# *Understanding mobile phones*

*HCI4: Lecture 5: Mobile Phones*



## One of the most successful technologies ever

- But not always that way
- Took over 50 years to become commercially successful
- An 'obvious' technology?
- Developed essentially by accident
  - Text messaging a late addendum to the GSM standard



## Predicting phones

- In 1980 McKinsey predicted around 1 million subscribers worldwide in the year 2000
- Actual numbers - 1 million phones sold **a day** in 2000
- Now 816 million sold a year (worldwide, 2005)
- Compare to 200 million PCs sold worldwide



## Technologies both succeed and failed

- WAP - failure (mobile internet)
- SMS - success (text messaging)
- MMS - failure (picture messaging)
- LBS - failure (location based services)
- Mobile games - success
- Mobile email - success (blackberry)

# Many new technologies in development

- Data speed: EDGE, improvements to 3G
- Camera phones: Improving resolution
- Cost: cheap phones for the third world
- Internet: better browsers, screen
- Location: Integration of GPS - 911 services



# Mobile phones have become a key ubicomp development platform

- Good development environments
- Most phones run Java
- C#: Windows mobile phones
- C++: Symbian
- Large array of mobile tools



# Designing for phones

- How people use their phones
- Numbers
- Surprising features of phone use
  - Gifts and emotions
- Designing good phone user interfaces
  - Learning from Nokia
- Programming phones



# Numbers on phone use

- Contract customers 22.2m
- Pre-pay 43.2m
- total 65.4m
- average bill £30.45

## So how do people use their mobile phones?

U.K. Mobile Subscriber Monthly Consumption of Content and Applications
M:Metrics Benchmark Survey: July 2006

Source: M:Metrics, Inc., Copyright © 2006. Survey of U.K. mobile subscribers.
Data based on three-month moving average for period ending 31 July, 2006, n= 14,842

| Activity | (000s) | Percent | Percent Change |
|---|---|---|---|
| *Sent Text Message* | 36,240 | 84.3% | -0.5% |
| *Used Photo Messaging* | 12,877 | 29.9% | 1.0% |
| *Browsed News and Information* | 6,229 | 14.5% | -3.2% |
| *Used Personal E-Mail* | 2,721 | 6.3% | -4.4% |
| *Purchased Ringtone* | 2,343 | 5.4% | -4.2% |
| *Downloaded Mobile Game* | 1,737 | 4.0% | -6.8% |
| *Used Mobile Instant Messenger* | 1,585 | 3.7% | -9.0% |
| *Used Work E-Mail* | 1,298 | 3.0% | -5.6% |
| *Purchased Wallpaper or Screensaver* | 945 | 2.2% | -2.1% |



| UK:Activity | (000s) | Percent | Percent Change |
|---|---|---|---|
| *Sent Text Message* | 36,240 | 84.3% | -0.5% |
| *Used Photo Messaging* | 12,877 | 29.9% | 1.0% |
| *Browsed News and Information* | 6,229 | 14.5% | -3.2% |

| US:Activity | (000s) | Percent | Percent Change |
|---|---|---|---|
| Sent Text Message | 70,864 | 37.3% | 1.0% |
| Used Photo Messaging | 26,070 | 13.7% | 7.2% |
| Browsed News and Information | 20,709 | 10.9% | 6.1% |



## In depth studies of mobile phone use

- People share their phones
  - Don't have credit so use each others phones
  - Talk around text messages
- People don't carry their phones with them all the time



## In depth studies of mobile phone use

- Example: Text use amongst teenagers
- Taylor's study of mobile phone use
  - http://research.microsoft.com/~ast/files/Gift_of_the_gab.pdf
- Examined how phone use was connected to gift exchange
- Mauss, M. (1997):The Gift: The Form and Reason for Exchange in Archaic Societies. London: Routledge.
  - Malinowski's study of the Kula ring

