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. Palm Pilot)
- 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

Generate card-based prototype from use case

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