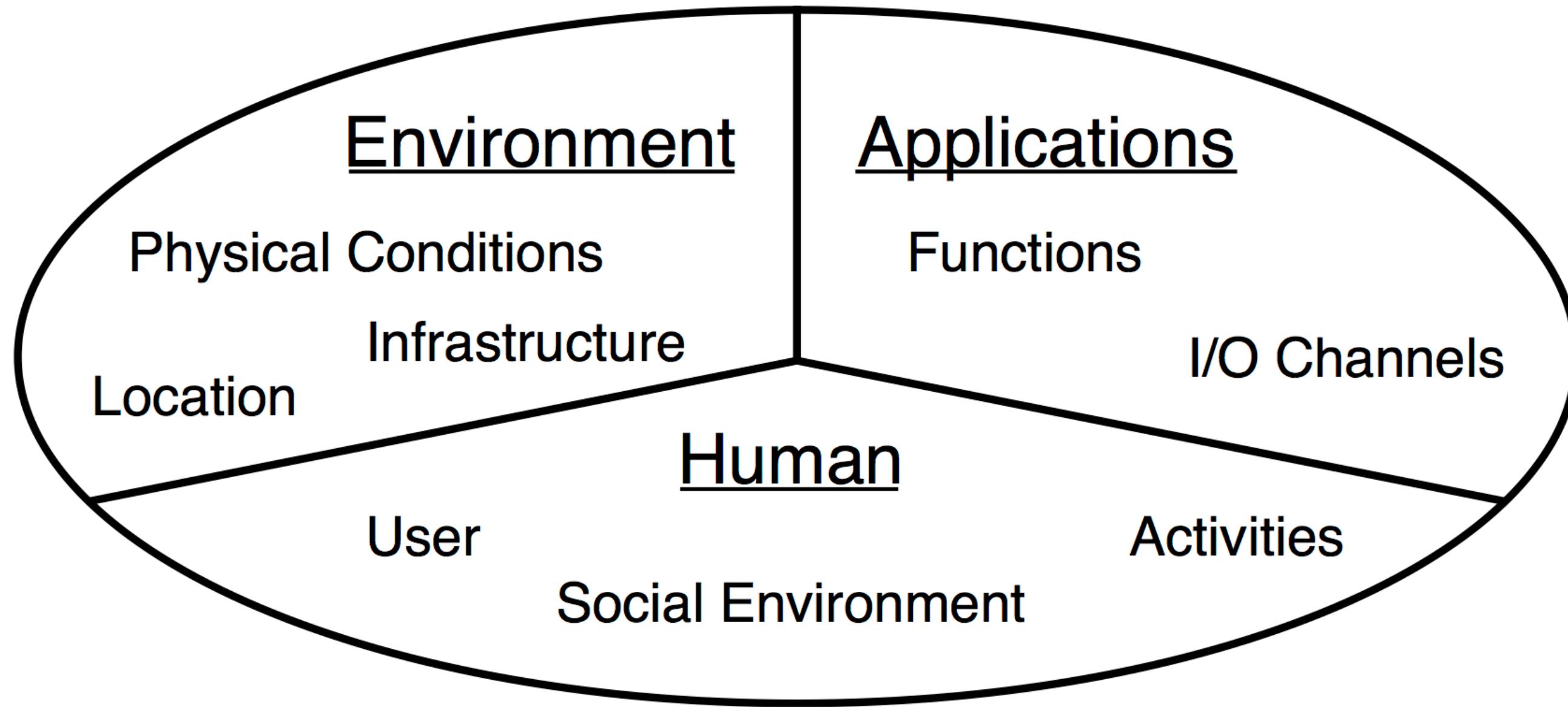
**Situational impairments are a growing usability and accessibility problem for mobile users**

# Improving Content Design on Mobile Devices To Reduce Situational Visual Impairments



# Situational impairments

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The 3D Context Space model from Sears et al. (2003)

