

CS 321: Introduction to HCI

Methods for Design, Prototyping and Evaluating User Interaction

Lecture 16:

Paper Prototyping

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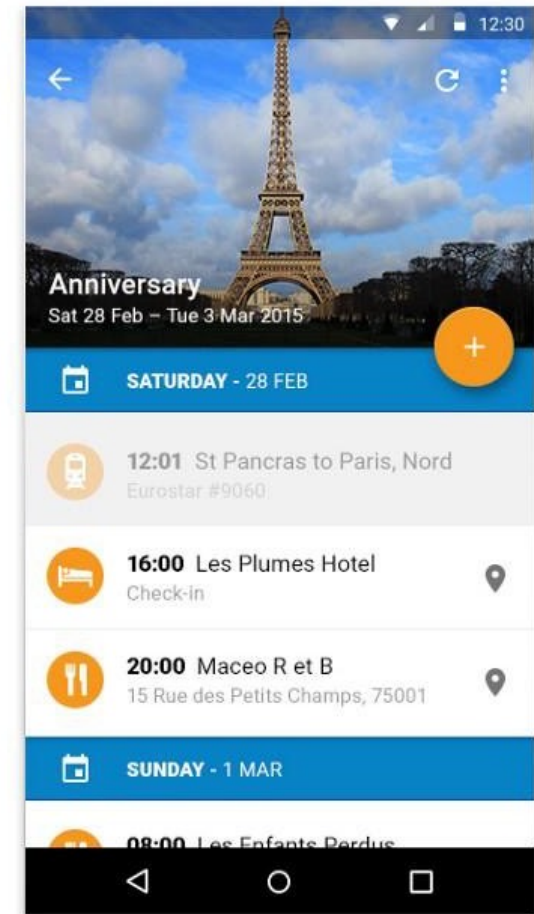
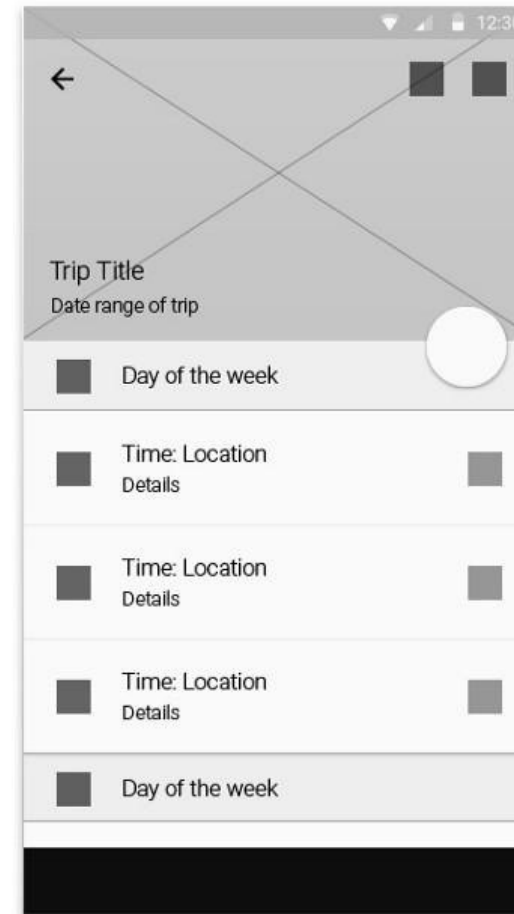
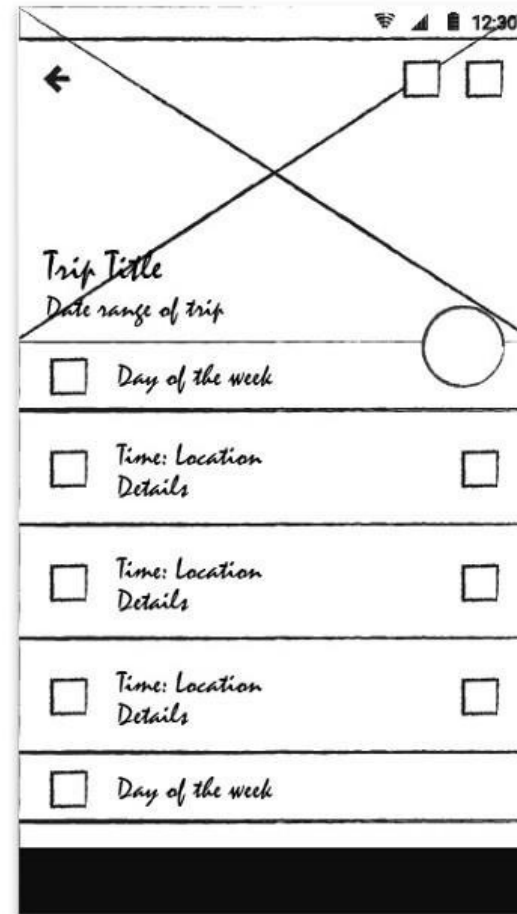
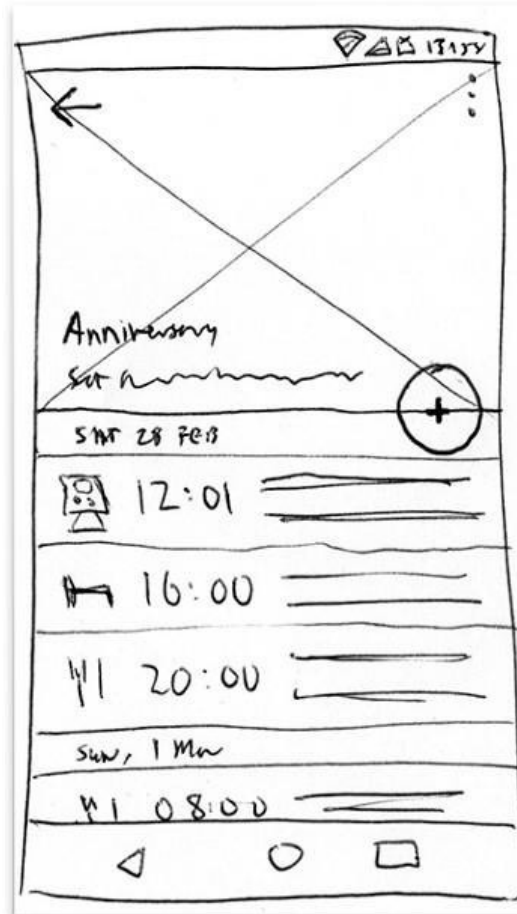
SIUE