# Text messages as gifts

Alex: What about you Mark. What do you use your phone for?
Mark: Well, I mostly ring the lady [laughs]... and spend about half an hour. That's why my phone bill's so high.
Alex: What talking?
Mark. Yeah, talking. Of course I have to text her, you know, when I go to bed...[sounds of acknowledgement from others].
Alex: You have to? What do you mean you have to?
Helen: It's your duty really.
Mark: Yeah, you have to.
Susan: It's the rules!
Alex: The rules! What are the rules?
Helen: You need to say 'good night'.
Mark: Yeah, you need to say 'good night', you need to say 'good morning'...
Alex: Otherwise?
Susan: Otherwise they get stropy and they dump you for being insensitive! [group laugh]
Alex: What happened before mobiles?
Helen: Well you could phone and say 'Night. I love you, bye.'
Mark: Yeah, I used to ring her before I went to bed yeah, but in the morning that couldn't happen. Really, this [picks up his mobile] has made my life hell!



# The goodnight call

- Not an exchange of information
- A symbol of your feeling for another person
  - *A gift*
- A routine
- Something reciprocated



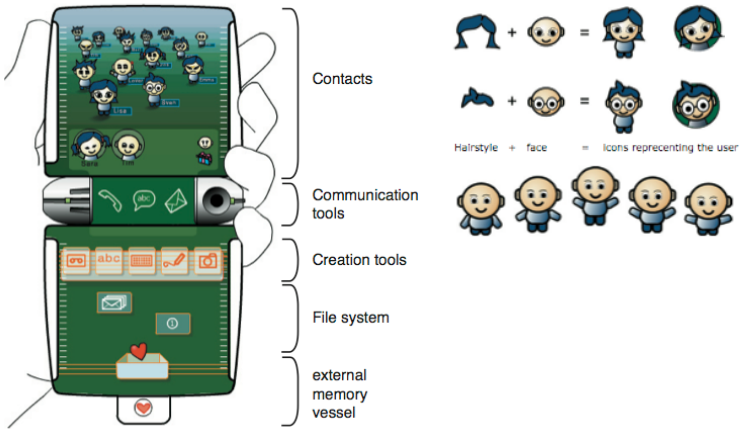
# Rituals of exchange

- Pleasure of recieving a message
- Obligation to reciprocate
- Value of text messages
  - Emotional
  - Symbolic
  - They cost real money
- Text messages are a huge business



# Design concepts

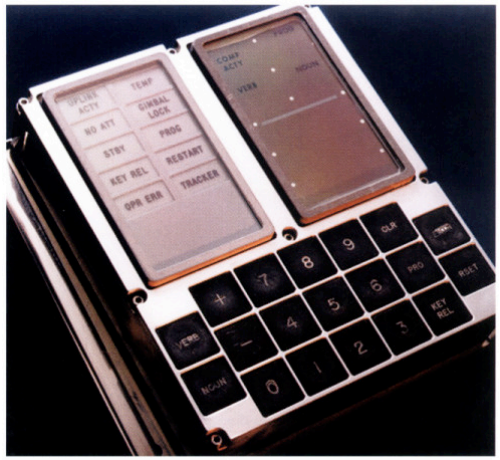
- A box for text messages
- Moving messages between phones
- A social interface for phones






# Designing phone interaces





Apollo Guidance Computer UI



- Consumer electronics
  - Often 1 key - 1 action
  - E.g. volume, tune
- As functionality increases so does complexity

