Design, prototyping and construction
Overview

• Prototyping and construction
• Conceptual design
• Physical design
• Generating prototypes
• 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
Card-based prototypes

• Index cards (3 X 5 inches)
• Each card represents one screen or part of 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
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?
Considering interaction types

• Which interaction type?
  How the user invokes actions
  Instructing, conversing, manipulating or exploring

• Do different interface types provide insight?
  WIMP, shareable, augmented reality, etc
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
Generate storyboard from scenario

1. Thomison family gather around
   - WELCOME

2. System suggests flotilla
   - Keyboard

3. System shows descriptions

4. System asks for details
   - further details?

5. Summary printed
   - Printer
   - PRINT
Generate card-based prototype from use case

**TRAVEL INFORMATION**
- Visa requirements
- Vaccination Recommendations
- What to pack before you go

**VISA REQUIREMENTS**
- Destination Country
- Traveller's Nationality

**VISA REQUIREMENTS FOR (COUNTRY)**
- Print
Tool support - DENIM
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)
- Consider interaction types and interface types to prompt creativity
- Storyboards can be generated from scenarios
- Card-based prototypes can be generated from use cases