Prototyping



Fidelity in Prototyping

<https://medium.freecodecamp.org/a-beginners-guide-to-rapid-prototyping-71e8722c17df>



Low Fidelity

Designer sketches
with many details missing

High Fidelity

Prototypes look like
the final product

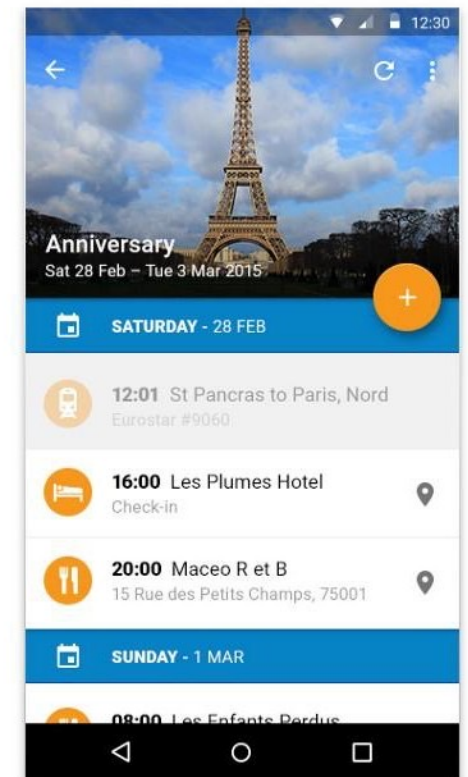
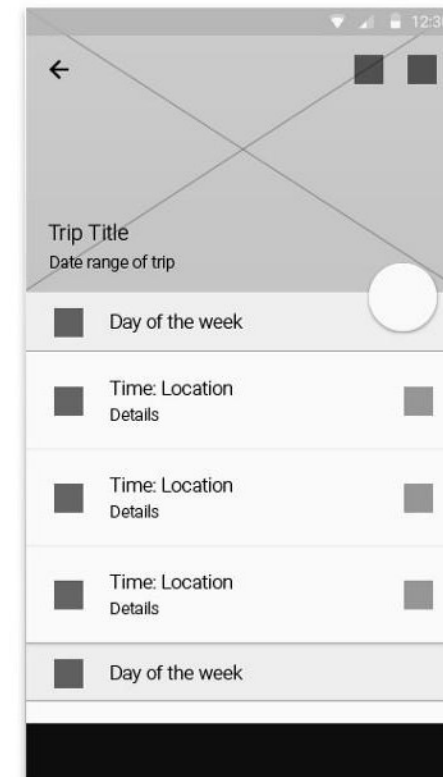
High-Fidelity Prototypes

Time and creativity

- Require precision (e.g., must choose a font)
- Specifying details takes time
- Can lose track of the big picture

Perceptions of a person reviewing or testing

- Representation communicates “finished”
- Comments often focus on color, fonts, alignment



