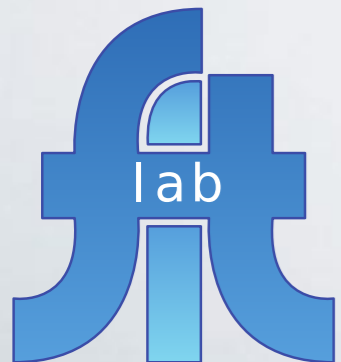


# It's About Time: Smartwatches as Public Displays

Jennifer Pearson, Simon Robinson, Matt Jones



Prifysgol Abertawe  
Swansea University

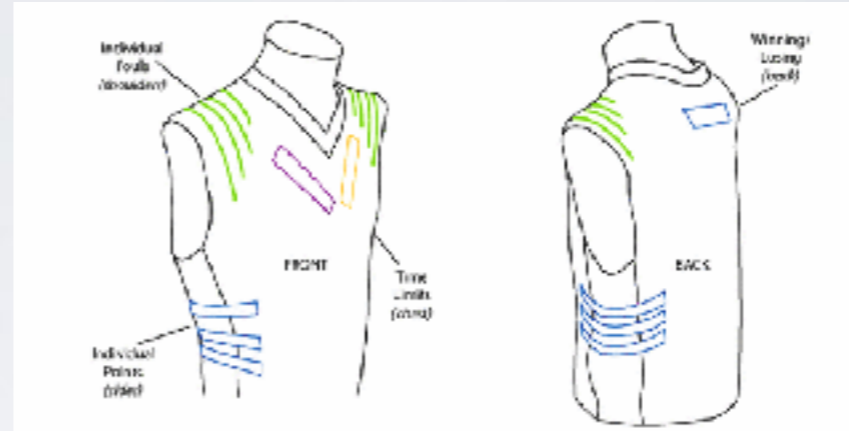
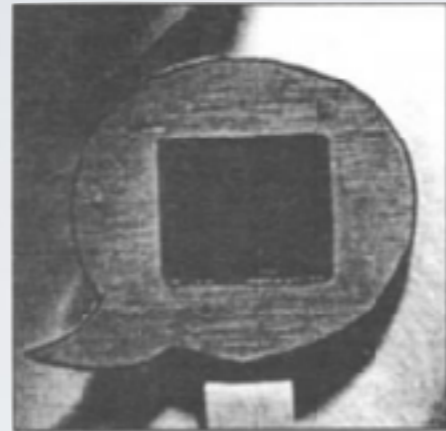
# INTRODUCTION



- Smartwatches are the new big thing
- So far, smartwatch research focuses on the *wearer*
- But: a watch can be seen by those around the wearer
- Why not use a watch as a public display?



# PREVIOUS WORK



- BubbleBadge (Falk and Björk, 1999)
- TeamAwear (Page and Moere, 2007)
- Social Fabric Fitness (Mauriello, Gubbels, Froehlich, 2014)
- LunarHelm (Walmink et al, 2014)



# OUR WORK – OVERVIEW

- 1 paper: 4 studies
- Design space for public smartwatch interaction
- **Aims:**
  - Open up a new research area of using personal wearables as public displays
  - Highlight the significant potential for future work

STUDY I:  
SOCIAL IMPLICATIONS

# THE IMPACT OF GLANCING

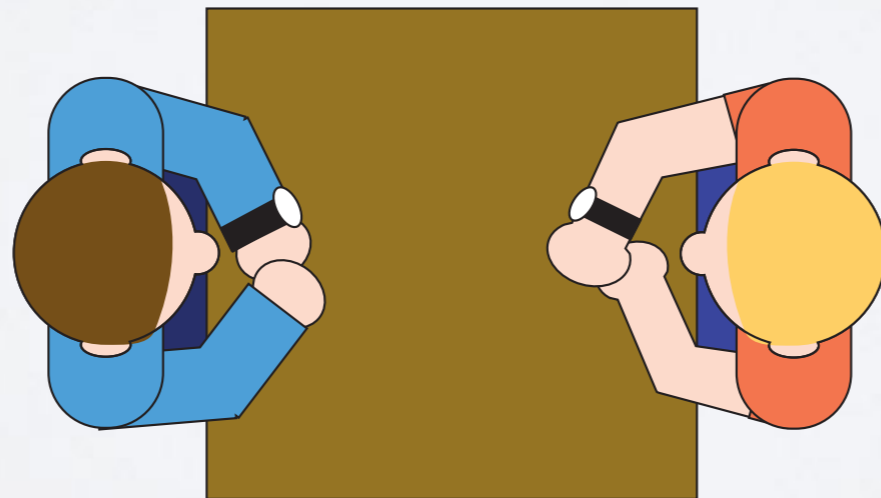
- A measure of people's awareness of interactions with watches
- We explored:
  - The perceived social acceptability of glancing at other people's watches
  - Whether this action was actually noticeable or disruptive to conversation

