Week 6

Designing User Interface
(Part 1)

Overview

- Interface types
    - Highlight the main design and research considerations for each of the different interfaces

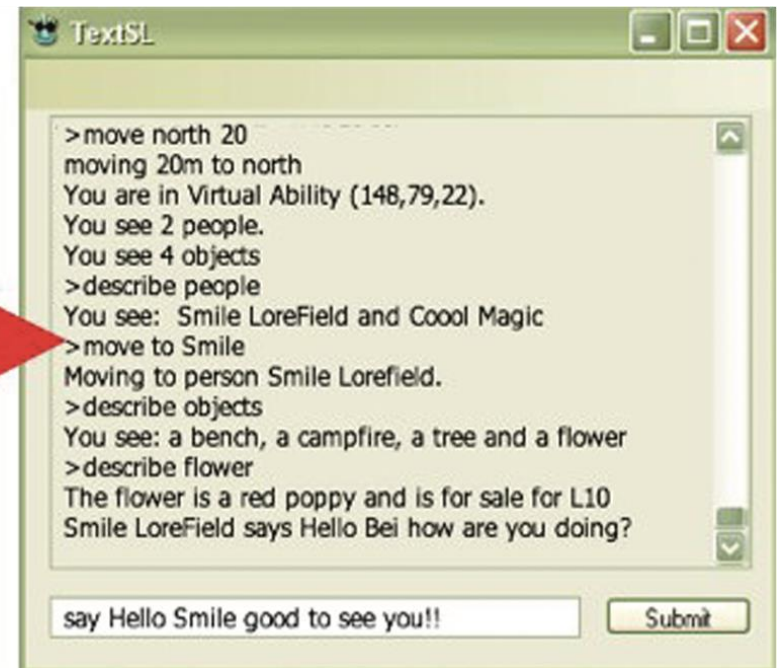- Consider which interface is best for a given application or activity

20 interface types covered

1. Command
2. Graphical
3. Multimedia
4. Virtual reality
5. Web
6. Mobile
7. Appliance
8. Voice
9. Pen
10. Touch
11. Gesture
12. Haptic
13. Multimodal
14. Shareable
15. Tangible
16. Augmented Reality
17. Wearables
18. Robots and drones
19. Brain–computer interaction
20. Smart

Command line interfaces

- Commands such as abbreviations (for instance, **ls**) typed in at the prompt to which the system responds (for example, by listing current files)

- Some are hard wired at keyboard, while others can be assigned to keys

- Efficient, precise, and fast

- Large overhead to learning set of commands

Second Life command line-based interface for visually-impaired users


```
TextSL
>move north 20
moving 20m to north
You are in Virtual Ability (148,79,22).
You see 2 people.
You see 4 objects
>describe people
You see: Smile LoreField and Coool Magic
>move to Smile
Moving to person Smile Lorefield.
>describe objects
You see: a bench, a campfire, a tree and a flower
>describe flower
The flower is a red poppy and is for sale for L10
Smile LoreField says Hello Bei how are you doing?
```

`say Hello Smile good to see you!!`   Submit

Research and design considerations

- Form, name types and structure are key research questions

- Consistency is most important design principle
  - For example, always use first letter of command

- Command interfaces popular for web scripting

Graphical user interfaces (GUIs)

- Xerox Star first WIMP gave rise to GUIs
- Windows
  - Sections of the screen that can be scrolled, stretched, overlapped, opened, closed, and moved around the screen using the mouse
- Icons
  - Pictograms that represent applications, objects, commands, and tools that were opened when clicked on
- Menus
  - Lists of options that can be scrolled through and selected
- Pointing device
  - A mouse controlling the cursor as a point of entry to the windows, menus, and icons on the screen