Low-Fidelity Prototypes

Traditional methods take too long

Sketches → High-fidelity Prototype

→ Evaluate → Iterate

Instead simulate the prototype

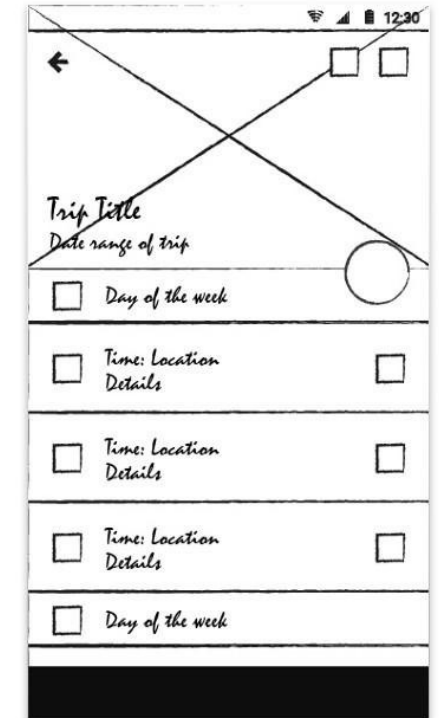
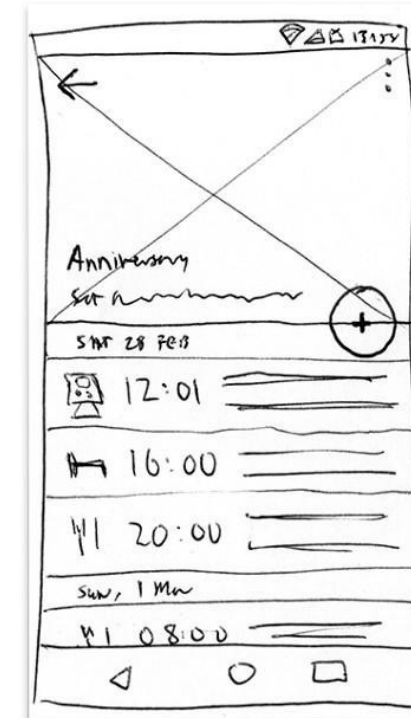
Sketches → Evaluate → Iterate

Sketches act as prototypes

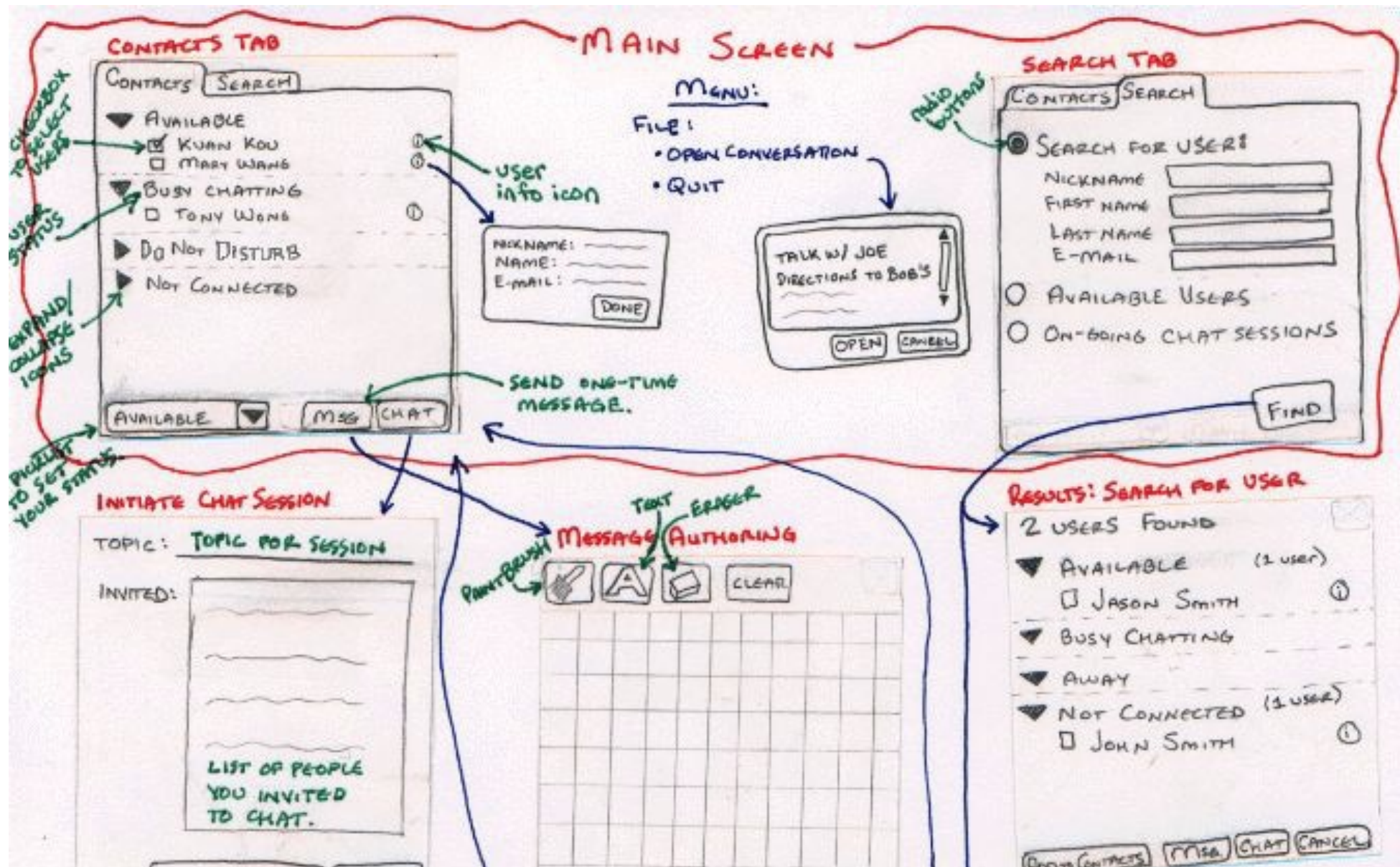
A designer “plays computer”