# THE IMPACT OF GLANCING

- Between-groups study:
  - Primary group: looking at effect of *public* wearables
  - Comparison group: looking at the effect of *personal* wearables

# THE IMPACT OF GLANCING

- **Primary group:** 18 participants in pairs – one *glancer* and one *wearer*, both wearing smartwatches
- Short conversation session
- *Glancer* looks at the other person's watch when they feel a vibration on their own watch



R2

R1



# THE IMPACT OF GLANCING

- **Comparison group:** 16 different participants in pairs, same conversation setup
- Only one of the participants wore a watch
- When they felt a vibration they looked at their *own* watch

# THE IMPACT OF GLANCING

- Followed by a semi-structured interview with the two participants:
  - Began by asking about flow of conversation
  - *Wearer* asked directly if they had noticed the *glancer* looking at the watch
  - Both participants rated the social acceptability of looking at (a) another person's watch; or, (b) their own watch, during one-to-one conversation

# THE IMPACT OF GLANCING – RESULTS

- Noticeability (during the study):
  - Primary group: **33%** noticed the glancer looking at the watch they themselves were wearing
  - Comparison group: **88%** noticed the glancer looking at their own watch
- Result: *less noticeable to look at another person's watch*

# THE IMPACT OF GLANCING – RESULTS

- Noticeability: (day-to-day life):
  - **71%** of participants said they had looked at someone else's watch to get the time
  - **13%** had noticed other people looking at their watch

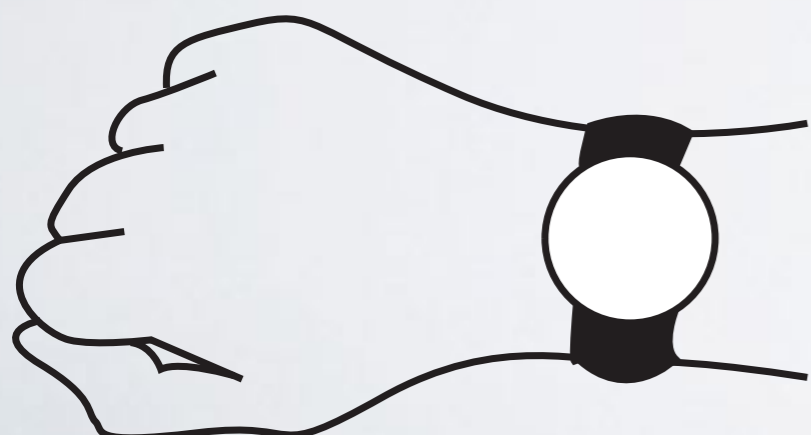
# THE IMPACT OF GLANCING – RESULTS

- Social acceptability, 1 (low) – 5 (high):
  - Looking at someone else's watch: **3.3**
  - Looking at your own watch: **2.9**
- In general: No more noticeable, unacceptable or unusual to look at another person's watch rather than your own

STUDY 2:  
IS IT FEASIBLE?

# WATCH FACE DEPARTMENT

- How visible are watch faces at the moment?
- Diary study: 7 weeks, 4 countries
- Eight arm positions; three basic visibility classifications from the perspective of someone sitting opposite the wearer:



Full visibility



Partial visibility



Not visible

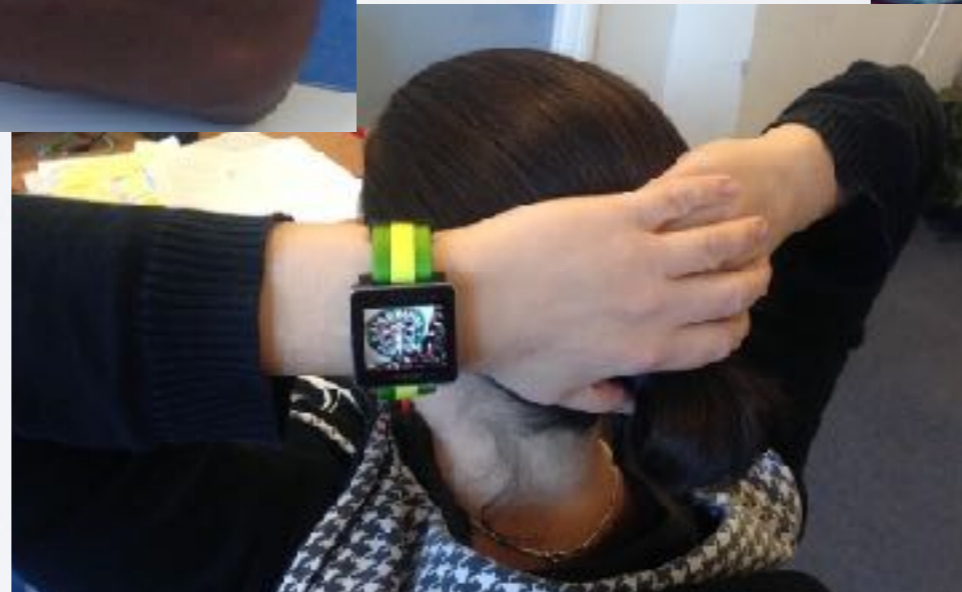
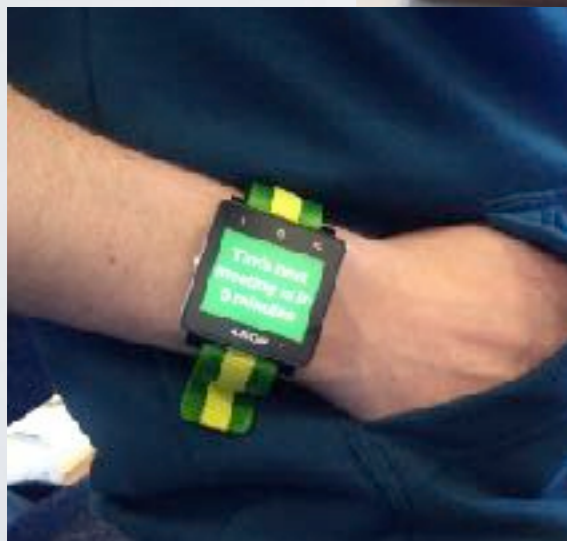
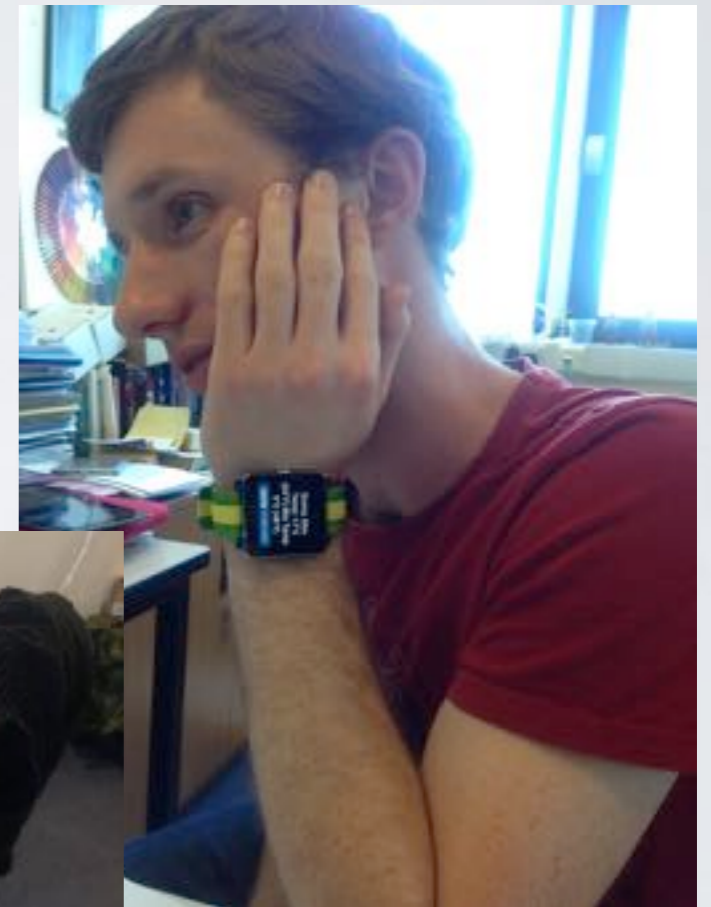
# WATCH FACE DEPARTMENT — RESULTS

- 300 watch faces observed (all non-smartwatches)
- **88%** were either fully visible (51%) or partially visible (37%)
- No noticeable differences in positions or visibilities between times of day, days of week, locations, cultures or countries



# WHERE AND WHEN

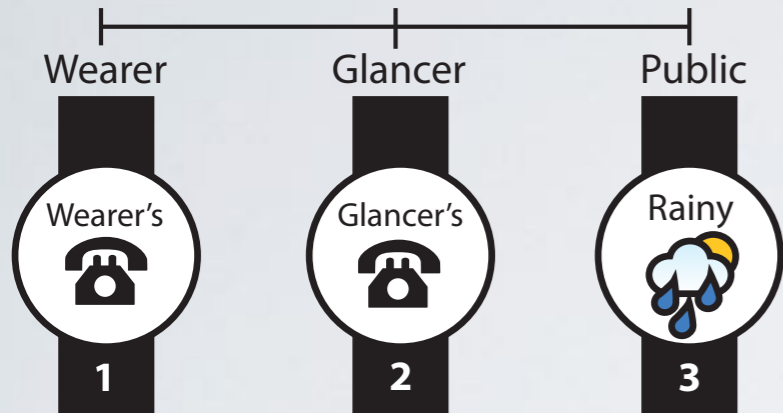
- Position, angle and orientation of the display are factors in choice of information type or audience



