PROTOTYPING

CS 147 + CS 77
Scott Klemmer and Michael Bernstein
Announcements

• First quiz two weeks from today: Needfinding + Prototyping
• Form teams in studio this Friday
• Assignment 2 due Thursday 11:59pm
Lab

- OK. That happened.
- Stanford is...
  - outfitting the room with five extra access points (beyond the three already here)
  - Upgrading to a gigabit switch in the room
- We are...
  - Posting the labs the night before so that you can load the page and clone the repo that morning
PROTOTYPING

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SANTA CLARA, California -- People thought Jeff Hawkins was crazy when they saw him taking notes, checking appointments, and synchronizing a small block of wood with his PC, pretending all the while that the block was a handheld computer.

“If I wanted to check the calendar I'd take it out and press the wooden button.”

Screen + Two Wii Controllers = Wii U
Prototype: rapid approximation of a design idea used to gather feedback
Prototyping is a strategy for efficiently dealing with things that are hard to predict.
Focus on Goals
Evolve the Designs
Flare and focus

beginning  time  end

inspired by Buxton, Sketching User Experiences
The rights of a prototype

- Should not be required to be complete
- Should be easy to change
- Gets to retire
What Do Prototypes Prototype?

- **Feel**  What might it look like?
- **Implementation**  What might it work like?
- **Role**  What might the experience be like?
LEARNING / COMMUNICATION

TIME
Prototyping as Search w/ Random Restart
STORYBOARDING
Storyboarding isn’t about “pretty pictures”  
*it’s about communicating ideas*
Star People (Bill Verplank)
LET'S CHECK OUT PLACES IN SF...

SHOW INTERACTIONS

DEVELOP A SETTING

LET'S TRY OUT BURMESE SUPERSTAR. AMAL RATED IT, & IT SOUNDS COOL!

SURE!

SHOW SATISFACTIONS

& FINALLY, BE CREATIVE! YOU DON'T NEED TO BE AN ARTIST TO GET A POINT ACROSS.

adapted with permission from Amal Dar Aziz, Guide to Storyboarding, http://hci.st/story
Storyboards are...a story!

• Setting
  • People involved
  • Environment
  • Task being accomplished

• Sequence
  • What steps are involved?
  • What leads someone to use the app?
  • What task is being illustrated?

• Satisfaction
  • What’s motivates people to use this system?
  • What does it enable people to accomplish?
  • What need does the system fill?
PROS

- Holistic focus: emphasize how an interface accomplishes a task
- Avoids commitment to a particular user interface (no buttons yet)
- Forces you to think through the idea in detail

CONS

- Can be easy to leave out important details
- Communication sketching is a new skill for h4xx0rz
Time Limits Help
Paper prototyping
6 Paper Prototyping Tips & Tricks

1. Keep all your materials in one place!
2. Work quickly and make reusable components (buttons, etc)
3. If something is difficult to simulate (progress indicators, right mouse menus, hyperlinks), verbally describe the interaction
4. Backgrounds (11”x14” poster board) can be useful to contain the prototype and provide context for the user
5. Don’t be afraid to mix and match hardware and software!
6. When appropriate, add context by including familiar operating system elements
Get Creative with Materials

• Widgets: Paper, Cardboard, Transparencies
• Connectors: Tape, Glue, Rubber Cement
• Drawing: Pens, Pencils, Markers
• ...and more
Comparison between tabular and graphical data report (sliding window)
Give your users the pen too.
What if we could...

- Make an interactive prototype without (much) code
Wizard-of-Oz prototyping

- Simulates machine behavior with human operators
Why do we do this?

· Time travel ahead to when the system is built...
· ...so we can find out if the system is worth building in the first place.
Making a Wizard-powered prototype

- Map out scenarios and application flow
  - what should happen in response to user behavior?
- Put together interface “skeletons”, often using paper
- Develop “hooks” for wizard input
- Where and how the wizard will provide input
  - selecting the next screen, entering text, entering a zone, recognizing speech, etc.
  - remember that later you’ll need to replace with computer
- Rehearse wizard role with a colleague

Courtesy Steven Dow. This segment draws heavily on his materials on Wizard-of-Oz prototyping
Running Wizard-Powered Prototypes

• Practice with a friend first
• Two roles: facilitator and wizard.
  • Facilitator provides tasks (paper) and takes notes
  • Wizard operates interface
    (more authentic if hidden or remote)
• User feedback can be...
  • Think aloud (speak freely as performing tasks)
  • Retrospective (best when think aloud distracts)
  • Heuristic evaluation (works with experts too)
• Debrief users (reveal wizard if needed)
Aardvark

“Why start-ups must pay attention to what’s behind the curtain”
— Wall Street Journal

PROS

- Fast (faster) and thus, cheaper and more iterative prototypes
- More “real” than paper prototyping
- Places the user at the center of development
- Designers learn by playing wizard