## Study 1 - Online questionnaire

- Collect details about an SVI experience. Key questions:
  - ▶ What were you trying to do?
  - ▶ What made it difficult?
  - ▶ How frustrated were you?
  - ▶ Were you able to complete your task?
  - ▶ What strategy was used due to the issue?
- Data from 174 participants (93 Male, 79 female, 2 Other)
- 18-75 yrs-old ( $M=26.88$ ,  $SD=10.47$ )



# Which method to use?

- There are always advantages and disadvantages with a data collection method
- Can you name some for the following?
  - ▶ Interview
  - ▶ Focus Group
  - ▶ Online questionnaire



# Questionnaires are limited

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- Conducting a survey with a questionnaire usually involves asking participants questions that require them to recall information.
- This can be unreliable!
- Less ecological validity

# Experience Sampling Method (ESM)

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Also known as:

- Ecological Momentary Assessment (EMA)
- Diary Study

# Experience Sampling Method

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- The ESM can be traced back to Csikszentmihalyi, M., Larson, R., & Prescott, S. (1977). The ecology of adolescent activity and experience. *Journal of youth and adolescence*, 6(3), 281-294.
- ESM involves:
  - ▶ Self-reports through questionnaires/journals/diaries
  - ▶ Usually these are made up of open-ended and closed-ended questions and other psychometric scales
  - ▶ Gathering data over a number of days (typically 2 weeks)

