Early Stage (lo-fi & med-fi)
Prototyping

Prof. James A. Landay
Computer Science Department
Stanford University

Autumn 2022
October 17, 2022
Interface Hall of Fame or Shame?

Dyson AirBlade hand dryer
example courtesy of Maya I.
Interface Hall of Fame or Shame?

Good
- shape indicates function
- so simple that instructions fit in 1 image
- fun!

Bad
- dripping water?
- too much noise
- still takes too long

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Interface Hall of Fame!

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example courtesy of Maya I.
Can We Do Better?

Good

– Integrate hand dryer into sinks…
Hall of Shame!

iOS 6 Maps
By Apple Inc.

Good
- beautiful alternative to the competition & generally easier to read
- turn by turn directions are efficient, clear & functions well – in general

Bad
- despite any aesthetics, the data is wrong & sparse, meaning, it does not perform the one task it should do well – getting from A to B
Hall of Shame!

Google Maps Data vs iOS6 Maps Data
A clear example of where no matter how good a design may be, without supporting its most important task, in this case finding a place with correct data, the interface is useless.

Hall of Shame!
Hall of Shame!

Google Maps Data vs iOS14 Maps Data – much closer in quality
Early Stage (lo-fi & med-fi) Prototyping

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Outline

• Sketching vs. Storyboarding
• Prototyping
• Low-fi prototyping
• Conducting a low-fi test
• Medium-fi prototyping
Sketches & Storyboards

• Where do storyboards come from?
  – film & animation
• Give you a “script” of important events
  – leave out the details
  – concentrate on the important interactions
DESCRIPTION: EXT. FOREST - MS LUKE & LEIA - TRUCKING

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<th>STAGE</th>
<th>ANIM</th>
<th>PLATE</th>
<th>MATTE</th>
<th>NON-ILM</th>
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<td>Biker #4</td>
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NOTES: 

SHOT # / SEQUENCE:
BC 28
FRM COUNT: 50  PAGE #:
Sketches & Storyboards in UX Design
Sketches & Storyboards in UX Design
Starts to tell a story, but still describes the design.
Task Flow
(Wireframe)
What is a Prototype?

“A prototype is an early sample or model built to test a concept or process or to act as a thing to be replicated or learned from.”
– Wikipedia

CS147 definition: a working representation of a final artifact
Types of Prototypes

Prototypes are concrete representations of a design

Prototype dimensions

- representation: form of the prototype
  - off-line (paper) or on-line (software)
- precision: level of detail (e.g., informal or polished)
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- representation: form of the prototype
  - off-line (paper) or on-line (software)
- precision: level of detail (e.g., informal or polished)
- interactivity: watch-only to fully interactive
  - fixed prototype (video clips)
  - fixed-path prototype (each step triggered by specified actions)
    - at extreme could be 1 path
  - open prototype (real, but limited error handling or performance)
- evolution: expected life cycle of prototype
  - e.g., throw away or iterative
Fidelity in Prototyping

• Fidelity refers to the level of detail
• High fidelity?
  – prototypes look like the final product

• Low fidelity?
  – artists renditions with many details missing
What do we like about this prototype?

What do wish could be improved?
What do we like about this prototype?

What do wish could be improved?
The feedback you get is different

Low-fi

Medium-fi
Hi-fi Prototypes Warp

- Perceptions of the tester/reviewer
  - representation communicates “finished”
    - comments focus on color, fonts & alignment

- Time of the designer
  - encourage **precision**
    - specifying details takes more time

- Creativity of the designer
  - lose track of the **big picture**
Why Use Low-fi Prototypes?

- Traditional methods take too long
  - sketches $\rightarrow$ prototype $\rightarrow$ evaluate $\rightarrow$ iterate
- Can instead simulate the prototype
  - sketches $\rightarrow$ evaluate $\rightarrow$ iterate
  - sketches act as prototypes
    - designer “plays computer”; others observe & record
- Kindergarten building skills
  - allows non-programmers to participate
Prototyping for Tiny Fingers
by Rettig

“Prototyping for Tiny Fingers” by Rettig
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Check out our no-hassle return policy.

