What is Interaction Design?

What is interaction design?

• Designing interactive products to support people in their everyday and working lives
  – Sharp, Rogers and Preece (2002)

• The design of spaces for human communication and interaction
  – Winograd (1997)

Goals of interaction design

• Develop usable products
  – Usability means easy to learn, effective to use and provide an enjoyable experience

• Involve users in the design process

Example of bad and good design

– Elevator controls and labels on the bottom row all look the same, so it is easy to push a label by mistake instead of a control button

– People do not make same mistake for the labels and buttons on the top row. Why not?
From: www.baddesigns.com
Why is this vending machine so bad?

- Need to push button first to activate reader
- Normally insert bill first before making selection
- Contravenes well known convention

From: www.baddesigns.com

What to design

- Need to take into account:
  - Who the users are
  - What activities are being carried out
  - Where the interaction is taking place

- Need to optimise the interactions users have with a product
  - Such that they match the users activities and needs

Understanding users’ needs

- Need to take into account what people are good and bad at
- Consider what might help people in the way they currently do things
- Listen to what people want and get them involved
- Use tried and tested user-based methods

Activity

- How does making a call differ when using a:
  - Cell phone
  - Public phone box?
- Consider the kinds of user, type of activity and context of use
What is an interface?

Evolution of HCI ‘interfaces’
- **50s** - Interface at the hardware level for engineers - switch panels
- **60-70s** - Interface at the programming level - COBOL, FORTRAN
- **70-90s** - Interface at the terminal level - command languages
- **80s** - Interface at the interaction dialogue level - GUIs, multimedia
- **90s** - Interface at the work setting - networked systems, groupware
- **00s** - Interface becomes pervasive
  - RF tags, Bluetooth technology, mobile devices, consumer electronics, interactive screens, embedded technology

From HCI to Interaction Design
- **Human-computer interaction (HCI)** is:
  “concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them” (ACM SIGCHI, 1992, p.6)

- **Interaction design (ID)** is:
  “the design of spaces for human communication and interaction”
  – Winograd (1997)

- Increasingly, more application areas, more technologies and more issues to consider when designing ‘interfaces’

Relationship between ID, HCI and other fields
- Academic disciplines (e.g. computer science, psychology)
- Design practices (e.g. graphic design)
- Interdisciplinary fields (e.g. HCI, CSCW)
Relationship between ID, HCI and other fields

- Academic disciplines contributing to ID:
  - Psychology
  - Social Sciences
  - Computing Sciences
  - Engineering
  - Ergonomics
  - Informatics

Relationship between ID, HCI and other fields

- Design practices contributing to ID:
  - Graphic design
  - Product design
  - Artist-design
  - Industrial design
  - Film industry

Relationship between ID, HCI and other fields

- Interdisciplinary fields that ‘do’ interaction design:
  - HCI
  - Human Factors
  - Cognitive Engineering
  - Cognitive Ergonomics
  - Computer Supported Co-operative Work
  - Information Systems

How easy is it to work in multidisciplinary teams?

- More people involved in doing interaction design the more ideas and designs generated…but…
- The more difficult it can be to communicate and progress forwards the designs being created
Interaction design in business

- Increasing number of ID consultancies, examples of well known ones include:
  - **Nielsen Norman Group**: “help companies enter the age of the consumer, designing human-centered products and services”
  - **Swim**: “provides a wide range of design services, in each case targeted to address the product development needs at hand”
  - **IDEO**: “creates products, services and environments for companies pioneering new ways to provide value to their customers”

What do professionals do in the ID business?

- **interaction designers** - people involved in the design of all the interactive aspects of a product
- **usability engineers** - people who focus on evaluating products, using usability methods and principles
- **web designers** - people who develop and create the visual design of websites, such as layouts
- **information architects** - people who come up with ideas of how to plan and structure interactive products
- **user experience designers** - people who do all the above but who may also carry out field studies to inform the design of products

What is involved in the process of interaction design

- Identify needs and establish requirements
- Develop alternative designs
- Build interactive prototypes that can be communicated and assessed
- Evaluate what is being built throughout the process

Core characteristics of interaction design

- Users should be involved through the development of the project
- Specific usability and user experience goals need to be identified, clearly documented and agreed at the beginning of the project
- Iteration is needed through the core activities
Usability goals

• Effective to use
• Efficient to use
• Safe to use
• Have good utility
• Easy to learn
• Easy to remember how to use

Activity on usability

• How long should it take and how long does it actually take to:
  – use a VCR to play a video?
  – use a VCR to pre-record two programs?
  – use an authoring tool to create a website?