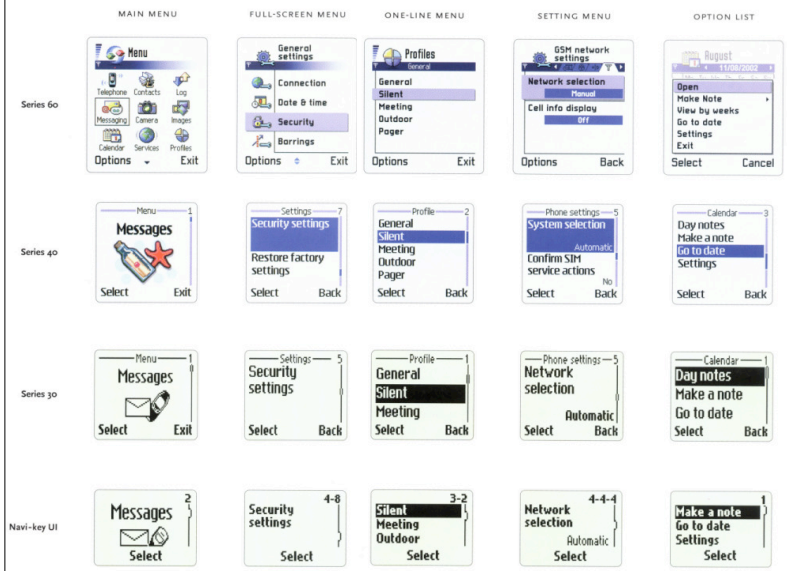
- How hard are clock radios to use?
  - Multiple buttons for each function
  - Multiple functions for each button




# Mobile phone interaction

- Since Nokia...
  - Use a menu which you can move around in
  - A very low number of buttons (4 at a minimum)
  - Different from PC's direct manipulation interfaces








# Design elements

- An'idle' screen
- A main menu
- Sub menus
- Option Screen
- Soft Keys
- Shortcuts

# The story of the nav-key

- 1995 - mobile phones really starting to take off
- Prestige project at Nokia is the Nokia communicator
- A group of designers working on the less glamarous ‘Ringo’ project (nicknamed ‘Bimbo’)
- Key design goal: get rid of the “send” and “end” buttons on the phone









- Management sceptical
  - But convinced by the prototype
  - Prototype implemented by an engineer just out of college
- User tests showed that the UI wasn’t perfect
  - Most users made one mistake call
  - ... but only one
- Simplicity of the design won out




# Development for mobile phones

- Java mobile edition (J2ME)
  - A special version of java for mobile devices
  - A cut-down set of classes you can use
- Two different configurations
  - CLDC: Connected limited device configuration
  - CDC: Connected device configuration (smartphones)
- MIDP2.0 - A variant on CLDC with more functionality
- MIDlet - an application written to work using MIDP



- A standard Java application
  - Can only use classes which are in the MIDlet specification (a subset of the normal java classes, but with a few added)
  - Must define methods - startApp, pauseApp, destroyApp
    - Also need to do some extra work to make your java app runnable on a phone
  - http://today.java.net/pub/a/today/2005/02/09/j2me1.html



# Writing a MIDlet

```
package com.j2me.part1;

import java.util.Date;

import javax.microedition.lcdui.Alert;
import javax.microedition.lcdui.Display;
import javax.microedition.midlet.MIDlet;

public class DateTimeApp extends MIDlet {

  Alert timeAlert;

  public DateTimeApp() {
    timeAlert = new Alert("Alert!");
    timeAlert.setString(new Date().toString());
  }

  public void startApp() {
    Display.getDisplay(this).setCurrent(timeAlert);
  }

  public void pauseApp() {
  }

  public void destroyApp(boolean unconditional) {
  }
}
```

# Mobile phone games

- MIDlets
- Use `javax.microedition.lcdui.game`
- Allows development of games using Sprites & TiledLayer
  - Sprites: Small objects that move around the screen
  - TiledLayer: A background consisting of the repitition of elements (tiles)




# Bluetooth Yoshi




# Windows Mobile 5

- A rich development environment similar to developing for windows
- Uses VisualStudio as the tool
- C# as the main language
  - A language very similar to java, but it looks a bit like C
- Can run on windows smartphones and PDAs
  - More in lab/lecture 13



# Review

- Mobile phones
  - A major platform for ubicomp
  - Lots of new developments, changing every day
  - Incredibly popular

- How mobile phones are used
  - Most customers pre-paid, 80% use text messages
  - Taylor's study of gift exchange
  - Phone use isn't just about rational information passing
- Designing phone UIs
  - The Nokia menu UI
  - History of the nav-key interface



- MIDlets and Java development on phones
- C# and Windows mobile
- Phone games