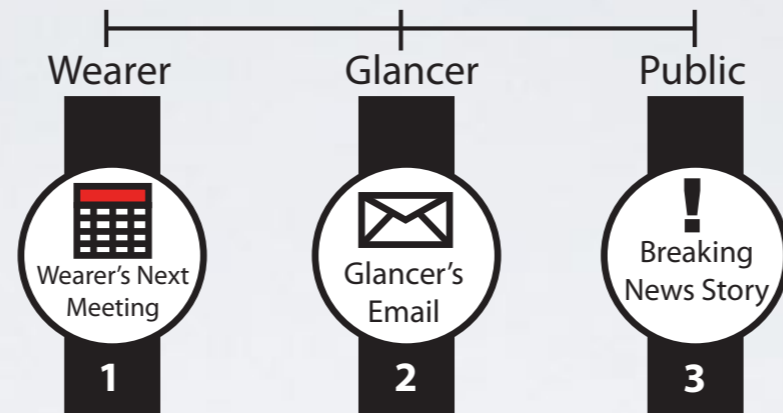
- Conclusion: Feasible and usable in diverse situations

# DESIGN SPACE

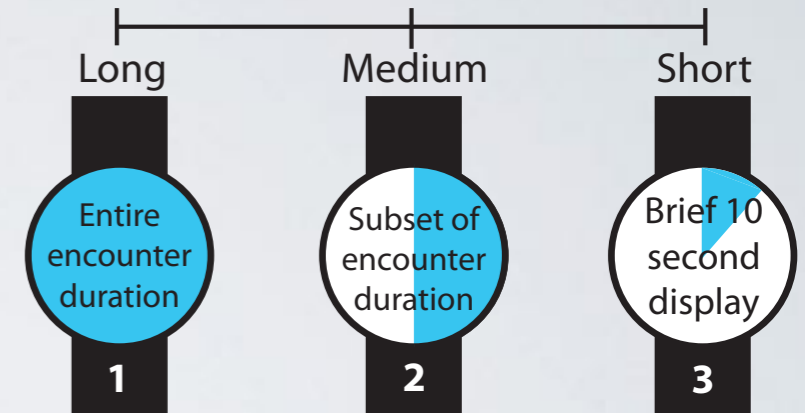
(a) Content source



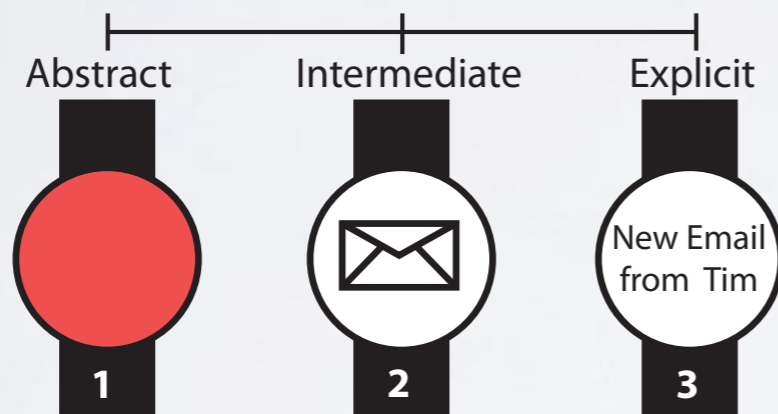
(b) Content relevance



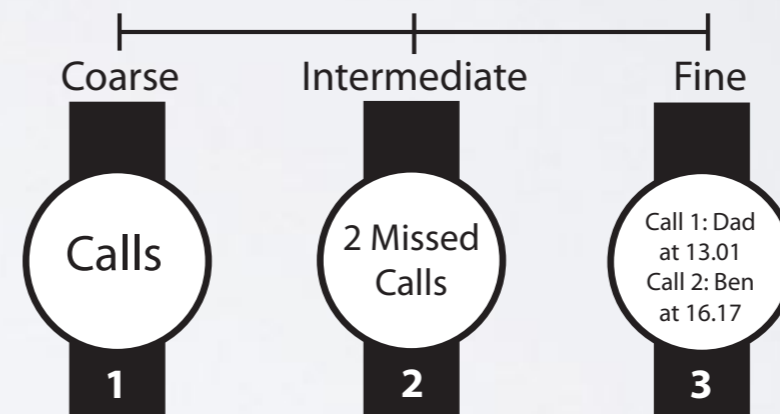
(c) Persistence



(d) Representation



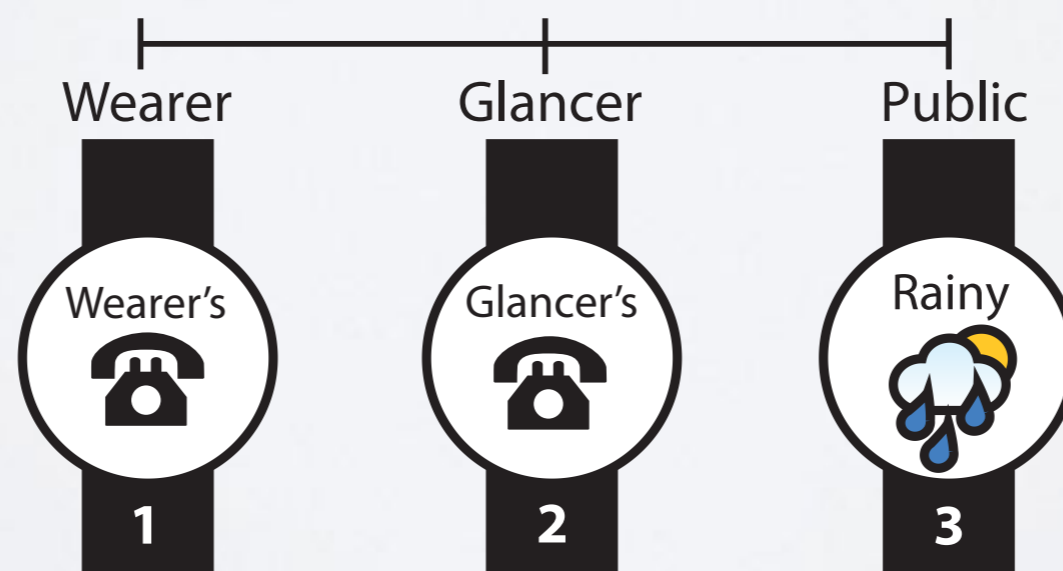
