Design, prototyping and construction

Overview
- Prototyping and construction
- Conceptual design
- Physical design
- Tool support

Prototyping and construction
- What is a prototype?
- Why prototype?
- Different kinds of prototyping
  - Low fidelity
  - High fidelity
- Compromises in prototyping
  - Vertical
  - Horizontal
- Construction

What is a prototype?
In other design fields a prototype is a small-scale model:
- A miniature car
- A miniature building or town
What is a prototype?

In interaction design it can be (among other things):
- a series of screen sketches
- a storyboard, i.e. a cartoon-like series of scenes
- a Powerpoint slide show
- a video simulating the use of a system
- a lump of wood (e.g. PalmPilot)
- a cardboard mock-up
- a piece of software with limited functionality written in the target language or in another language

Why prototype?

- Evaluation and feedback are central to interaction design
- Stakeholders can see, hold, interact with a prototype more easily than a document or a drawing
- Team members can communicate effectively
- You can test out ideas for yourself
- It encourages reflection: very important aspect of design
- Prototypes answer questions, and support designers in choosing between alternatives

What to prototype?

- Technical issues
- Work flow, task design
- Screen layouts and information display
- Difficult, controversial, critical areas

Low-fidelity Prototyping

- Uses a medium which is unlike the final medium, e.g. paper, cardboard
- Is quick, cheap and easily changed
- Examples:
  - sketches of screens, task sequences, etc
  - ‘Post-it’ notes
  - storyboards
  - ‘Wizard-of-Oz’
Storyboards

• Often used with scenarios, bringing more detail, and a chance to role play

• It is a series of sketches showing how a user might progress through a task using the device

• Used early in design

Sketching

• Sketching is important to low-fidelity prototyping

• Don’t be inhibited about drawing ability. Practice simple symbols

Using index cards

• Index cards (3 X 5 inches)

• Each card represents one screen

• Often used in website development

‘Wizard-of-Oz’ prototyping

• The user thinks they are interacting with a computer, but a developer is responding to output rather than the system.

• Usually done early in design to understand users’ expectations

• What is ‘wrong’ with this approach?
High-fidelity prototyping

- Uses materials that you would expect to be in the final product.
- Prototype looks more like the final system than a low-fidelity version.
- For a high-fidelity software prototype common environments include Macromedia Director, Visual Basic, and Smalltalk.
- Danger that users think they have a full system.......see compromises

Compromises in prototyping

- All prototypes involve compromises
- For software-based prototyping maybe there is a slow response? sketchy icons? limited functionality?
- Two common types of compromise
  - ‘horizontal’: provide a wide range of functions, but with little detail
  - ‘vertical’: provide a lot of detail for only a few functions
- Compromises in prototypes mustn’t be ignored. Product needs engineering

Construction

- Taking the prototypes (or learning from them) and creating a whole
- Quality must be attended to: usability (of course), reliability, robustness, maintainability, integrity, portability, efficiency, etc
- Product must be engineered
  - Evolutionary prototyping
  - ‘Throw-away’ prototyping

Conceptual design: from requirements to design

- Transform user requirements/needs into a conceptual model
  - “a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”
- Don’t move to a solution too quickly. Iterate, iterate, iterate
- Consider alternatives: prototyping helps
Three perspectives for a conceptual model

• Which interaction mode?
  How the user invokes actions
  Activity-based: instructing, conversing, manipulating and navigating, exploring and browsing.
  Object-based: structured around real-world objects

• Which interaction paradigm?
  Desktop paradigm, with WIMP interface (windows, icons, menus and pointers), ubiquitous computing, pervasive computing, wearable computing, mobile devices and so on.

• Is there a suitable metaphor?
  (contd)....

Is there a suitable metaphor?

• Interface metaphors combine familiar knowledge with new knowledge in a way that will help the user understand the product.

• Three steps: understand functionality, identify potential problem areas, generate metaphors

• Evaluate metaphors:
  How much structure does it provide?
  How much is relevant to the problem?
  Is it easy to represent?
  Will the audience understand it?
  How extensible is it?

Expanding the conceptual model

• What functions will the product perform?
  What will the product do and what will the human do (task allocation)?

• How are the functions related to each other?
  Sequential or parallel?
  Categorisations, e.g. all actions related to telephone memory storage

• What information needs to be available?
  What data is required to perform the task?
  How is this data to be transformed by the system?
Using scenarios in conceptual design

• Express proposed or imagined situations
• Used throughout design in various ways
  scripts for user evaluation of prototypes
  concrete examples of tasks
  as a means of co-operation across
  professional boundaries
• Plus and minus scenarios to explore extreme
  cases

Using prototypes in conceptual design

• Allow evaluation of emerging ideas
• Low-fidelity prototypes used early on, high-
  fidelity prototypes used later

Physical design: getting concrete

• Considers more concrete, detailed issues of designing
  the interface
• Iteration between physical and conceptual design
• Guidelines for physical design
  - Nielsen’s heuristics
  - Shneiderman’s eight golden rules
• Styles guides: commercial, corporate
  decide ‘look and feel’ for you
  widgets prescribed, e.g. icons, toolbar

Physical design: getting concrete

• Different kinds of widget (dialog boxes,
  toolbars, icons, menus etc)
  - menu design
  - icon design
  - screen design
  - information display
**Menu design**

- How long is the menu to be?
- In what order will the items appear?
- How is the menu to be structured, e.g. when to use sub-menus, dialog boxes?
- What categories will be used to group menu items?

- How will division into groups be denoted, e.g. different colors, dividing lines?
- How many menus will there be?
- What terminology to use? (results of requirements activities will indicate this)
- How will any physical constraints be accommodated, e.g. mobile phone?

**Icon design**

- Good icon design is difficult
- Meaning of icons is cultural and context sensitive
- Some tips:
  - always draw on existing traditions or standards
  - concrete objects or things are easier to represent than actions
- From clip art, what do these mean to you?

**Screen design**

Two aspects:
- How to split across screens moving around within and between screens how much interaction per screen? serial or workbench style?
- Individual screen design
  - white space: balance between enough information/interaction and clarity grouping items together: separation with boxes? lines? colors?
Screen design: splitting functions across screens

• Task analysis as a starting point
• Each screen contains a single simple step?
• Frustration if too many simple screens
• Keep information available: multiple screens open at once

Screen design: individual screen design

• Draw user attention to salient point, e.g. colour, motion, boxing
• Animation is very powerful but can be distracting
• Good organization helps: grouping, physical proximity
• Trade off between sparse population and overcrowding

Information display

• Relevant information available at all times
• Different types of information imply different kinds of display
• Consistency between paper display and screen data entry

Summary

• Different kinds of prototyping are used for different purposes and at different stages
• Prototypes answer questions, so prototype appropriately
• Construction: the final product must be engineered appropriately
• Conceptual design (the first step of design)
• Physical design: e.g. menus, icons, screen design, information display
• Prototypes and scenarios are used throughout design