Other design team members observe & record

Kindergarten implementation skills reduce barriers to participation in design and testing



Low-Fidelity Prototypes & Sketches



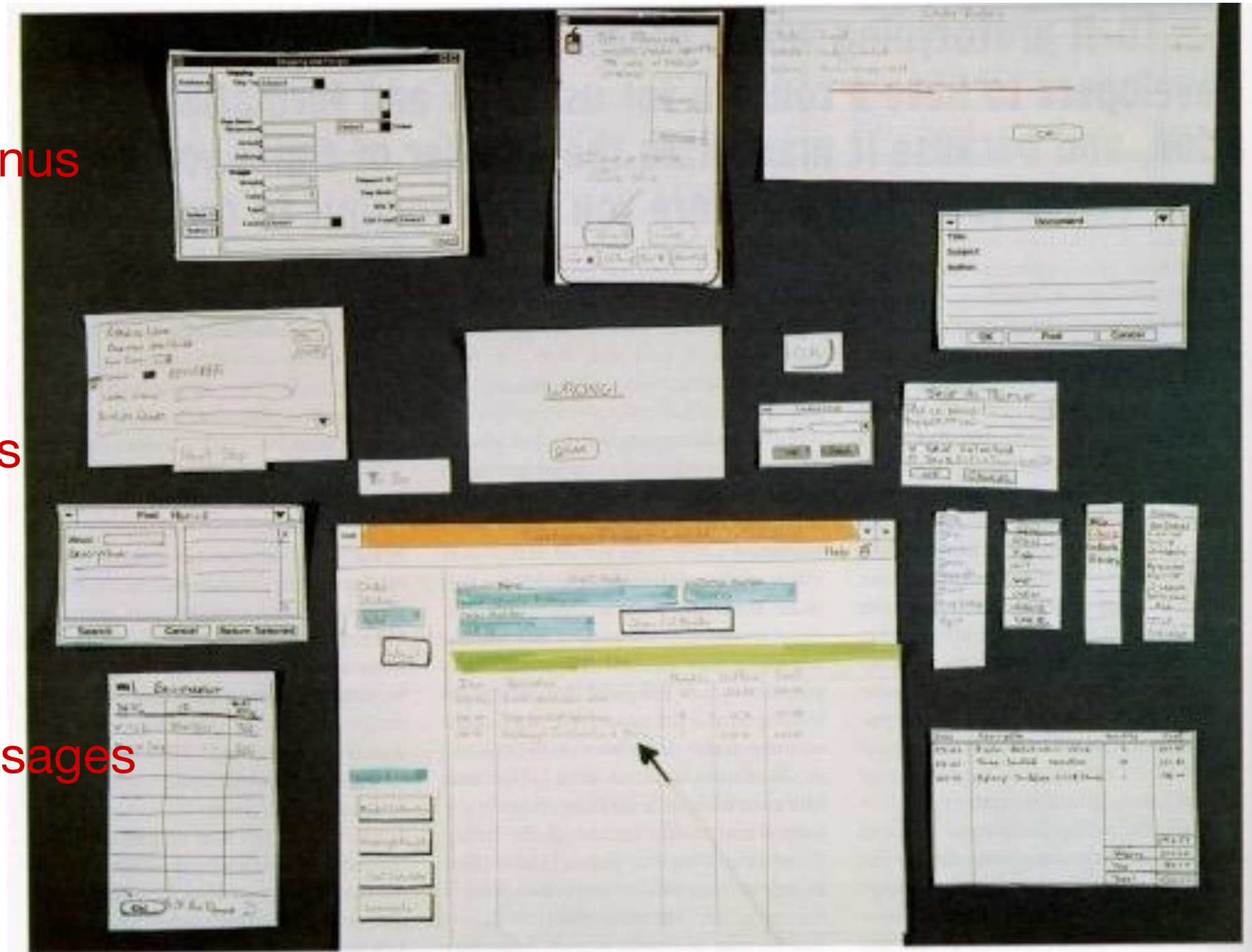
Remember how Sketches should be quick, cheap, easy to change, and open for critique?