(e) Granularity



# DESIGN SPACE – INTERACTION DIMENSIONS

- **Content Source:**

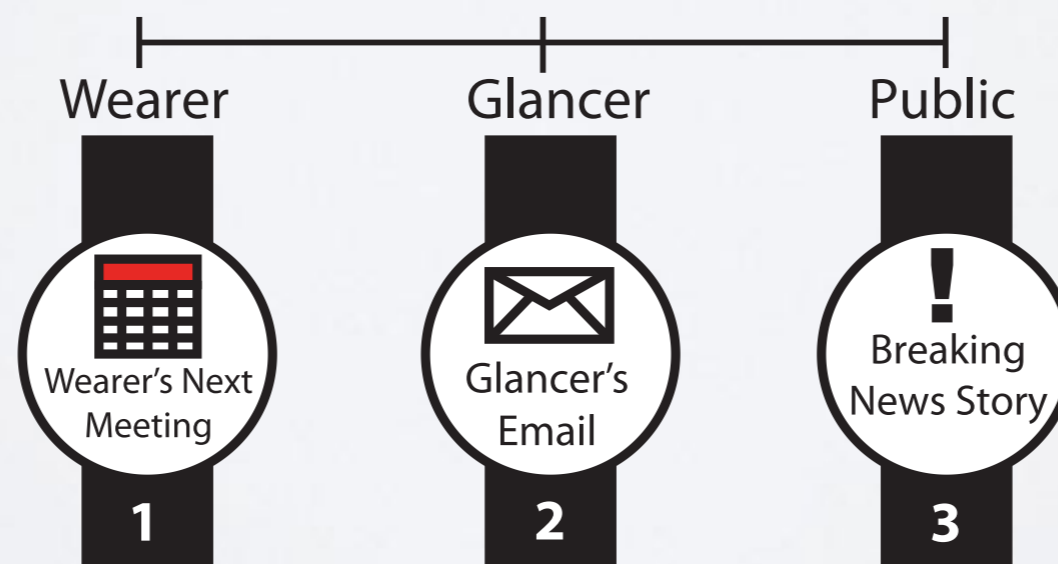
- *Wearer:* e.g., holiday photographs, health information, next meeting time, contact information etc.
- *Glancer:* e.g., missed call details, alerts etc.
- *Public:* e.g., weather forecast, adverts, news bulletins etc.