Example of first generation GUI

Simple smartwatch menus
with 1, 2, or 3 options

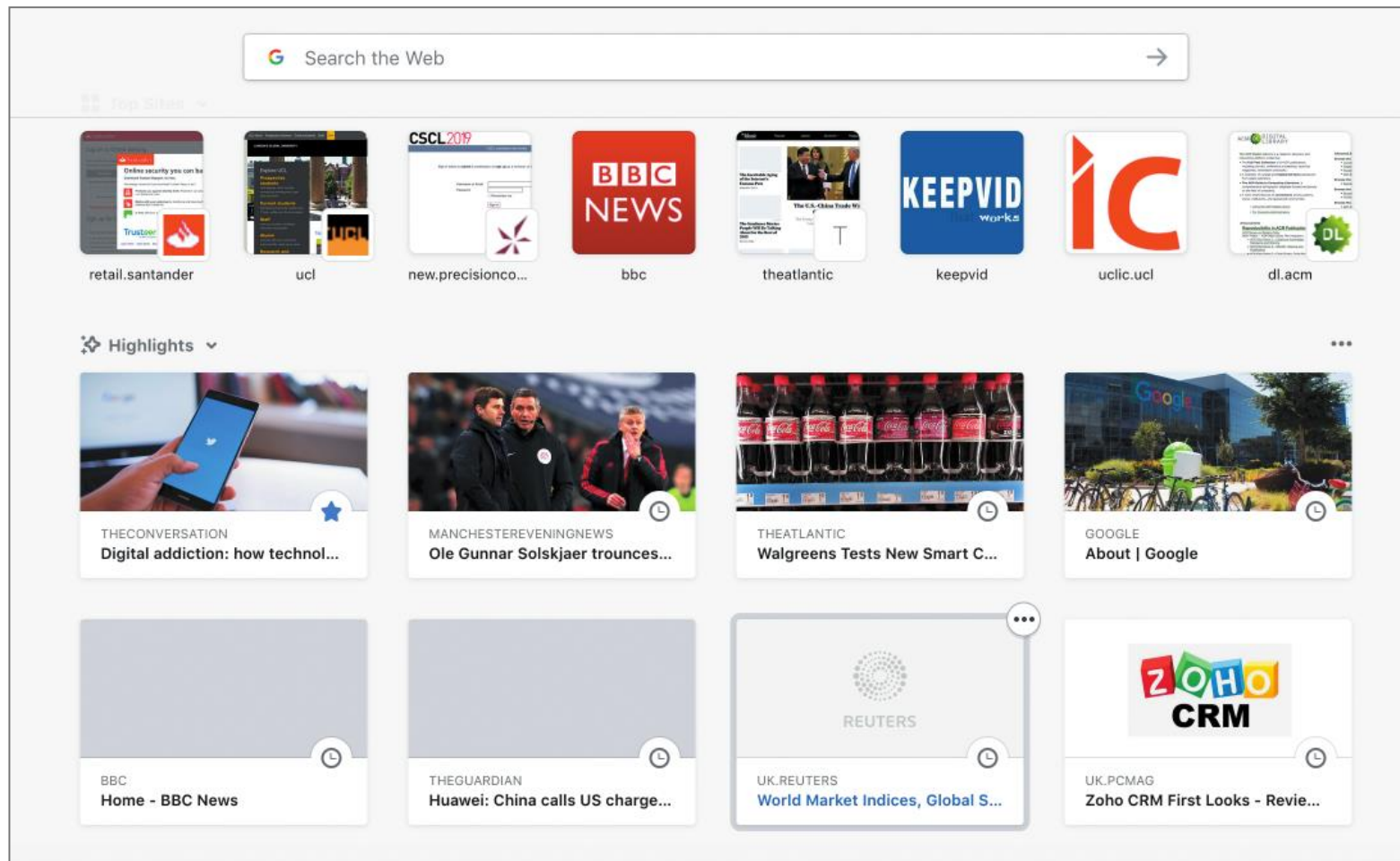One Action

Two Actions

Three Actions

Window design

- Windows were invented to overcome the physical constraints of a computer display
    - They enable more information to be viewed and tasks to be performed
- Scroll bars within windows enable more information to be viewed
- Multiple windows can make it difficult to find desired one
    - Listing, tabbing, and thumbnails are techniques that can help