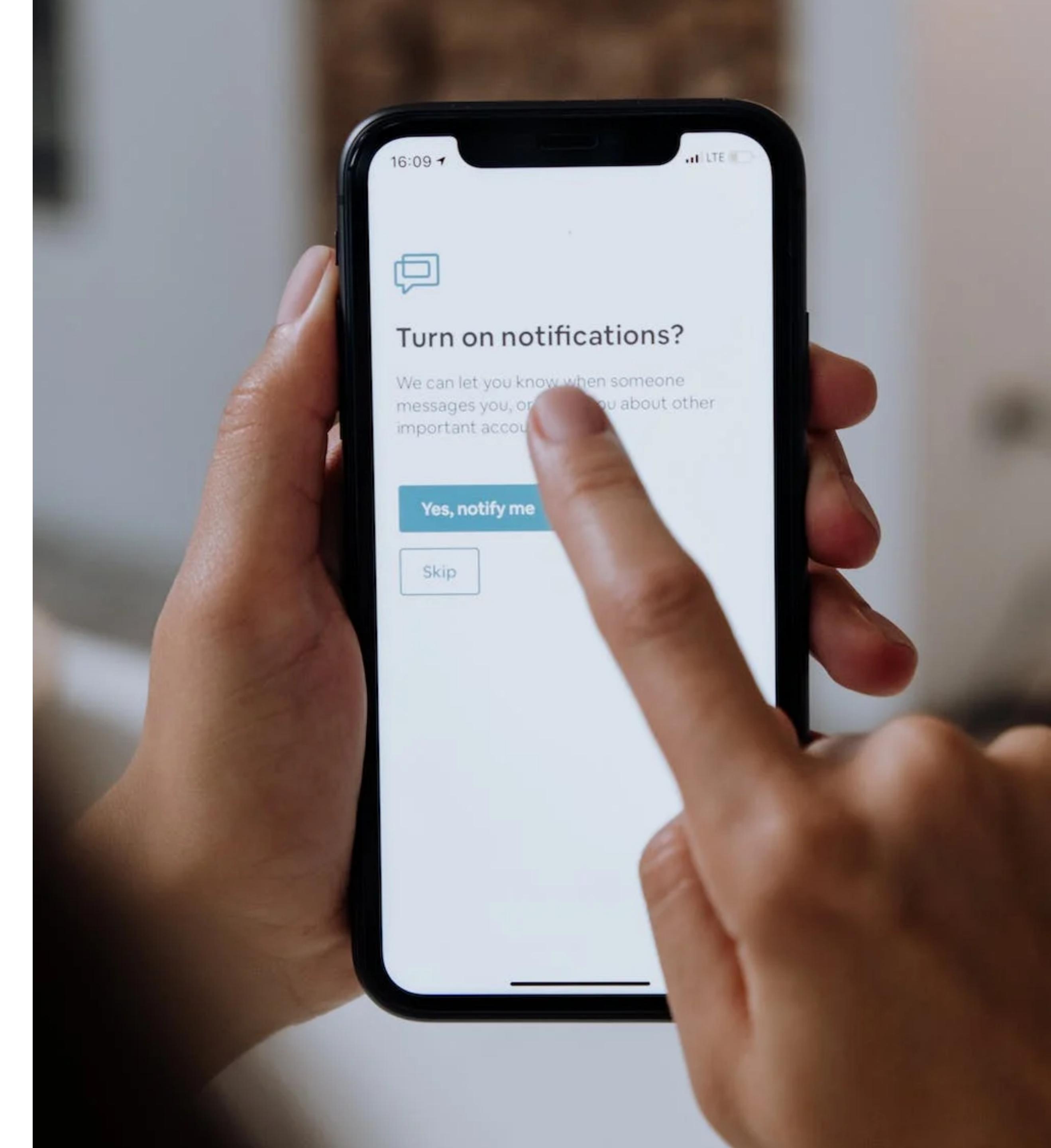
# Experience Sampling Method

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- The ESM study usually falls under two categories
  - ▶ **Feedback** – the participants are responding in the moment to predetermined questions
  - ▶ **Elicitation** – the participants are providing responses or capturing details which are used later on as prompts in an interview
  - ▶ *But there can also be a hybrid of the two*

# Experience Sampling Method

- There are three types of protocol that can be implemented for an experience sampling methods study
  1. Interval-contingent
  2. Signal-contingent
  3. Event-contingent



# ESM – Interval-contingent

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- The participant is prompted at set points during the day
- Interval-contingent protocols are useful for frequent experiences
- Overall, it is the least taxing for the participants out of the three
- However, its structure allows for participants to prepare for when the next report is due, which introduces its own issues.

# ESM – Signal-contingent

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- Participants are typically notified with a randomly times signal
- This approach is good when you are interested in understanding a state that are very susceptible to memory bias
- Good for studying something that is on-going (i.e., you know a random signal will coincide with what you are studying)
- This can be a pain for participants since they do not know when the next signal is coming

# ESM – Event-contingent

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- Participants taking part in an event-contingent protocol are submitting responses following the immediate occurrence of an event
- However, a clear definition is needed so that participants understand when to do this
- For events that occur frequently this method is likely too burdensome for participants

# ESM – Some more details

- Traditionally ESM would involve the signal-contingent protocol
- As with most methods, an ESM study will have its limitations
- Recommendation is that another methodology is used in the same study, e.g., follow-up interviews.



# ESM – Many Challenges

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- This type of study is time consuming
- It is difficult to recruit participants for a long study
- You have to try and keep the participants motivated
- It is a challenge to ensure participants follow the study protocol
- Reimbursing participants is high

# what did I do?

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Remember the conclusions from my first  
PhD study were limited due to approach.

# Study 2 - Two week ESM Study

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- We ran a two-week long ESM study with Scottish and Australian participants



FEBRUARY

# Study 2 - Two week ESM Study

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- 239 participants signed up for a study investigating “daily experiences using a mobile device”
- 24 participants between 18 and 46 years-old were selected
  - ▶ *6 males and 6 females from both Australia and Scotland*