# DESIGN SPACE – INTERACTION DIMENSIONS

- **Content Relevance:**

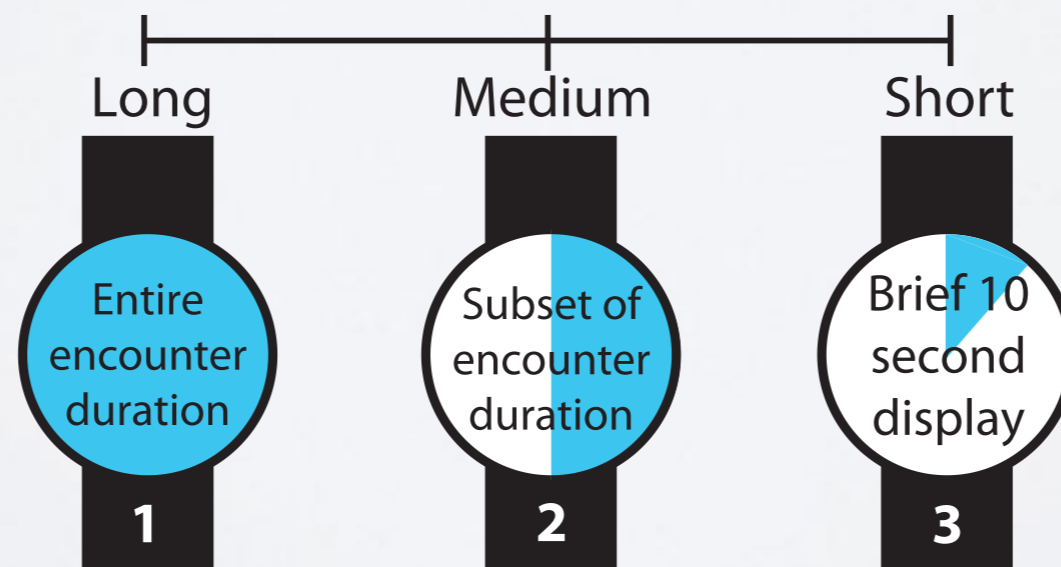
- *Wearer*: e.g., information about their schedule, contact details etc.
- *Glancer*: e.g., their missed calls, conversation cues etc.
- *Public*: e.g., current time, breaking news, stock prices



# DESIGN SPACE – INTERACTION DIMENSIONS

- **Persistence:**

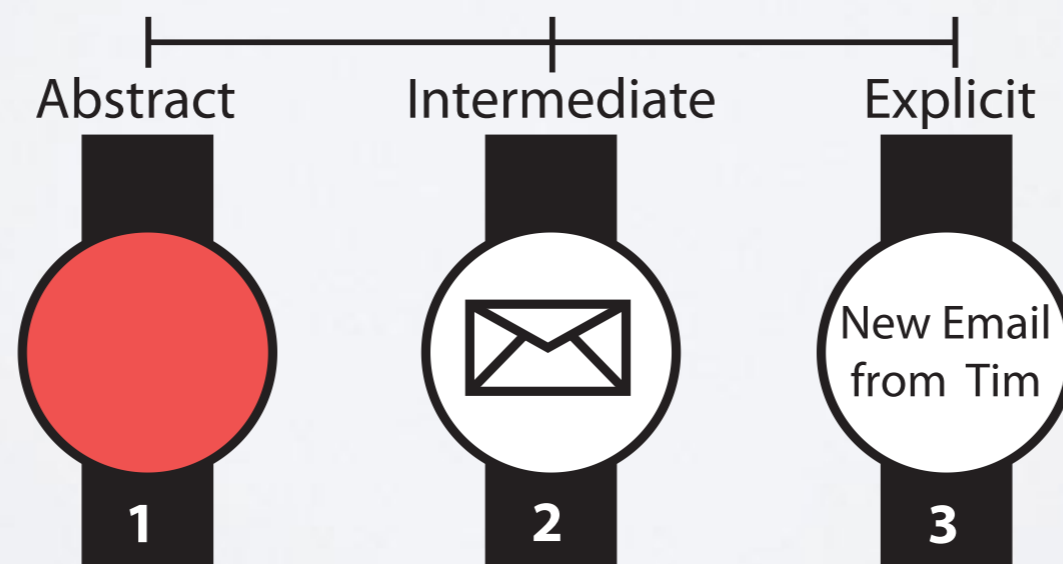
- *Long*: e.g., schedule information
- *Medium*: e.g., a weather warning
- *Short*: e.g., standard phone alerts, adverts