**Subtotal**: 207.99
**St H**: 12.95
**Tax**: 6.00
**Total**: 220.84

Continue Shopping  Checkout
Cookable
Cookable

- Salad
- Favorites
- Trending
Cookable

Results

Caesar Salad 30 min
- Parmesan cheese
- Lettuce
- Croutons
- Olive oil
- Egg
- Mustard
- Parsley
- Worcestershire sauce

Greek Salad 15 min
- Tomatoes
- Cucumber
- Red Onion
- Olive Oil
- Lemon Juice
- Dried Oregano
- Salt
- Pepper
- Crumbled feta cheese

Apple Cinnamon Salad 25 min
- Cabbage
- Apple
- Carrot
- Red Bell Pepper
- Green Onion
- Mayonnaise
- Brown Sugar
- Lemon Juice

Black Bean and Corn Salad 25 min
- Lime Juice
- Olive Oil
- Cilantro
- Green Onion
- Black Bean
- Corn
- Avocado
- Red Bell Pepper
- Tomatoes

Simple Potato Salad 40 min
- Red Potatoes
- Egg
- Honey Salad Dog
Cookable

Caesar Salad

- 2 cloves garlic, finely chopped
- 3 anchovy fillets
- 1/2 lemon, juiced
- 2 tablespoons red wine vinegar
- 1 tablespoon Dijon mustard
- 1 egg yolk
- 1/4 teaspoon Worcestershire sauce
- 1/4 cup olive oil
- Pinch salt and ground black pepper
- 1/2 head romaine lettuce, chopped
- 1/2 cup grated Parmesan cheese
- 2 tablespoons croutons

Order  Cook
Caesar Salad

2 cloves garlic, finely chopped
3 anchovy fillets
1/2 lemon juiced
2 tablespoons red wine vinegar
1 tablespoon Dijon mustard
1 egg yolk
Dash Worcestershire sauce
1 tablespoon olive oil
1 pinch salt and ground black pepper
1/2 head romaine lettuce, chopped
1/4 cup grated Parmesan cheese
2 tablespoons croutons

Order  Cook
Who is Zuki?
Administrivia

- Assignment #5 – Low-fi Prototype & Pilot Usability Test
  - 15-20 rough sketches of different design realizations
    - everyone on team contributes
    - use different modalities (e.g., visual, speech, watch) or different visual UIs' input techniques (gestures, taps, etc.)
  - will start this in studio this week
Administrivia

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    • everyone on team contributes
    • use different modalities (e.g., visual, speech, watch) or different visual UIs input techniques (gestures, taps, etc.)
    • will start this in studio this week
  - pick top 2 realizations & storyboard/task flow more
  - pick best realization & add details to task flow
  - build low-fi prototype of the best & test it w/ at least 3 target (non-Stanford) participants

• Web site directories will be created for each team by this weekend
  - each team needs 1 person to fill out this form by tonight (Monday, Oct 17th)
  - start to get sites up there this weekend!
    • should have all of your work—not graded until mid-point check-in & near end of quarter
  - CAs will send you your directory path/name on web.stanford.edu
Administrivia: Video Hints

• Under 2 minutes (90 seconds or less even better)

• Add credits at end
  - Team/project name
  - Your names (first name & last initial)
  - “CS 147 – Autumn 2022”
  - Won’t count in your time limit
Administrivia

- Use handbrake to compress your video
  - It will take your video from 250MB-1GB down to ~50MB
Team Break

• Reflect on last week’s assignment (~5-8 min)
  – what did you like about your teamwork?
  – what do you wish could be improved?
  – share out with each other

• This week’s assignment (~15 min)
  – Get greenlight from CA on solution + tasks
  – work on your video storyboards/editing
Constructing the Model

• Set a deadline  
  – don’t think too long - *build it!*
• Draw a window frame on large paper
• Put different screen regions on cards  
  – anything that moves, changes, appears/disappears
• Ready response for any user action  
  – e.g., have those pop-up dialogs, etc. already made
• Use printer/scanner to make many versions
Tasks:
1. Open the EE app
2. Register and Log-in
3. Remove the minutes tile from your home screen
4. Place the "add $10 Top-up" tile to your home screen
5. Re-arrange the tiles on your home screen

User Notification
Input Field
Pressable Button
Constructing the Model

Autumn 2022

dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation

EULA
Preparing for a Test

• Select your “customers”
  - understand background of intended users
  - use a screening questionnaire to get the people you need
  - don’t use friends or family
  - start recruiting today

• Prepare scenarios that are
  - typical of the product during actual use
  - make prototype support these (small, yet broad)

• Practice to avoid “bugs”
Conducting a Test

Four Roles

- Greeter – puts users at ease & gets data
- Facilitator – only team member who speaks
  - gives instructions & encourages thoughts, opinions
- Computer – knows application logic & controls it
  - always simulates the response, w/o explanation
- Observers – take notes & recommendations
Wonderlust
Who is Zuki?
Practice: low-fi prototype testing

In a group of 3-4 people around you, you will test the low-fi prototype of Parbon app!