Paper Prototype

Scroll Menus

Text Fields

Error Messages



Buttons

Dropdown Menus

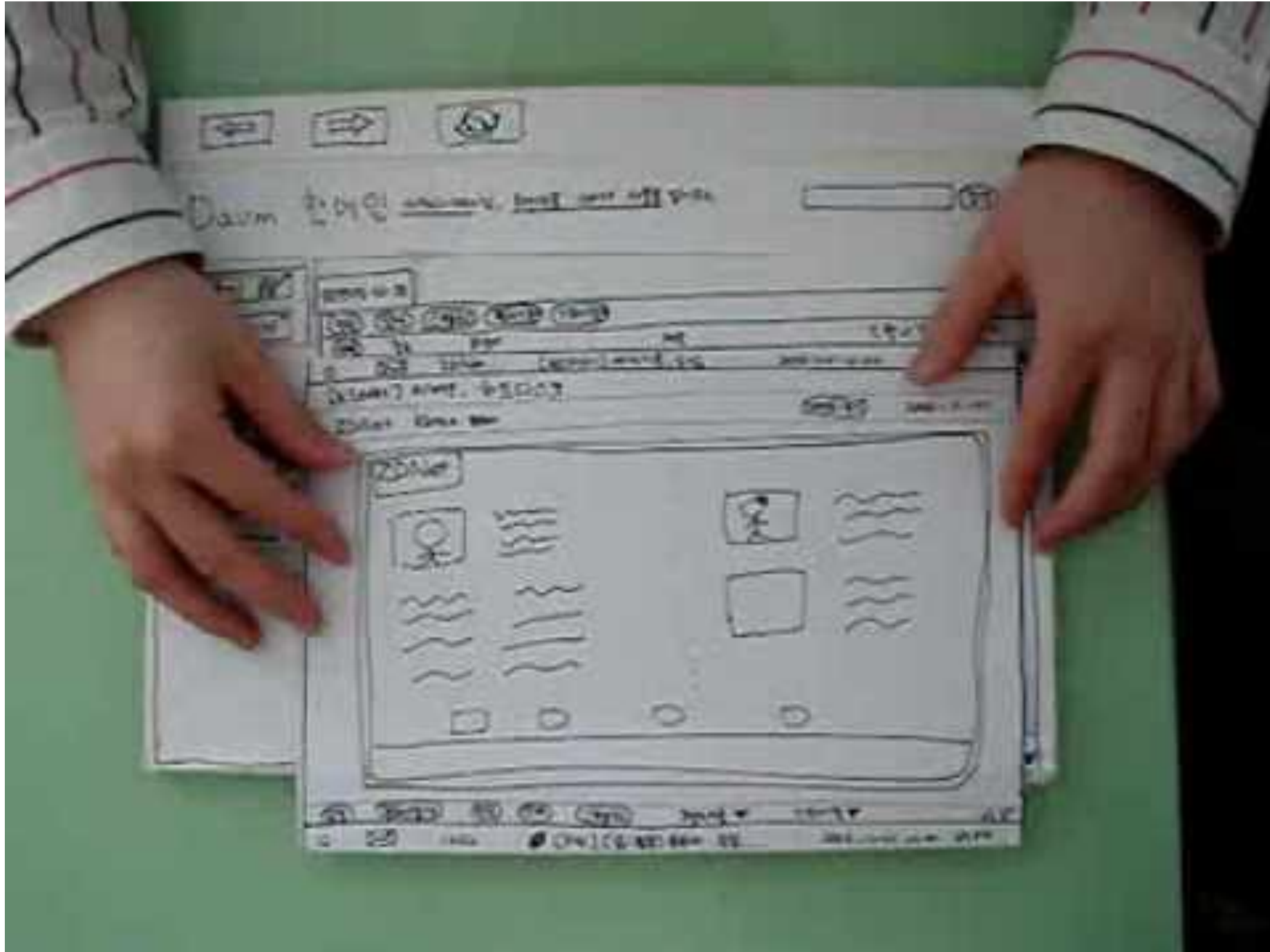
Cursors

What to use?

- Paper: Large, heavy, white
- Index cards
- Post-its
- Tape, stick glue, correction tape
- Pens & markers (many colors & sizes)
- Overhead transparencies
- Scissors, X-Acto knives, etc.



Paper Prototype - Example



Compose interface from different pieces

The image shows a hand-drawn wireframe of a web interface for an EECs Schedule Planner. The interface is divided into two main sections: a navigation menu on the left and a main content area on the right.

Navigation Menu (Left):

- + Add a course
- Drop a course
- a Search for a course
- ✓ View Requirement
- ? Help
- ≡ Preferences
- ⌂ Print
- ⌂ Update telebears
- ⌂ Save
- ⌂ Logout

Main Content Area (Right):

ESP EECs Schedule Planner

Welcome to ESP.