CONS

- May misrepresent the underlying technology
- Wizards are slower than computers
- Some interactions are difficult or impossible to simulate entirely
FAKING IT

VIDEO PROTOTYPING
Walkabout

Video prototypes can be any fidelity

informal (vine) | formal (premiere)
Efficient video prototyping

- Can use audio or a silent movie with title cards (audio can be finicky)
- Interface can be paper, mock-ups, code, or invisible (just showing the task)
- Edit as little as possible because editing is hugely time-consuming. (In-camera/pause editing is most efficient)
And now, a video prototype.
## PROS

- Cheap and fast
- Helps achieve common ground
- Ideally, portable and self-explanatory
- Can serve as a ‘spec’ for developers
- Ties interface designs to tasks

## CONS

- Harder to strike appropriate fidelity balance
- Requires more than kindergarten skills
- Easy to run long — edit aggressively!

Thanks to Wendy Mackay. This section draws heavily on her video prototyping materials.
HIGH-FIDELITY PROTOTYPING
Digital Mock-ups

CRISIS
10:18 AM

Help requested: Anesth.
ETA: 3 minutes

00:00:10 since last dose
WAIT to re-dose, OK in 2:59:50

Epi 1mg IV q 3-5 min

T

Treatable Causes: Asystole

Hypovolemia

Toxins (overdose)

Hypoxia

Tamponade - cardiac

Hypoglycemia/calcemia

Hydrogen ions - acidosis

Tension pneumothorax

Hyper/Hypokalemia

Thrombosis coronary

Hyper/Hyperthermia

Thrombosis pulmonary

Hypoglycemia/calcemia

CRISIS

Team: WHO’S PRESENT

Larry
Anesthesiologist

Kyle
Surgeon

Chelsea
Nurse

Patient: C. JONES, 47, 76 kg

Procedure: Knee surgery
Allergies: Latex
History: Hypotension
Past surgeries: Hip replacement

Cognitive Aids: Asystole

1. 100% FiO2.
2. Confirm oxygen connections.
3. Check for bilateral breath sounds.

HR:
1 min ago

VTACH

BP:
3 min ago

120/80

HR:
138
Beware Inappropriate Fidelity

high fidelity: feedback is detail-oriented
low fidelity: feedback is broader
Form and Feedback Co-evolve

- Needfinding
- Storyboards
- Lo-fidelity mocks
- Hi-fidelity mocks
- User Scenarios
- Grab some people! [informal]
- Structured Critiques
- Controlled Experiments
Creating and Comparing Alternatives

Dow, Klemmer, et al.


“The best way to have a good idea is to have lots of ideas.”

-Linus Pauling

Quantity or Quality?

Bayles and Orland, 2001
Quantity or Quality?

“While the quantity group was busily churning out piles of work—and learning from their mistakes—the quality group had sat theorizing about perfection, and in the end had little more to show for their efforts than grandiose theories and a pile of dead clay”

Bayles and Orland, 2001
Does creating parallel prototypes improve the final design?
PARALLEL

Prototype

Prototype

Feedback

Feedback

Prototype

SERIAL

Prototype

Feedback

Feedback
Task: design an advertisement

issue 11

Spring 2009: Space

As children some of you may have dreamed of becoming astronauts, or at least vied for a spot in Space Camp. Maybe you were inspired by the worlds of Flash Gordon or those created by Frank Lloyd Wright. In this issue of Ambidextrous, we tackle space and beyond in all of its frontiers.
Procedure \( N=33 \)

Serial prototyping condition

Parallel prototyping condition
Web advertising analytics
Parallel design → more clicks

F(1,30)=4.227  p<.05

Clicks per million impressions:
- Parallel condition: 445
- Serial condition: 398
...and a trend toward more time on site

Average time on client site per visitor (seconds)

Parallel condition: 31.3 seconds
Serial condition: 12.9 seconds

F(1,493) = 3.172, p = 0.076
…and higher expert ratings

Serial condition: $F(1,5)=7.948$, $p<0.05$

Parallel condition: 24.4

Serial condition: 21.7

Likert-scale rating (0-50)

F(1,5) = 7.948, p < 0.05
...and more diverse designs

- Parallel condition: 2.78
- Serial condition: 3.18

F=182, p<0.001

7=highly similar
0=not at all similar
Why does parallel prototyping yield better results?
Separating Ego from Artifact
Parallel ideation encourages comparison and transfer
Does **sharing** multiple prototypes improve design results?
Three conditions \( N=84 \)

- Share multiple
- Share one
- Share best
Share multiple → more clicks

Chi-squared = 4.72, p < 0.05
Benefits of sharing multiple

- More individual exploration
- More feature sharing
- More conversational turns
- Better consensus
- Increase in group rapport
Alternatives provide a vocabulary

Tohidi, Buxton, Baecker, Sellen, CHI ‘06
In sum:
Prototypes are questions. Ask lots of them.