Window design: Thumbnails of top websites visited and suggested highlights

Selecting a country from a scrolling window
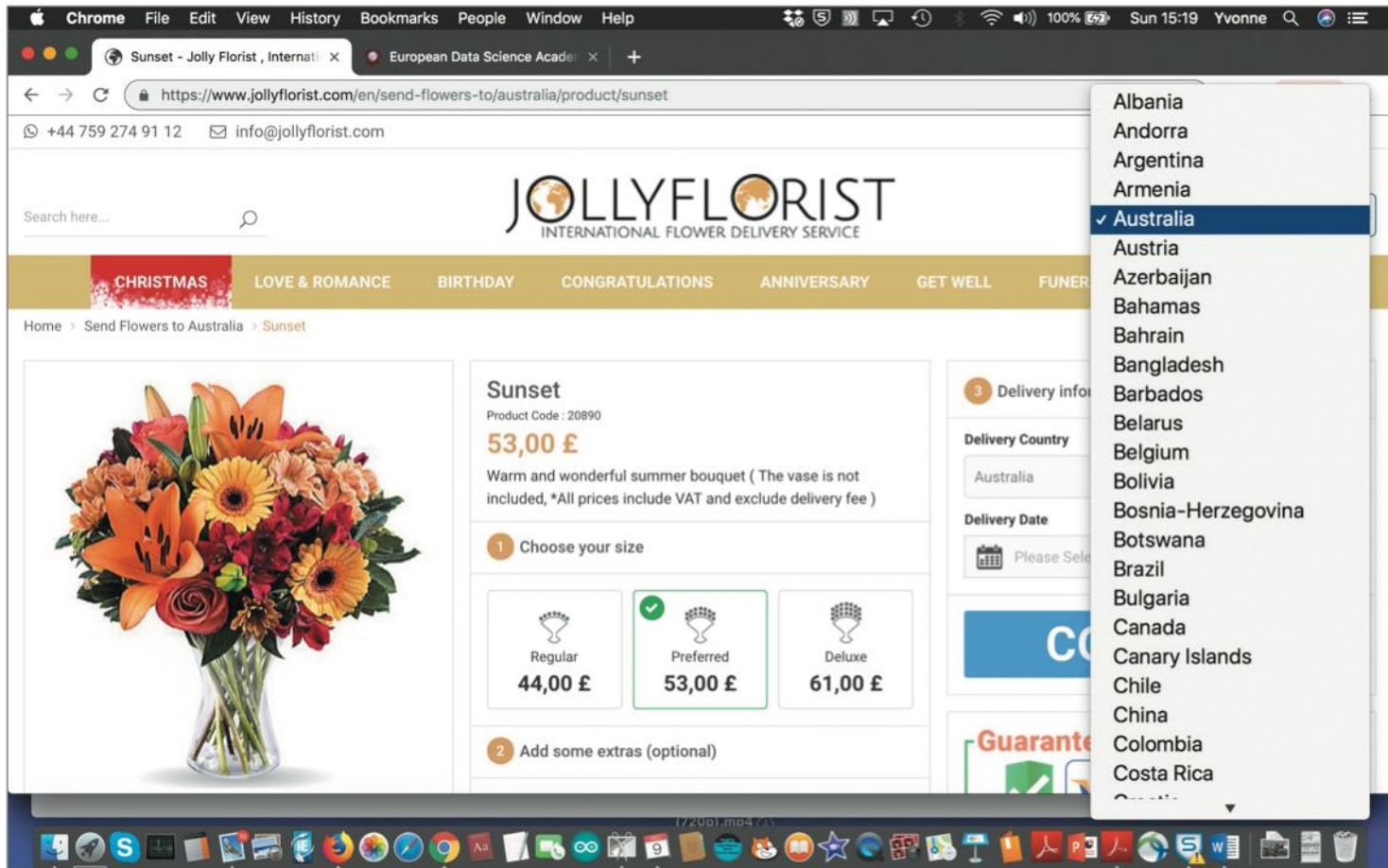
Is this method any better?

F	G	H	I	J
Fiji	Gabon	Haiti	Iceland	Jamaica
Finland	Germany	Holland	India	Japan
France	Gibraltar	Honduras	Indonesia	Jordan
French Guyana	Greece	Hong Kong	Iran	
French Polynesia	Greenland	Hungary	Ireland	
	Guadeloupe		Israel	
	Guam		Italy	
	Guatemala		Ivory Coast	

Menu styles

Flat list: Good for showing large number of options at the same time when display is small

Drop down: Shows more options on same screen (for example, cascading)

Pop-up: When pressed, command key for relevant options

Contextual: Provides access to often-used commands associated with a particular item

Collapsible: Toggles between **+** and **–** icons on a header to expand or contract its contents

Mega: All options shown using 2D drop-down layout
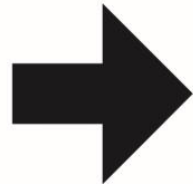
Template for a collapsible menu

A mega menu

John Lewis & Partners website navigation showing a mega menu.