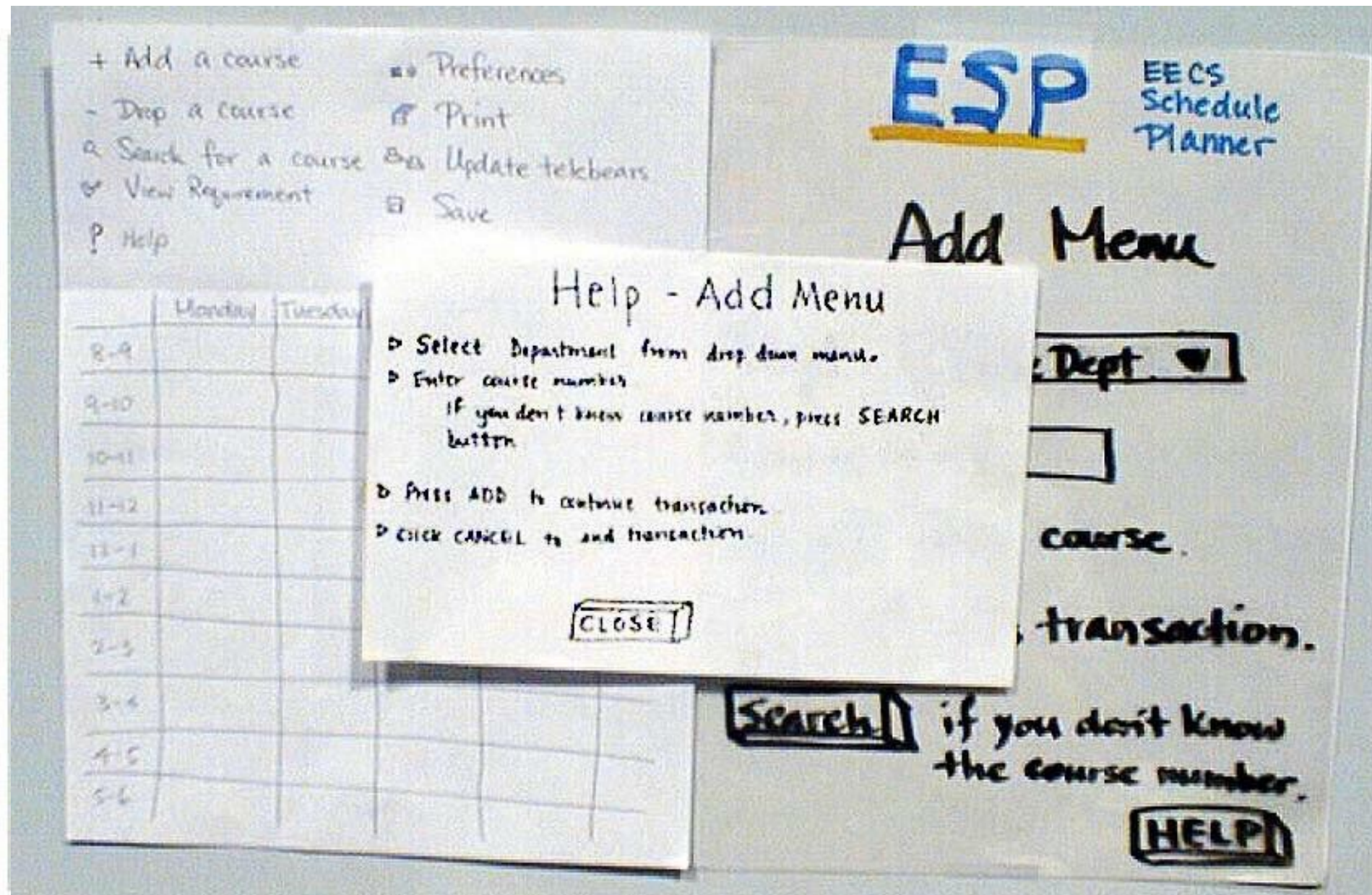
Your Telebears session is Tues. Sept. 21 @ 10am

Your current schedule is empty. Please click on Add a course to continue.

Schedule Grid:

	Monday	Tuesday	Wednesday	Thursday	Friday
8-9					
9-10					
10-11					
11-12					
12-1					
1-2					
2-3					
3-4					
4-5					
5-6					

Compose interface from different pieces



Use Transparencies

Back Forward Stop Home Search Print

Kool Klothes Logo Guys Gals Kids Customer Service


Shopping Cart

Item	Description	Color	Size	Status	Qty	Price	Total
42773	Cashmere sweater	Green	M	In Stock	1	79.99	79.99
23076	Backcountry boot	BR	8 1/2	In Stock	1	128.00	128.00