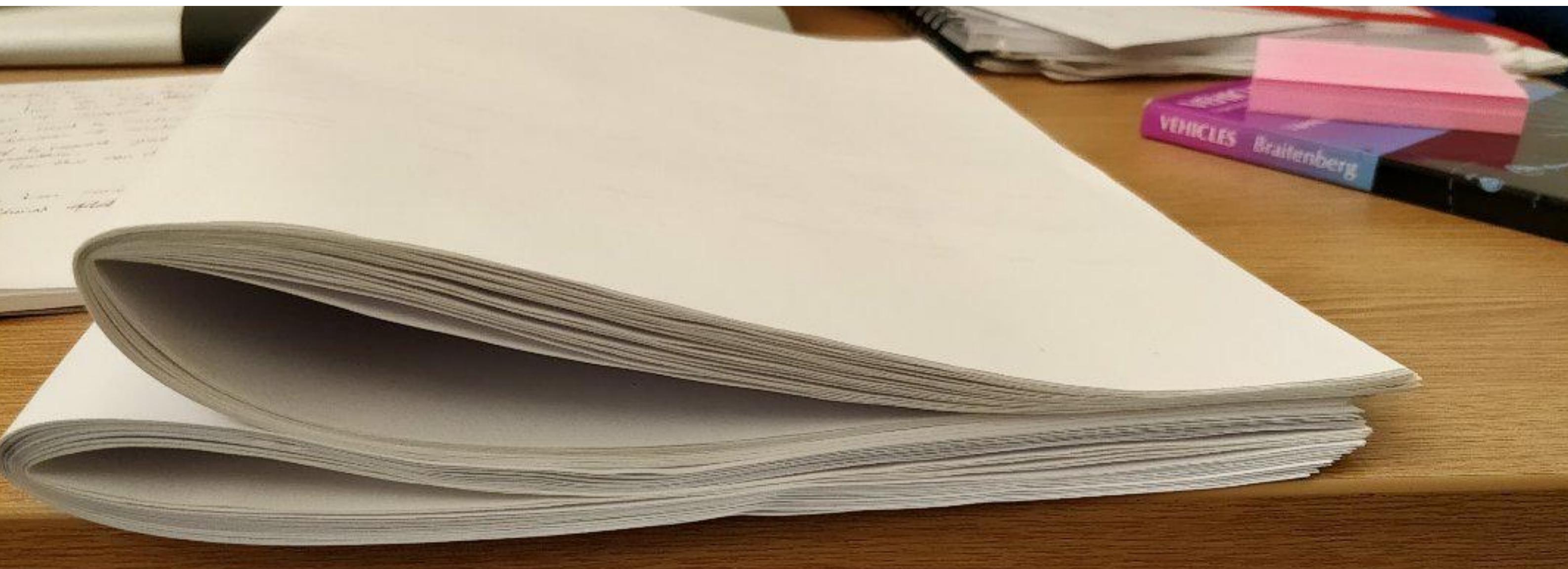
	Male	Female	Australia	Scotland
Mean	30.25	30.67	30.67	30.25
SD	8.50	8.72	8.75	8.47