Navigation bar: Home & Garden | Furniture & Lights | Electricals | Women | Men | Beauty | Baby & Child | Sport & Leisure | Gifts | Offers

Search product or brand   Create an account   Sign in

Furniture by Room
- Bedroom
- Living Room
- Dining Room
- Kitchen
- Bathroom
- Children's
- Nursery
- Home Office
- Hallway
- Garden

Furniture by Type
- Beds
- Mattresses
- Wardrobes
- Bedside Tables
- Chests of Drawers
- Dressing Tables
- Headboards
- Bookcases, Shelving Units & Shelves
- Office Desks
- Office Chairs
- Bathroom Cabinets

- Sofas & Armchairs
- Sofa Beds
- Coffee Tables
- Side Tables
- Console Tables
- TV Stands
- Cabinets & Sideboards
- Dining Tables
- Dining Chairs
- Dining Furniture Ranges
- Bar Chairs & Stools

Lighting
- View all Lighting
- Ceiling Lighting
- Wall Lighting
- Desk & Table Lamps
- Floor Lamps
- Ceiling & Lamp Shades
- Line, Fairy & Novelty Lights
- SAD & Wake Up Lighting
- Cabinet Lighting
- Light Bulbs
- Lighting & Electrical Accessories

Lighting By Room
- Garden & Outdoor Lighting
- Bathroom Lighting
- Kitchen Lighting
- Children's Lighting

Don't Miss
- New in: Lighting
- New in: House by John Lewis
- New in: Made to Order Upholstered Beds
- Bring the outdoors in: Conservatory Furniture
- Try our new Sofa Discovery Tool
- 20% off Mattresses
- 20% off Sofas & Armchairs
- 20% off Living & Dining Furniture
- 20% off Fitted Bedrooms
- 30% off Special Buy Fitted Kitchens

Research and design considerations

- Window management
  - Enables users to move fluidly between different windows (and monitors)

- How to switch attention between windows without getting distracted

- Design principles of spacing, grouping, and simplicity should be used

- Which terms to use for menu options (for example, "front" versus "bring to front"

- Mega menus easier to navigate than drop-down ones

Icon design

- Icons are assumed to be easier to learn and remember than commands

- Icons can be designed to be compact and variably positioned on a screen

- Now pervasive in every interface

  - For example, they represent desktop objects, tools (for example, a paintbrush), applications (for instance, a web browser), and operations (such as cut, paste, next, accept, and change)

Icons

- Since the Xerox Star days, icons have changed in their look and feel:

  - black and white ➡

    Color, shadowing, photorealistic images, 3D rendering, and animation

- Many designed to be very detailed and animated making them both visually attractive and informative

- Can be highly inviting, emotionally appealing, and feel alive

Icon forms

- The mapping between the representation and underlying referent can be:

  - Similar (for example, a picture of a file to represent the object file)
  - Analogical (for instance, a picture of a pair of scissors to represent 'cut')
  - Arbitrary (such as the use of an X to represent 'delete')

- The most effective icons are similar ones

- Many operations are actions making it more difficult to represent them

  - Use a combination of objects and symbols that capture the salient part of an action

2 types of icon styles

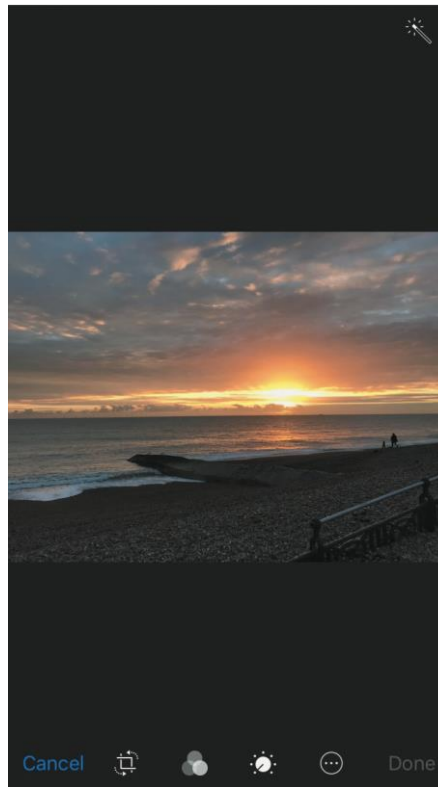# Flat 2D icons for a smartphone and a smartwatch
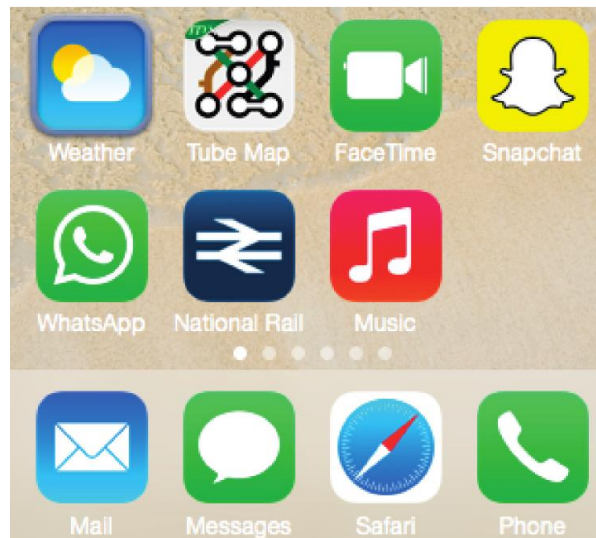
(a)

