**Prototyping**

**Early design**
- Brainstorm different representations
- Choose a representation
- Rough out interface style
- Task centered walkthrough and redesign
- Fine tune interface, screen design
- Heuristic evaluation and redesign
- Usability testing and redesign

**Late design**
- Limited field testing
- Alpha/Beta tests

**Low fidelity prototypes**
- **Low fidelity paper prototypes**
  - Paper prototypes
    - paper mock-up of the interface look, feel, functionality
    - quick and cheap to prepare and modify
  - Purpose
    - brainstorm competing representations
    - elicit user reactions
    - elicit user modifications / suggestions

**Sketches**
- drawing of the outward appearance of the intended system
- crudity means people concentrate on high level concepts
- but hard to envision a dialog’s progression

**Computer Telephone**

<table>
<thead>
<tr>
<th>Item</th>
<th>Style</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>6.98</td>
</tr>
</tbody>
</table>

*Tax: 6.98
Total: $104.98*
**Storyboarding**

- a series of key frames
  - originally from film; used to get the idea of a scene
  - snapshots of the interface at particular points in the interaction
- users can evaluate quickly the direction the interface is heading

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**Pictive**

- plastic interface for collaborative technology initiatives through video exploration

Designing with office supplies
- multiple layers of sticky notes and plastic overlays
- different sized stickies represent icons, menus, windows etc.

interaction demonstrated by manipulating notes
- new interfaces built on the fly

session videotaped for later analysis
- usually end up with mess of paper and plastic!
Pictive

Can pre-make paper interface components

buttons

combo box

list box

menu

alert box

tabs

entries

Tutorial manuals

Write them in advance of the system
- a step by step storyboard walkthrough with detailed explanations
- key interface concepts for programmers

Apple's Tutorial Guide to the Macintosh Finder

Medium fidelity prototypes

Prototyping with a computer
- simulate some but not all features of the interface
  - engaging for end users

purpose
- provides sophisticated but limited scenario for the user to try
- can test more subtle design issues

dangers
- user's reactions often "in the small"
- users reluctant to challenge designer
- Users reluctant to touch the design
- management may think its real!

Limiting prototype functionality

vertical prototypes
- includes in-depth functionality for only a few selected features
- common design ideas can be tested in depth

horizontal prototypes
- the entire surface interface with no underlying functionality
- a simulation; no real work can be performed

scenario
- scripts of particular fixed uses of the system; no deviation allowed

Integrating prototypes and products

**Throw-away**
- prototype only serves to elicit user reaction
- creating prototype must be rapid, otherwise too expensive

**Incremental**
- product built as separate components (modules)
- each component prototyped & tested, then added to the final system

**Evolutionary**
- prototype altered to incorporate design changes
- eventually becomes the final product

Painting/drawing packages

draw each storyboard scene on computer
- very thin horizontal prototype
- does not capture the interaction “feel”

Scripted simulations

create storyboard with media tools
- scene transition activated by simple user inputs
- a simple vertical prototype

user given a very tight script/task to follow
- appears to behave as a real system
- script deviations blow the simulation
Interface builders

Design tools for laying out common widgets

- excellent for showing look and feel
  - a broader horizontal prototype
  - but constrained to widget library

- vertical functionality added selectively
  - through programming
**Wizard of Oz**

A method of testing a system that does not exist
- the voice editor, IBM 1984

Human ‘wizard’ simulates system response
- interprets user input according to an algorithm
- controls computer to simulate appropriate output
- uses real or mock interface
- wizard sometimes visible, sometimes hidden
  - “pay no attention to the man behind the curtain!”

**What you now know**

User centered + participatory design
- based upon a user’s real needs, tasks, and work context
- bring end-user in as a first class citizen into the design process

Prototyping
- allows users to react to the design and suggest changes
- low-fidelity vs medium-fidelity

Prototyping methods
- vertical, horizontal and scenario prototyping
- sketches, storyboarding, pictive
- scripted simulations, Wizard of Oz

**Interface Design and Usability Engineering**

- Articulate: who users are - their key tasks
- Brainstorm designs
- Refined designs
- Completed designs
- Task centered design
- Participatory design
- User-centered design
- Psychology of everyday things
- User involvement
- Participatory interaction
- Task scenario walkthrough
- Graphical screen design
- Interface guidelines
- Usability testing
- Heuristic evaluation
- Field testing

**Products:**
- User and task descriptions
- Throw-away paper prototypes
- Testable prototypes
- Alpha/beta systems or complete specification
Storyboard of a computer telephone

Wizard of Oz Examples

IBM: an imperfect listening typewriter using continuous speech recognition
- secretary trained to:
  - understand key words as "commands"
  - to type responses on screen as the system would
  - manipulating graphic images through gesture and speech

Intelligent Agents / Programming by demonstration
- person trained to mimic "learning agent"
  - user provides examples of task they are trying to do
  - computer learns from them
- shows how people specify their tasks

In both cases, system very hard to implement, even harder to change!