# DESIGN SPACE – INTERACTION DIMENSIONS

- **Representation:**

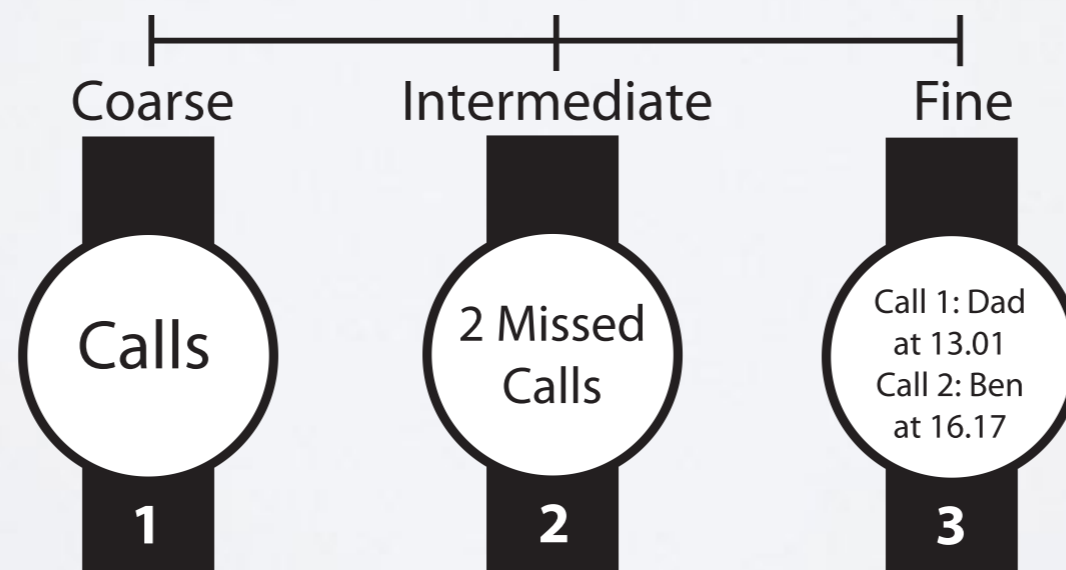
- *Abstract:* e.g., red for lateness, green for new email
- *Intermediate:* e.g., an envelope to indicate a new message
- *Explicit:* e.g., an alert or instruction, a news headline



# DESIGN SPACE – INTERACTION DIMENSIONS

- **Granularity:**

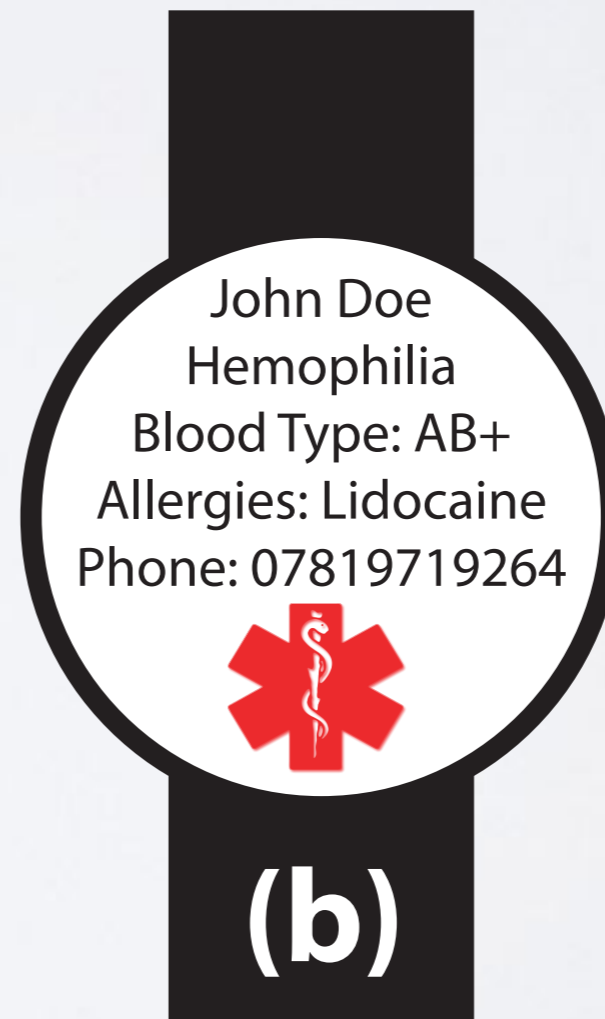
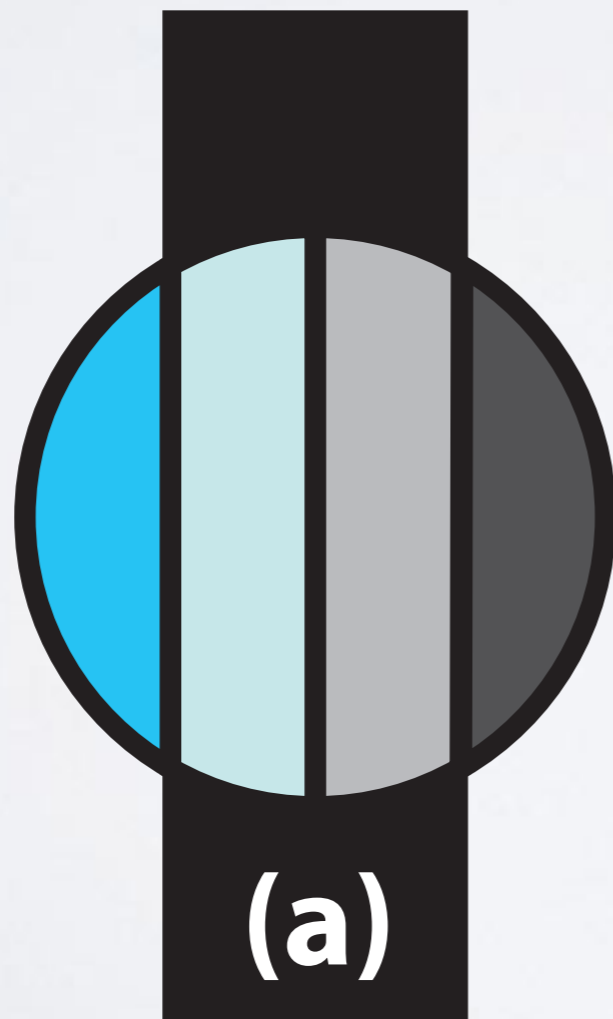
- *Coarse:* e.g., the word “calls” to show missed calls
- *Intermediate:* e.g., the number of missed calls only
- *Fine:* e.g., all missed call information