(b)

Activity

- Sketch simple icons to represent the following operations to appear on a digital camera screen:

  - Turn image 90-degrees sideways
  - Auto-enhance the image
  - Crop the image
  - More options

- Show them to someone else and see if they can understand what each represents

Basic edit icons that appear on the iPhone app

Research and design considerations

- There is a wealth of resources for creating icons

    - Guidelines, style guides, icon builders, libraries, online tutorials

- Text labels can be used alongside icons to help identification for small icon sets

- For large icon sets (for instance, photo editing or word processing) can use the hover function

Multimedia

- Combines different media within a single interface with various forms of interactivity
    - Graphics, text, video, sound, and animation
- Users click on links in an image or text
    - Another part of the program
    - An animation or a video clip is played
    - Users can return to where they were or move on to another place
- Can provide better ways of presenting information than a single media can

Pros and cons

- Facilitates rapid access to multiple representations of information

- Can provide better ways of presenting information than can any media alone

- Can enable easier learning, better understanding, more engagement, and more pleasure

- Can encourage users to explore different parts of a game or story

- Tendency to play video clips and animations while skimming through accompanying text or diagrams

Multimedia learning app designed for tablet

Research and design considerations

- How to design multimedia to help users explore, keep track of, and integrate the multiple representations
    - Provide hands-on interactivities and simulations that the user has to complete to solve a task
    - Provide quizzes, electronic notebooks, and games
- Multimedia good for supporting certain activities, such as browsing, but less optimal for reading at length

Virtual reality

- Computer-generated graphical simulations providing:
    - "the illusion of participation in a synthetic environment rather than external observation of such an environment" (Gigante, 1993)

- Provide new kinds of experience, enabling users to interact with objects and navigate in 3D space

- Create highly-engaging user experiences

Pros and cons

- Can have a higher level of fidelity with objects that they represent compared to multimedia

- Induces a sense of presence where someone is totally engrossed by the experience
  - "a state of consciousness, the (psychological) sense of being in the virtual environment" (Slater and Wilbur, 1999)

- Provides different viewpoints: first and third person

- Early head-mounted displays were uncomfortable to wear and could cause motion sickness and disorientation

- Lighter VR headsets are now available (for example, HTC Vive) with more accurate head tracking

Application areas

- Video games
- Arcade games for social groups
- Therapy for fears
- Experience how others feel emotions
  - For example, empathy and compassion
- Enrich user's planning experience for travel destinations
- Architecture, design, and education

Polygon graphics used to represent avatars for the We Wait VR experience

Research and design considerations

- Much research on how to design safe and realistic VRs to facilitate training
    - For example, flying simulators
    - Help people overcome phobias (for example, spiders or talking in public)
- Design issues
    - How best to navigate through them (for instance, first versus third person)
    - How to control interactions and movements (for example, by using head and body movements)
    - How best to interact with information (for instance by using keypads, pointing, and joystick buttons)
    - Level of realism to aim for to engender a sense of presence

Website design

- Early websites were largely text-based, providing hyperlinks

- Concern was with how best to structure information to enable users to navigate and access them easily and quickly

- Nowadays, more emphasis is on making pages distinctive, striking, and aesthetically pleasing

- Need to think of how to design information for multiple platforms—keyboard or touch?
  - For example, smartphones, tablets, and PCs

Usability versus aesthetics?