Check out our no-hassle Return Policy

Subtotal	207.99
S&H	12.95
Tax	0.00
Total	220.84

Continue Shopping Checkout



Constructing the Prototype

Set a deadline

Do not think too long

Instead build it, then learn and iterate as you go

Put different screen regions on cards

Anything that moves, changes, appears/disappears

Ready responses for actions

Have those pull-down menus already made

Planned tasks can guide this

Use photocopier to make many versions

Start by thinking of your Tasks



Remember Your Target Platform Constraints



Advantages of Paper Prototypes

Forces you to think through potential solutions

Facilitates discussion of solutions with other designers and stakeholders

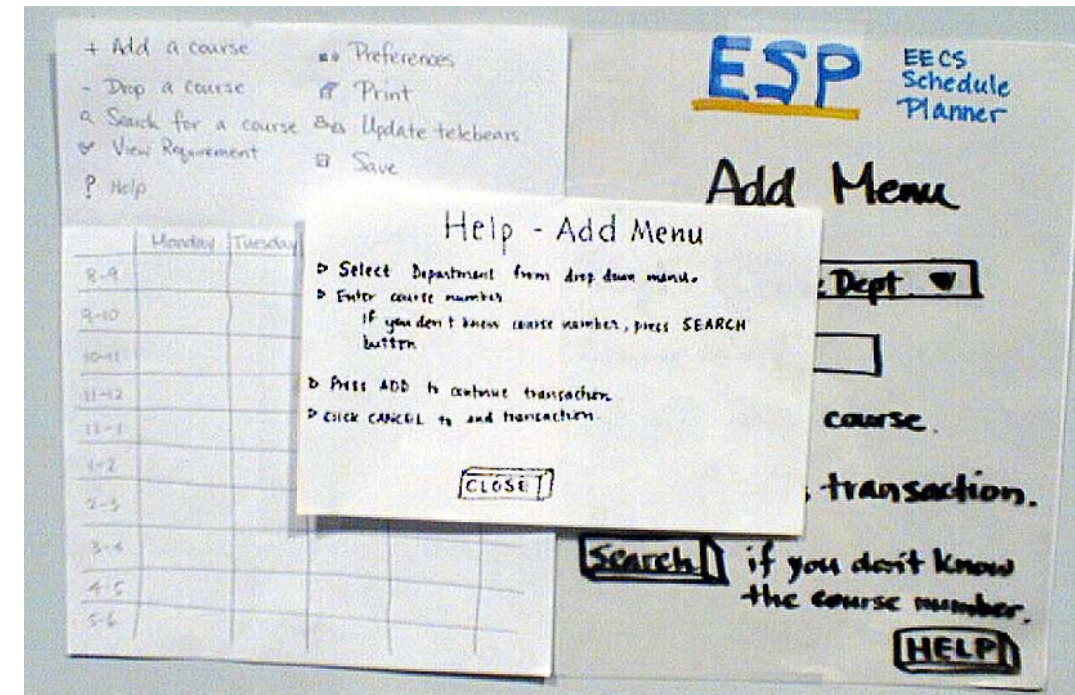
Allows testing!

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

Problems with Low-fi Prototypes

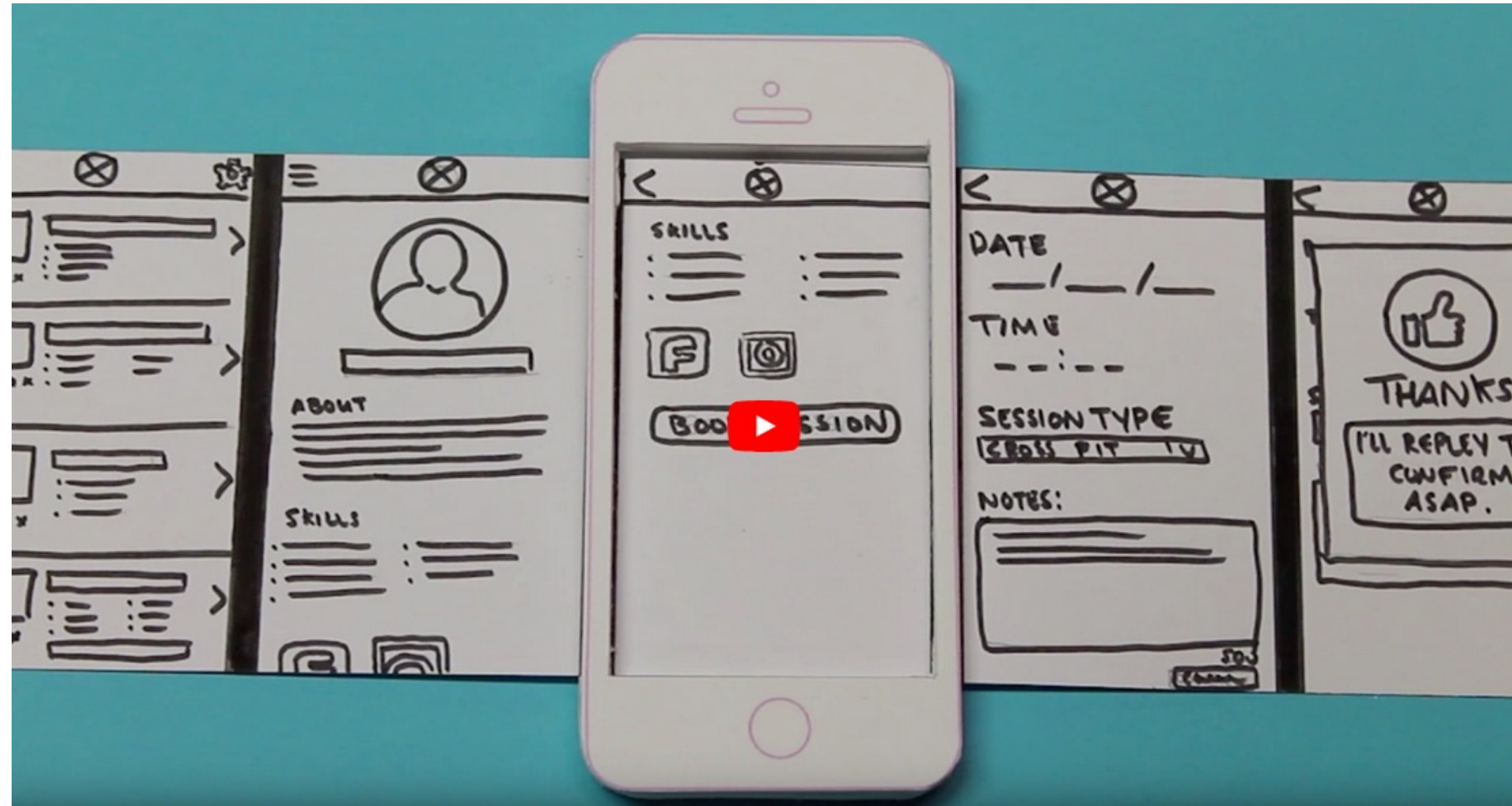
- “Computer” inherently buggy
- Slow compared to real app
 - **timings not accurate**
- Hard to implement some functionality
 - **pulldowns, feedback, drag, viz ...**
- Won't look like final product
 - **sometimes hard to recognize widgets**
- End-users can't use by themselves
 - **not in context of user's work environment**