# DESIGN SPACE – EXAMPLES

- Helps generate potential watch services
- Unusual/uncommon design parameter combinations:



STUDY 4:  
DESIGN PROBES

# PUBLIC WATCH DISPLAYS DEPLOYMENT

- To test naturalistic use of public watch displays, we conducted three longitudinal deployments using technology probes
- Each probe illustrates how the design space factors we describe would inform designs in this space
- Content source probes:
  - Wearer's content
  - Glancer's content
  - Public content



# PUBLIC WATCH DISPLAYS DEPLOYMENT

- Wearer's content
  - A display that shows the time remaining until the wearer's next meeting



**Tim's next  
meeting is in  
3 minutes**

**Tim's next  
meeting is in  
1 minute**

# PUBLIC WATCH DISPLAYS DEPLOYMENT

- **Glancer's content**
  - Any missed calls, emails or SMS messages (sourced from the glancer's phone)



# PUBLIC WATCH DISPLAYS DEPLOYMENT

- Public content
  - From public sources – adverts, weather, news bulletins



**Calais chaos as  
refugees dodge  
trucks**

**BBC NEWS**

**Sunny Intervals,  
Max Temp: 15°C  
(59°F) Min Temp:  
6°C (43°F)**

**BBC WEATHER**

# PROBES IN ACTION

# PUBLIC WATCH DISPLAYS DEPLOYMENT

- 4 participants used one of the probes for 8-12 days.
- *Probe 1 (Wearer's content)*: Man aged 46 who regularly attends scheduled formal and informal meetings with one or more people
- *Probe 2 (Glancer's content)*: Married couple aged 27 who work and live together. Each person's phone was connected to the watch of the other person
- *Probe 3 (Public content)*: Man aged 29 who regularly engages in group encounters in both professional and social capacities



# PUBLIC WATCH DISPLAYS DEPLOYMENT – RESULTS

- *Probe 1 (Wearer's content):*
  - Participant saw a correlation between observed glances and the information being displayed.
  - Useful: People would also bring meetings to a close for him (“*you're late*”)
  - Did not deter from working life, but might feel uncomfortable using it in some situations (e.g., important external meetings)

# PUBLIC WATCH DISPLAYS DEPLOYMENT – RESULTS

- *Probe 2 (Glancer's content):*
  - Male participant changed behaviour: As his wife always knew when he was getting a call, he felt more inclined to answer it
  - Female participant noted her “nosiness” at first
  - Both liked the feeling of knowing they were close to their partner

# PUBLIC WATCH DISPLAYS DEPLOYMENT – RESULTS

- *Probe 3 (Public content):*
  - Participant's observation: People are far more likely to comment on the watch display in social situations rather than work settings
  - People often initiated conversations about the content, (e.g., interesting news articles)
  - Slight annoyance at times – difficult to see the content himself (as it was upside down )

# SUMMARY

- Prevalence of smartwatches is increasing
- We have sketched out a comprehensive design space and conducted four key studies to explore the concept of personal watches as public displays
- Glancing at someone else's watch is already common practice – why not use this in new ways?

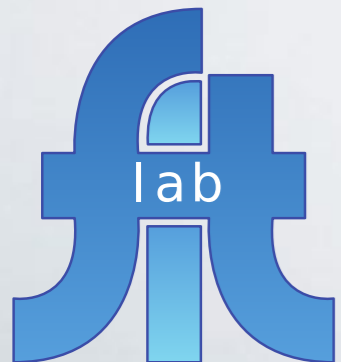
# THANK YOU

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