- Vanilla or multi-flavor design?
    - Ease of finding something versus aesthetic and enjoyable experience
- Web designers are:
    - "thinking great literature"
- Users read the web like a:
    - "billboard going by at 60 miles an hour" (Krug, 2014)
- Need to determine how to brand a web page to catch and keep 'eyeballs'

Breadcrumbs for navigation

Breadcrumbs are category labels:

- Enable users to look at other pages without losing track of where they have come from

- Very usable

- Enable one-click access to higher site levels

- Attract first time visitors to continue to browse a website having viewed the landing page

In your face Web ads

- Web advertising is often intrusive and pervasive

- Flashing, aggressive, persistent, and annoying

- Often requires action to get rid of

- What is the alternative?
  - Use of ad blockers

Research and design considerations

- Many books and guidelines on website design

- Veen's (2001) three core questions to consider when designing any website:

  1. Where am I?

 2. Where can I go?

  3. What's here?

Activity

- Look at a fashion brand's website, for example, Nike.com
- What kind of website is it?
- How does it contravene the design principles outlined by Veen?
- Does it matter?
- What kind of user experience is it providing for?
- What was your experience of engaging with it?

Mobile interfaces

- Handheld devices intended to be used while on the move

- Have become pervasive, increasingly used in all aspects of everyday and working life
    - For example, phones, fitness trackers, and smartwatches

- Larger-sized tablets used in mobile settings
    - Including those used by flight attendants, marketing professionals, and at car rental returns

QR codes and smartphones
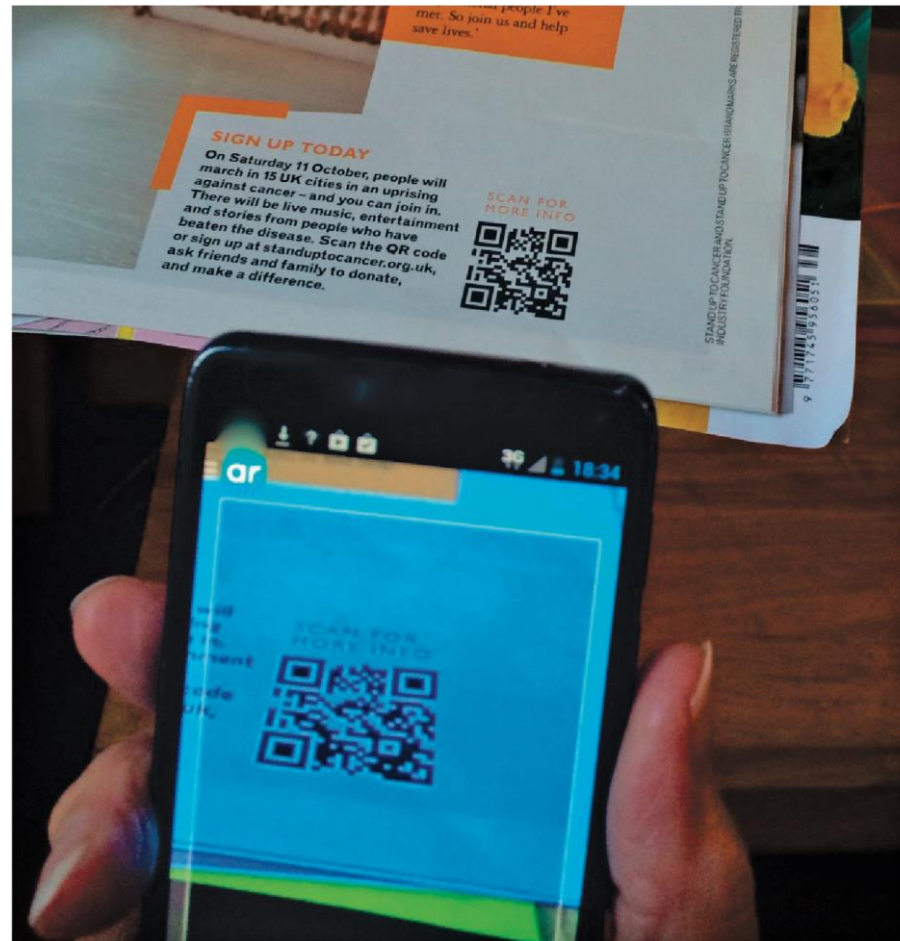
Research and design considerations

- Mobile interfaces can be cumbersome to use for those with poor manual dexterity or 'fat' fingers

- Key concern is hit area:
    - Area on the phone display that the user touches to make something happen, such as a key, an icon, a button, or an app
    - Space needs to be big enough for all fingers to press accurately
    - If too small, the user may accidentally press the wrong key
    - Fitts' law can be used to help design right spacing
        - Minimum tappable areas should be 44 points x 44 points for all controls