3012 / GC25 Interaction Design
Mobile Systems

"E-mail, voice mail, web pages, stock quotes, news, banking...that's a lot of responsibility for such a little guy!"
Objectives

1) Usability issues with mobile phones.
2) Beyond usability: appearance.
3) The evolution of the device
4) Services – esp. mobile TV
5) Impact of mobile technology on communication and lifestyle.

Mobile devices are a great example of the complexity involved in designing usable interaction in the real world – wide range of users, goals, and contexts of use.

Definitions
mobile phone = basic form of a communication devices where the main aims of using the devices deal with voice- and text-based communication services
ubiquitous communication devices = more advanced devices handling all media, running a number of applications, and connecting over more than one network
Size: some mobiles are getting too small for some users, e.g. button sizes are getting too small for big fingers and those who have difficulty with precise pointing. Screens and characters are getting too small for everyone who does not have perfect vision. Even those who can work small buttons and screens ok in normal circumstances may have problems in an emergency - one of the key motivations for many users for having a phone (see next lecture).
Miniturisation - input

- Keypad
  - ITU standard telephone keypad for dialling
  - Hard keys or soft keys?
  - Possibility of mode errors (dialling unintentionally)
  - Keypad for SMS
    - Multipress or T9?
- PDAs: tapping or pen input (which tends to be less efficient)
- Speech recognition proved not useful (interference), but speech/sound output (e.g. ringtones) are popular

Softkeys change semantics depending on context
so is it a good idea to have lots of softkeys?
Low number = mode errors
High = increased selection time
Miniturisation - output

- Limited screen space
- WAP disaster
  - 3-4 lines at a time = web pages didn’t translate to small devices
- Screens (and devices) seem to be getting bigger
  - Integration of mobile and PDA
  - Services such as mobile TV
- But:
  - How usable is most functionality without headset?
  - How useful are cameras?
Increasing complexity means decreasing usability …

- So restriction to core functionality becomes a selling point
- Example: Vodafone/SAGEM *Simply* phone
“Ashamed of your mobile?”

- Mobiles are personal devices: extension of self
- Considerations beyond usability
- Appearance: linked to self-image
  - geeks vs. fashion victims
- Personalisation
  - Hardware: appearance (facia, add-ons)
  - Downloads: ring tones, games, ....
  - Access to favourite services (navigation, dating, ...)
“I’m on the train”

In the early 1990’s something exceedingly disturbing was happening on trains across Britain. People were talking. Loudly. The anger, generated among unwilling eavesdroppers and aimed at the mobile owners cheerfully declaring that they were ‘on the train’ was a sure indicator that an invisible social boundary had been transgressed. […] Railways were symbols of an industrial age, and in the sprawling industrial city, people became increasingly anonymous. Although the division of carriages into different classes … gave some clues, it remained extremely awkward to strike up a conversation on a ‘suitable’ note. Rather than commit a social gaffe, travellers on trains in Britain chose silence. Delicate issues of class had created social protocols of communication - rules governing when to speak and what could be said, rules that may never have been written down but that were all the more powerful for that.

(Agar: Constant Touch)
Cars and cellphones

- Homer Simpson: *It’s really hard to drive while talking on the phone!*
- Barney Gumble: “*Why don’t you get one of them hands-free things? It’s the next best thing to paying attention to the road!*”

Users only have one focus of **attention** — not just perceptual, cognitive too.
... and there is a processing 'Bottleneck'

'Bottleneck' slows brain activity. One in five people admit to talking on the mobile phone while driving. US researchers have discovered a likely reason why people find it hard to do two things at once. A "bottleneck" occurs in the brain when people attempt to carry out two simultaneous tasks, the research shows. The study found the brain slows down when attempting a second task less than 300 milliseconds after the first. The findings, published in Neuron, support the case for a complete ban on the use of mobile phones when driving, the team said.

The researchers from Vanderbilt University used functional MRI scans to detect changes in oxygenated blood in the brain - a way of monitoring the activity in different brain regions. They found that the lateral frontal and prefrontal cortex, and also the superior frontal cortex, were unable to process two tasks at once, leading to a bottleneck.

BBC News Jan 29, 2007

Interference/interruptions and dual tasks reduce performance and induce stress.
Push or pull?

- Different services require different models
- Messaging - being kept informed vs. information on demand
  - Customisation (profiles of use)
  - But: requires a lot of user effort, either upfront or through review as you go on using it
- And never forget: Most users get mobiles for to ‘stay in touch! - too much “push” can interfere with that.
Cameras in mobile phones

- Capturing things on the move
- Sharing experiences - "wish you were here"
- Celebrity snapping
- Citizen journalism
- Security (e.g. taking pics of cab drivers for safety)
Other services

- Downloads
  - Ringtones: fizzling out - US: $510 million in 2008 (down 7%) Chart hits to ringtone, ringtone to chart hits
  - Games still increasing
- M-commerce
  - purchase of small items (public transport tickets, coffee etc.)
- Staying in touch – e.g. auction sites, betting sites
- Mobile terminal as identity provider?
Mobile TV

- Quality issues due to bandwidth limits, even on 3G
- Small screen size makes many types of content not worth watching
- No point putting high-quality video on too small screens
- Competing with podcasts – timeliness/quality tradeoff

http://www.vitaphone.de/herz.htm
“Observation of human interaction suggests that a prime cause of stress in human behaviour is the appearance of signals or cues calling for the initiation of a new operation before the current one is completed. A choice must be made as to which is more important. At the present time the telephone and intercom systems almost always win, and a flurry of calls leaves behind a debris of incompletely sequences of behaviour upon which effort has been expended but for which personal rewards have not yet been realised. Increasing interruptions seem to be associated with increasing stress.”

Meier, 1962
The Dark Side

- **SMS bullying**
  - Can be worse than face-to-face
    - Importance of phone
    - “follows you everywhere”
  - Countermeasures
    - black/whitelisting
    - Advisory lines
    - Parental supervision (pingalert), Teen Tracker
    - But: children and teenagers resent “tug of home” through mobile
- **“Happy slapping”**
  - filming attacks on cameraphone and distributing widely
  - children, but serious criminal activity
- **Examples for social shaping of technology – unintended usage**

“The Pingalert can be activated by pressing a speed dial button on a child’s handset, which can be kept hidden from view. It sends a text message to the parent’s phone with a location description and picture message map where possible.”

Disney offers a “Teen tracker” service in the US, allowing parents to keep track of children’s whereabouts and who they receive calls/messages from.
Evaluating designs for mobile

- UI Design on PC
  - for analytical evaluation
  - For user recognition of commands, symbols etc.
- Interactive prototype on handheld
  - Walking, talking, navigating …
  - Observation difficult
- Simulation in CAVE
  - Environments, buildings, crowds etc.
  - Recording, eyetracking, physiology …
Summary points

1) Miniturisation vs. ease of interaction.
2) Perception of device is important
3) Increasing integration with other devices
4) Interface to e-commerce interactions
5) Mobile communication has had wide-ranging impact on many people's lives: work, fun, family, social relationships.
6) Ubiquitous availability has pros and cons for productivity and well-being.

References


Happy Slapping
http://www.guardian.co.uk/mobile/article/0,2763,1470214,00.html#article_continue and http://www.al4ie.com/?p=5

Mobile entertainment forum: http://www.m-e-f.org/news122305.html

Mobile life survey