**Table 1.** Mean and SD for age (years) by gender and location

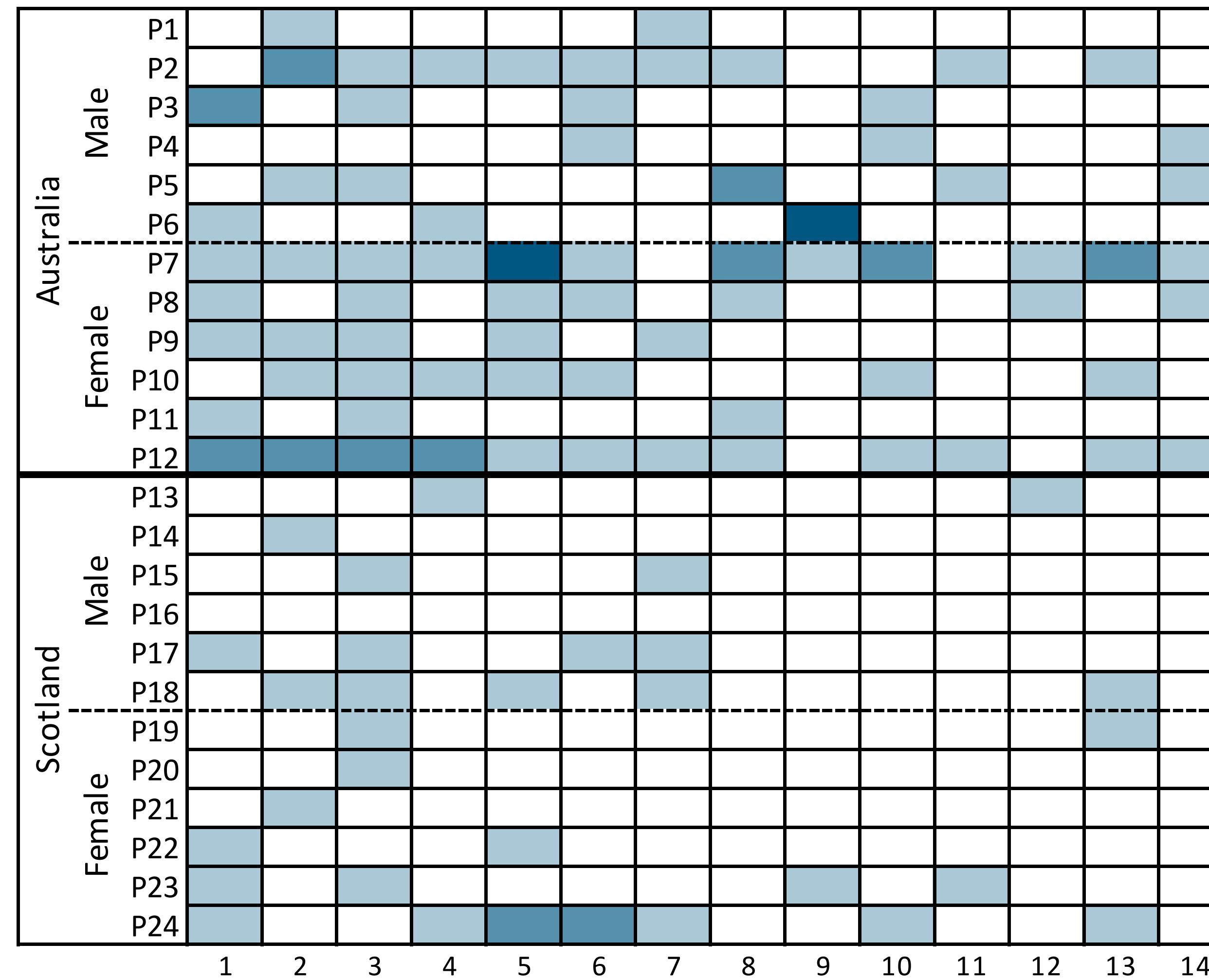
# **Study 2 - Two week ESM Study**

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- Between 7am and 8.45pm, participants would submit a self-report after experiencing an SVI event (if safe to do so)
- An end-of-day report was submitted each day of the study
- 424 reports were submitted with 117 detailed SVI events

