Prototyping 1:
Concepts and Software Tools

Sketches, storyboards, mock-ups and scenarios
Software tools
Agenda

- Dimensions and terminology
- Non-computer methods
- Computer methods
Why Prototype?

YOU KEEP USING THAT WORD

I DON'T THINK IT MEANS WHAT YOU THINK IT MEANS

memegenerator.net
How do we express early design ideas?
- No software coding at this stage

Key notions
- Make it fast!!!
- Allow lots of flexibility for radically different designs
- Make it cheap
- Promote valuable feedback

*** Facilitate iterative design and evaluation ***
Dilemma

- You can’t evaluate design until it’s built
- Simulate the design, in low-cost manner
Why Prototype?

- Better designs
  - More creative
- Find failures quickly
- Faster feedback from users
- Feasibility for high-fi versions
Prototyping Dimensions

- Representation
- Scope
- Executability
- Maturation
Prototyping Dimensions

1. Representation
   - How is the design depicted or represented?
   - Can be just textual description or can be visuals and diagrams

2. Scope
   - Is it just the interface (mock-up) or does it include some computational component?
3. Executability

- Can the prototype be “run”? 
- If coding, there will be periods when it can’t

4. Maturation

- What are the stages of the product as it comes along?
  
  Revolutionary - Throw out old one
  Evolutionary - Keep changing previous design
Terminology (1)

- **Early prototyping**
  - Used to evaluate function and interface
  - Typically non-computer

- **Late prototyping**
  - Used to evaluate performance
  - Usually computer-based
Terminology (2)

- Low-fidelity prototype
- High-fidelity prototype
Terminalogy (3)

- **Horizontal prototype**
  
  Very broad, does or shows much of the interface, but does this in a shallow manner.

- **Vertical prototype**
  
  Fewer features or aspects of the interface simulated, but done in great detail.
Flow Chart

- Functional specification of how the system operates, in a step-by-step flow
  - IF-THENs, branches, loops
  - No visual layout/interface specified
  - More detailed, useful for quick evaluation, but requires more commitment of resources to produce
  - Also more advanced (sometimes means more rigid) than simpler mockups
Paper-based “drawings” of interfaces

- Good for brainstorming
- Focuses people on high-level design notions
- Not so good for illustrating flow and the details
- Quick and cheap -> helpful feedback
Mockups: Simple sketches…

View Inside the sub
Mockups: Complex details…
Mockup: Controls...

Sub 'joysticks'

- close hand
- open hand
- speed up
- speed down
- up
- down

Vacuum
Mockup: Displays...
Mockup: Controls + Displays

- Inclinometer
- Ballast Panel
- Speedometer
- Compass
- Clock
- Depth Sounder
- Pressure Gauges
- Fuel Monitor
- Hydraulic Monitor
- RPM Gauge
- Depth Gauge
- Thrust Meter
- Rudder Monitor
- Active Sonar
Physical Mockup
Nintendo Does It

The Wii U
14.3 Interface wireframes, sketches, and final interface for multiplayer Wheel of Fortune.
Pros/Cons

➤ **Pros:**
  - Give grounding to feedback
  - Helps users think about it instead of conceptual only
  - Good for brainstorming iteration

➤ **Cons:**
  - Users could get stuck on the colors/wording
  - Harder to test new interaction styles
Possible Fix
Obama advocates stem cell research.

Tags: Obama, Election 08, stem cell research

CNN – Election 2008 Issues...

DEMOCRATS

Barack Obama

Advocates increased stem cell research. Campaign Web site states: “We owe it to the American people to explore the potential of stem cells to treat the millions of people suffering from debilitating and life-threatening diseases.” Supported legislation during his tenure in the Illinois Senate that allowed embryonic stem cell research in that state. Opposes human cloning.

Voted in support of these congressional stem-cell bills:

-- The Stem Cell Research Enhancement Act, which amends the Public Health Service Act to provide for human embryonic stem cell research.

