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

- Often use 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
- Most positive and most negative consequences of design

Generate storyboard from scenario
Generate card-based prototype from use case

Tool support - DENIM

http://dub.washington.edu/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