User experience goals

– Satisfying
– Fun
– Enjoyable
– Entertaining
– Helpful
– Motivating
– Aesthetically pleasing

– rewarding
– support creativity
– emotionally fulfilling

– and more

Usability and user experience goals

• How do usability goals differ from user experience goals?
• Are there trade-offs between the two kinds of goals?
  – e.g. can a product be both fun and safe?
• How easy is it to measure usability versus user experience goals?
Design principles

- Generalizable abstractions for thinking about different aspects of design
- The do’s and don’ts of interaction design
- What to provide and what not to provide at the interface
- Derived from a mix of theory-based knowledge, experience and common-sense

Visibility

- This is a control panel for an elevator.
- How does it work?
- Push a button for the floor you want?

- Nothing happens. Push any other button? Still nothing. What do you need to do?

It is not visible as to what to do!

From: www.baddesigns.com

Feedback

- Sending information back to the user about what has been done
- Includes sound, highlighting, animation and combinations of these

- e.g. when screen button clicked on provides sound or red highlight feedback:

  - Previous → “ccclichk”
  - Previous → Previous
Constraints

- Restricting the possible actions that can be performed
- Helps prevent user from selecting incorrect options
- Three main types (Norman, 1999)
  - physical
  - cultural
  - logical

Physical constraints

- Refer to the way physical objects restrict the movement of things
  - E.g. only one way you can insert a key into a lock
- How many ways can you insert a CD or DVD disk into a computer?
- How physically constraining is this action?
- How does it differ from the insertion of a floppy disk into a computer?

Logical constraints

- Exploits people’s everyday common sense reasoning about the way the world works
- An example is the logical relationship between physical layout of a device and the way it works as the next slide illustrates

Logical or ambiguous design?

- Where do you plug the mouse?
- Where do you plug the keyboard?
- Top or bottom connector?
- Do the color coded icons help?

From: www.baddesigns.com
How to design them more logically

(i) A provides direct adjacent mapping between icon and connector

(ii) B provides color coding to associate the connectors with the labels

From: www.baddesigns.com

Cultural constraints

- Learned arbitrary conventions like red triangles for warning

- Can be universal or culturally specific

Which are universal and which are culturally-specific?

Mapping

- Relationship between controls and their movements and the results in the world

- Why is this a poor mapping of control buttons?
Mapping

- Why is this a better mapping?
- The control buttons are mapped better onto the sequence of actions of fast rewind, rewind, play and fast forward.

Activity on mappings

- Which controls go with which rings (burners)?

Why is this a better design?

Consistency

- Design interfaces to have similar operations and use similar elements for similar tasks.
- For example:
  - always use ctrl key plus first initial of the command for an operation – ctrl+C, ctrl+S, ctrl+O.
- Main benefit is consistent interfaces are easier to learn and use.
When consistency breaks down

• What happens if there is more than one command starting with the same letter?  
  – e.g. save, spelling, select, style
• Have to find other initials or combinations of keys, thereby breaking the consistency rule 
  – E.g. ctrl+S, ctrl+Sp, ctrl+shift+L
• Increases learning burden on user, making them more prone to errors

Internal and external consistency

• Internal consistency refers to designing operations to behave the same within an application 
  – Difficult to achieve with complex interfaces
• External consistency refers to designing operations, interfaces, etc., to be the same across applications and devices 
  – Very rarely the case, based on different designer’s preference

Keypad numbers layout

• A case of external inconsistency

(a) phones, remote controls  (b) calculators, computer keypads

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Affordances: to give a clue

• Refers to an attribute of an object that allows people to know how to use it 
  – e.g. a mouse button invites pushing, a door handle affords pulling
• Norman (1988) used the term to discuss the design of everyday objects
• Since has been much popularised in interaction design to discuss how to design interface objects 
  – e.g. scrollbars to afford moving up and down, icons to afford clicking on
What does ‘affordance’ have to offer interaction design?

- Interfaces are virtual and do not have affordances like physical objects
- Norman argues it does not make sense to talk about interfaces in terms of ‘real’ affordances
- Instead interfaces are better conceptualised as ‘perceived’ affordances
  - Learned conventions of arbitrary mappings between action and effect at the interface
  - Some mappings are better than others

Activity

- Physical affordances:
  How do the following physical objects afford? Are they obvious?

Virtual affordances:
  How do the following screen objects afford? What if you were a novice user? Would you know what to do with them?

Usability principles

- Similar to design principles, except more prescriptive
- Used mainly as the basis for evaluating systems
- Provide a framework for heuristic evaluation
Usability principles (Nielsen 2001)

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Help users recognize, diagnose and recover from errors
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation

Key points

- ID is concerned with designing interactive products to support people in their everyday and working lives
- ID is multidisciplinary, involving many inputs from wide-reaching disciplines and fields
- ID is big business even after the dot.com crash!

Key points

- ID involves taking into account a number of interdependent factors including context of use, type of task and kind of user
- Need to strive for usability and user experience goals
- Design and usability principles are useful heuristics for analyzing and evaluating interactive products