-- The Alternative Puirpotent Stem Cell Therapies Enhancement Act, which promotes research into deriving stem lines by methods “that do not knowingly harm embryos.”

-- The Fetal Farming Bill of 2006, which prohibits the “solicitation or acceptance of tissue from embryos gestated for research purposes.”

He was one of the co-sponsors of the Stem Cell Research Enhancement Act of 2007 (S. 5), which expands the number of human embryonic stem cells eligible for federally funded research.

Watch Obama speak about stem cell research

He supported legislation during his tenure in the Illinois Senate that allowed embryonic stem cell research in that state.

Obama voted in support of congressional stem cell bills.

Obama and McCain supported the same stem cell bills.
Sketch Design - IMTC
Valve Software

- Created “Orange Maps” for playtesting Half-Life 1/2
  - Placeholder graphics (obvious to user)
- Isolate game level design/testing from content creation
- Playtesters don’t criticize visuals
Orange Map - Prison
In Between
Final Prison Map
Storyboarding

- Pencil and paper simulation or walkthrough of system look and functionality
  - Use sequence of diagrams/drawings
  - Show key snapshots
  - Quick & easy
DR. DIETRICH'S CLASS TRIP TO THE HIGH MUSEUM...

THE SYSTEM RECORDS DR.
DIETRICH'S GESTURES AND LINKS
THEM TO HER VOICE NOTATIONS

AS DR. DIETRICH LECTURES, THE
SYSTEM RECORDS HER
HOTSPOT ANNOTATIONS

VAN GOGH'S SUNFLOWERS,
SIMPLICITY LEAVES THE
VIEWER CAPTIVATED

I DISAGREE. I
WOULDN'T USE THE
TERM SIMPLISTIC TO
DESCRIBE THIS
WORK.

JUDY CAN ACCESS THE NOTES FROM
THE MUSEUM KIOSK OR DOWNLOAD
THEM AT HOME

JUDY LISTENS TO THE
LECTURE AND MAKES
HER OWN NOTATIONS

VAN GOGH'S SUNFLOWERS,
SIMPLICITY...
Scenarios

- Hypothetical or fictional situations of use
  - Typically involving some person, event, situation and environment
  - Provide context of operation
  - Often in narrative form, but can also be sketches or even videos
Scenario Utility

- Engaging and interesting
- Allows designer to look at problem from another person’s point of view
- Facilitates feedback and opinions
- Can be very futuristic and creative
- Can involve social and interpersonal aspects of the task
Personas

- Prevent designers from designing for themselves or for “average” customers
- Maintain focus on customer needs
- Evolve as survey and focus groups continue
- NOT a replacement for user testing!
About Face: The Essentials of Interaction Design
So...this result?
Paper Prototype
Paper Prototype (game design)
Paper Prototype (game design)
Computer-Supported Methods

- Can support more rapid changes to simple mockups
- Can support more functionality for prototypes
- Can lead to “stale” design, can focus user (or customer) too much on the details of the interface, too early in the design process
e.g., Computer Mockups
Mockup – “Four Angry Men”

- AR Experience “Four Angry Men”
- 6 months of content development...three times
- 1 year of software development before testing was possible
- Motivated creation of Designers’ Augmented Reality Toolkit (DART)
Prototyping Tools

1. Draw/Paint programs
   - Draw each screen, good for look

Thin, horizontal prototype  PhotoShop, Corel Draw,...
Through international education, experience and community service, United World Colleges enable young people to become responsible citizens, politically and environmentally aware, and committed to the ideals of peace and justice, understanding and cooperation, and the implementation of these ideals through action and personal example.

