

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

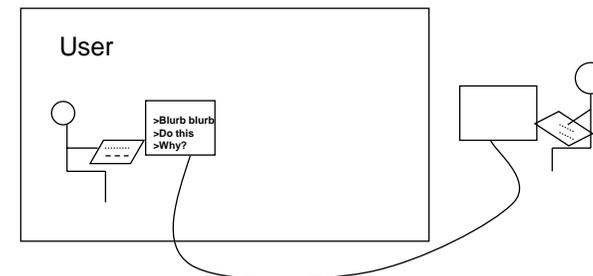
- Sketching is important to low-fidelity prototyping
- Don't be inhibited about drawing ability. Practice simple symbols

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

Three perspectives for a conceptual model

- 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

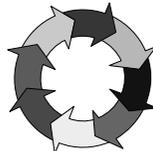
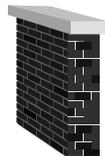
- How long is the menu to be?
- In what order will the items appear?
- How is the menu to be structured, e.g. when to use sub-menus, dialog boxes?
- What categories will be used to group menu items?

Menu design

- 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