One will play **user**, one will play **facilitator**, and 1-2 will play **observers** taking notes.

Share the **critical incidents** (both **positive** and **negative** events) from your test in Slack.

Note: If you are the user, remember to talk-aloud about what you are thinking as you navigate the prototype!
Practice: low-fi prototype testing

Parbon allows users to log and track their carbon usage from commutes, understand what their carbon footprint means relative to the world around them, and buy carbon offsets.

- Simple task: Log your personal carbon emissions data
- Moderate task: Purchase carbon offsets to counteract your emissions
- Complex task: Post your carbon metrics to share with friends and family

Evaluating Results

• High level questions about your design
  – does it address the problem you want to solve?
  – is this the right realization of your solution?

• Sort & prioritize observations
  – what was important?
  – lots of problems in the same area?

• Make changes & iterate
  – even iterate between tests
Advantages of Low-fi Prototyping

• Takes only a few hours
  – no expensive equipment needed

• Can test multiple alternatives
  – fast iterations
    • number of iterations is tied to final quality

• Almost all interaction can be faked (Wizard of Oz)
Problems with Low-fi Prototypes

- “Computer” inherently buggy
- Slow compared to real app
  - timings not accurate
- Hard to implement some functionality
  - pulldowns, feedback, drag, viz …
- Won’t look like final product
  - some widgets/controls hard to recognize
- End-users can’t use by themselves
  - not in context of user’s work environment
Interactive Lo-fi Tools

Balsamiq Mockups
http://balsamiq.com

POP
https://marvelapp.com/pop
Remote Testing of Low-fi Prototypes

1. Participant runs & records prototype (e.g., Balsamiq/POP) on their phone [hardest]
   - user records interaction by recording screen on iOS/Android
   - you record zoom meeting while participant speaks aloud
   - [Link to article](https://uxdesign.cc/moderating-ux-research-with-zoom-1d4e89614277)

2. Participant runs zoom on their phone while you screen share prototype [moderate]
   - user taps on items & verbalizes aloud
   - you control prototype & record meeting
   - [Link to article](https://uxdesign.cc/moderating-ux-research-with-zoom-1d4e89614277)

3. Participant hugs their laptop [easiest]
   - user runs your prototype (e.g., Balsamiq/POP) on their own phone
   - you record zoom meeting of their screen as *captured by their laptop camera*
   - [Link to article](https://medium.com/@beparticular/were-still-hugging-our-laptops-8c7f22ed800e)

Autumn 2022

dt+UX: Design Thinking for User Experience Design, Prototyping & Evaluation
Fidelity in Prototyping:

Instagator

Moderate Task: Start new trip

1. View all trips ("my trips home")
2. Click for new trip
3. Click to add person to group
4. Drag to send
5. Search for friend
6. Name & description
7. Add trip!
Fidelity in Prototyping

Task 1: Take a Destination Poll

Low-fi

Medium-fi
Summary

• Prototypes are a concrete representation of a design or final product

• Low-fi testing allows us to quickly iterate
  – get feedback from users & change right away
Further Reading

Prototyping

- Books

- Articles
  - “Prototyping for Tiny Fingers” by Marc Rettig, in Communications of the ACM, 1994
Next Time

- **Lecture on Wednesday**
  - come in and work with your team, get feedback from your CA
    - get feedback from CA on your draft video *before Wed*
    - go to office hours of another CA to get feedback on project direction
- **Lecture next Monday**
  - Watch, Critique, & Vote on Concept Videos (CS 147 Film Festival)
- **Reading**
  - none
- **Figma workshop today at 3:30 PM in Lathrop 296**
- **Project**
  - 15-20 sketches of 3-5 design realizations (start in studio…)
  - pick the top two & storyboard/task flow those
  - pick the top 1 & build/test low-fi prototypes using 3 key tasks for next week’s studio presentation
    - recruit representative participants *now!*