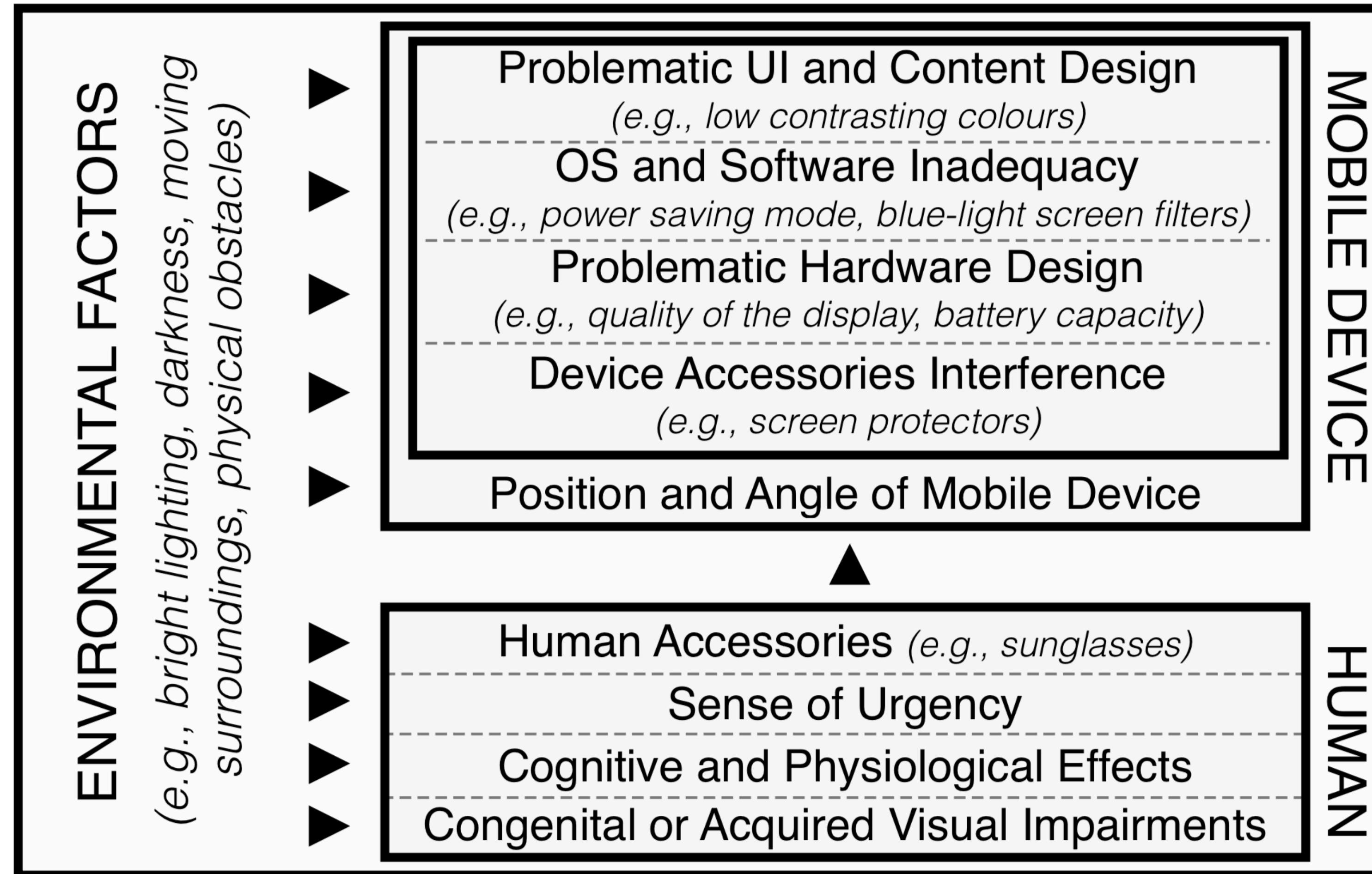


# How often are SVIs experienced?



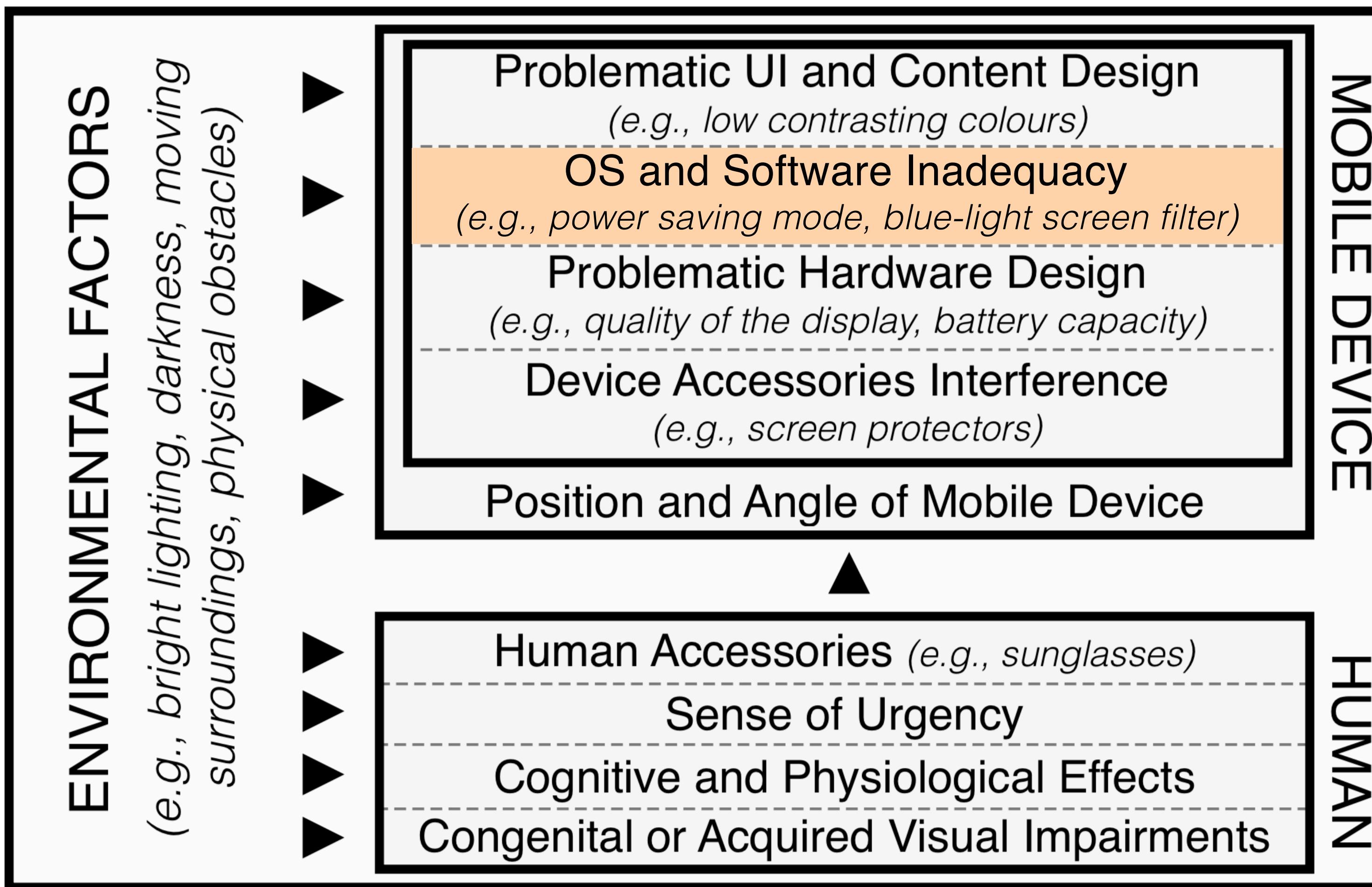
*frequency heatmap*

# Causes of SVIs – Context Model



# Is ESM useful in AI research?

- Qualitative data is necessary. You can't fully understand something without qualitative data.



# Advice on ESM running studies

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- Run pilot – this is important!
  - ▶ Some confusion with the phrasing of certain questions
  - ▶ Participant uncertainty if they were doing something wrong
  - ▶ Interest in the study dropped after just 2 days!
- Daily self-reports questionnaire and an end-of-day report questionnaire

An optimal team consists of two team leaders (either a graduate assistant or a paid study coordinator) plus enough research assistants so that each is assigned between 5 and 10 participants.

Christensen et al. (2003)

# **Advice on ESM running studies**

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- Automate as much of the process as possible
- Get better at managing email
- Use Spreadsheets to stay organised
- Also use a calendar

# Utilizing the Experience Sampling Method for More Ecologically Valid Qualitative Data Collection

Thank You!  
Questions?

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