Prototypes and Evaluation

1 Prototypes

Prototypes can come in all shapes and forms

- Early in the development process they may be made of paper, post-its or cardboard

- Later they may be screen mock-ups or products with restricted functionality

- Finally they may be more polished pieces of software, metal or plastic that represent the final product

> **Definition: Prototyping**
>
> The process of building the interactive versions of the proposed product

A prototype allows users to

- Interact with envisioned product

- Gain experience of using it in a realistic setting

- Explore imagined uses

A prototype is a limited representation that allows interaction and helps users explore its suitability

1.1 What is a prototype

An interaction design it can be (among other things):

- A series of screen sketches

- A storyboard

- A powerpoint slide show

- A video simulating the use of a system

- A lump of wood

- A cardboard mock-up

- A piece of software with limited functionality

1.2 What to prototype

Technical issues:

- How feasible is the design

- If you can't make a mock up what hope is there for the full product

Screen layouts and information display

- What will the screens look like?

- How will information be displayed?

- How does this affect the proposed interaction?

Difficult, controversial, critical areas

- Remove ambiguity from the design

- Clarify vague requirements

- Force the developers to make concrete design decisions and see how they work

- Can be difficult to get users to articulate exactly what they want

- When presented with examples Stakeholders can see, hold, interact with a prototype more easily than a document or drawing

- Allows developers to verify requirements

- Prototypes answer questions, and support designers in choosing between alternatives

- Team members can communicate effectively

- It encourages reflection: very important aspect of design

- You can test out ideas yourself

1.3   Wireframe vs Mockup vs Prototype

> **Definition: Wireframe**
>
> Basic illustrations of structure and components of a web page

> **Definition: Mockups**
>
> Close or identical to the actual final web site design and include graphics - generally just image files

> **Definition: Prototypes**
>
> Semi functional and generally give the client the ability to click around and simulate the way the site will eventually work

1.4   Prototyping process

- Very early in the process, you should develop paper prototypes- wireframes of screen designs - and walk through this with end-users

- You then refine your design and develop increasingly sophisticated automated prototypes, then make them available to users for testing

1.5   Low-fidelity Prototyping

Uses a medium which is unlike the final medium

Is quick, cheap and easily changes

- Supports the exploration of alternative designs and ideas

- Important for early stage of design

- They are exploratory only

1.6   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

- A series of sketched screens for a GUI interface
- A series of scene sketches showing the user performing an activity
- Used early in design

1.7   High-fidelity programming

- Uses materials that you would expect to be in the final product
- Prototype looks more like the final system than a low-fidelity version
- Danger that users think they have a full system - need to manage user expectations

Problems with high fidelity prototypes

- They take too long to build
- Reviewers and testers tend to comment on superficial aspects rather than content
- Developers are reluctant to change something they have crafted for hours
- A software prototype can set expectations too high
- Just one bug in a high-fidelity prototype can bring testing to a fault

1.8   Compromises in prototyping

- All prototypes involve compromises
- For software based prototyping
    - Slow response
    - Sketchy icons
    - Limited functionality
- Two common types of compromise
    - Horizontal - lots of functions, little detail
    - Vertical - Lots of detail, few functions
- Compromises in prototypes mustn't be ignored, product still needs to be produced

1.9   Management of problems for prototyping

Time

- Building prototypes take time
- Needs to be fast - rapid prototyping. Careful this does not lead to rushed evaluation and erroneous results

Planning

- Hard to adequately and cost a design involving prototyping

Non functional requirements

- Such features sacrificed in prototypes
- May be critical to product acceptance

Contracts

- Design often bound by contractual agreement on technical and managerial issues
- Prototypes are quick to change but this needs to be reflected in the requirements document which serves as the binding development agreement

1.10 Key points

- Prototyping is the process of building interactions of a proposed product

- Used to gather formative evaluation results and feedback from users

- Low fidelity prototypes are cheap and quick to develop and should be used early in the design for formalise requirements

- High fidelity prototypes provide the look and feel of the final product and serve as a living specification

- Need early consideration of the nature of the prototype

- Prototyping can be difficult to plan and cost and we must be aware of the non-functional components that may be missing

2 Evaluation

2.1 Goals of evaluation

- To assess the extent of the systems functionality

- To assess the effect of the interface on the user

- To identify any specific problems with the system

2.2 Why, what, where and when to evaluate

- Why: to check users' requirements and that users can use the product and they like it

- What: a conceptual model, early prototypes of a new system and later, more complete prototypes

- Where: in natural and laboratory settings

- When: Throughout design; finished products can be evaluated to collect information and to inform new products

2.3 Types of evaluation

- **Controlled settings** involving users

  - Usability testing
  - Living labs

- **Natural settings** involving users

  - Evaluate people in natural settings
  - Goal to be unobtrustive

- **Any settings** not involving users

  - Researcher has to imagine or model how an interaction will take place
  - Inspection methods used to predict user behaviours and identify usability problems

2.3.1 Inspection methods

- Heuristic evaluation

  - Guides design or critique a decision. Critique based on principles and guidelines

- Cognitive walkthrough

  - Analysis of action sequences the user interface requires the user to perform

- Analytics

  - Measurement, collection, analysis and reporting of internet data

2.4   Key points

- Evaluation and design are closely integrated in user-centred design

- Some of the same data gathering methods are used in evaluation as for establishing requirements but they are used differently

- Three types of evaluation. Controlled - laboratory based with users, Less controlled - in the field with users, studies that do not involve users

- Usability testing and experiments enable they evaluator to have high level of control over what gets tested, whereas evaluations typically impose little or no control on participants in field studies