About UWC
- Introduction
- History
- Programme
- Service & Experiences
- UWC Graduates
- Short Courses

Applying to UWC
- How to Apply
- Applying Through a National Committee
- Scholarships

National Committees
- Introduction
- Contact Details

UWC Graduates
- UWCNet Alumni Home Page
- Web Pages
- Chat
- Discussion Forums
- ICQ Network
- Email (listserv) lists
- Global Directory
- UWC.NET Email
- Events

2. Scripted simulations/slide shows
   - Put storyboard-like views down with (animated) transitions between them
   - Can give user very specific script to follow
   - Often called chauffeured prototyping

Examples: PowerPoint, Hypercard, Macromedia Director, HTML
Scripting Example

Ctrl-p

e.g., HTML, Javascript
Macromedia Director

- Combines various media with script written in Lingo language
- Concerned with place and time
  - Objects positioned in space on “stage”
  - Objects positioned in time on “score”
- Easy to transition between screens
- Can export as executable or as Web Shockwave file
end repeat
sprite(63).loch = endh
DataTabState = 0
else

    -- move into scene

    currenth = 918
    endh = 648

repeat while sprite(63).loch - 3 > endh
    if myvartime < the ticks then
        sprite(63).loch = ((1.0/5)*(endh-currenth
        currenth = sprite(63).loch
        myvartime = the ticks + 5
        updatestage
    end if
<table>
<thead>
<tr>
<th>Activity</th>
<th>Which hand do you prefer when?</th>
<th>Do you ever use the other hand?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Drawing</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Throwing</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Using Scissors</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Using a Toothbrush</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Using a Knife (without fork)</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Using a Spoon</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Using a Broom (upper hand)</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Striking a Match</td>
<td>(select)</td>
<td>(select)</td>
</tr>
<tr>
<td>Opening a Box (lid)</td>
<td>(select)</td>
<td>(select)</td>
</tr>
</tbody>
</table>

**OK**
Reflect on these

➢ Do you see any issues with these?
  ✤ Inaccessible
3. Interface Builders

- Tools for laying out windows, controls, etc. of interface
  - Have build and test modes that are good for exhibiting look and feel
  - Generate code to which back-end functionality can be added through programming

- Examples: Visual Basic (or Visual C++), Delphi, UIMX, ...
UI Controls

Design area

e.g., Visual Basic

Control properties
Flash - A category of its own
True Programming

- Less useful for rapid prototyping, but can save re-coding time down the road
- More constrained in look and feel
- Constrained to traditional interaction styles and methods
  - Hard to think outside the box...
Other Prototyping Tools

- Denim
- Sketch-based
- Web design

Axure

www.axure.com
Axure

www.axure.com
Components for Web, Application, and Mobile Interface Design

http://www.balsamiq.com
Pencil

- Similar to Balsamiq
- Open-source
- Works with Firefox or as an app
  - OSX
  - Windows
  - GNU/Linux
Microsoft SketchFlow


quick demo
Audio Interface (Telephony) Builder Tools

- SUEDE - flow-chart speech interface dialogue
  - Landay et al.
- For wizard-of-Oz studies
- Could be used to drive real system
Prototyping “Enhancements”

- **Wizard of Oz** - Person simulates and controls system from “behind the scenes”
  - Use mock interface and interact with users
  - Good for simulating system that would be difficult to build

Can be either computer-based or not
Wizard of Oz

Method:
- Behavior should be algorithmic.
- Good for voice recognition systems and non-traditional interfaces.

Advantages:
- Allows designer to immerse oneself in situation.
- See how people respond, how to specify tasks.
Starner’s CopyCat – Wizard of Oz
AR Façade – Wizard of Oz

http://www.interactivestory.net/
Review of Prototyping Concepts

- **Early**
  - Low-fidelity
    - Sketches, mock-ups
    - Scenarios
  - Vertical
  - Horizontal

- **Late**
  - High-fidelity
    - System prototypes
    - Wizard of Oz
  - Vertical
  - Vertical

- **Medium-fidelity**
  - Slide shows
  - Simulations
Prototyping Summary

- Tradeoffs of simplicity, manageability
- Veracity
- Interactiveness
- Up-front costs vs. down the road costs

Key: Don’t let the prototyping environment drive or constrain your creativity!!