Paper Prototyping in Action!



Paper Prototyping in Action!



What caught your attention there?

Why Usability Test?

Find and fix problems in a design

Removes the expert blind spot

Obtain data to inform changes

Uncover unexpected behaviors

Drives changes, sometimes innovations

In the long run, this is a win-win

Both improves design and saves money

Deciding What Data to Collect

Process data

Observations of what people do and think

Focused on improving this process

Summary, statistical, or bottom-line data

Summary of what happened (time, errors, success)

Focused on measurement

Which one is more useful at the prototyping stage?

Stages of a Usability Test

Preparation

Introducing the Test

Conducting the Test

Debriefing

Analyzing the Data

Creating the Report

Preparing for a Test

Select your participants

Friends and family are not your design targets

Understand background, consider recruiting questionnaire

Prepare tasks and paper prototype

Practice to avoid “bugs” in your prototype

Task-Based Usability

Set up an overall context

“We are interested in improving people’s ability to save, update, and use contacts in their mobile phones.”

Then prescribe tasks

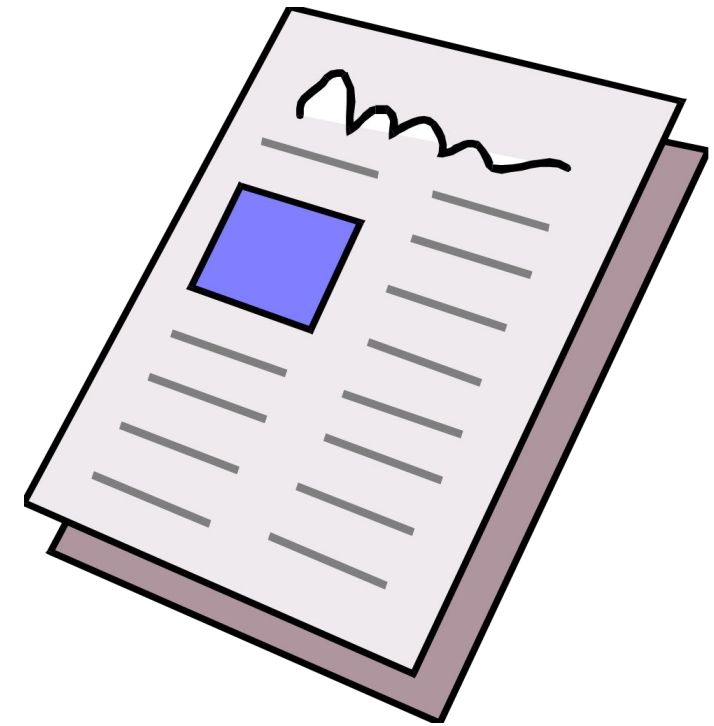
1. Try to find the contacts list in the phone
2. View the contact information for John Smith
3. Change John Smith’s number to be 555-555-5555

Tasks can be chained to naturally lead to the next

Usability Test Proposal

A report that contains

Objective description of System,
Environment and Materials,
Participants, Methodology,
Tasks, Test Measures



Work through it with colleagues to debug test

Reuse when presenting final report

Introducing the Test

Address Feelings of Judgment

“Today we are interested in learning about X. That’s where you come in!”

“I did not develop X. I just want to know what the problems are with X.”

“It is X being tested here, not you.”

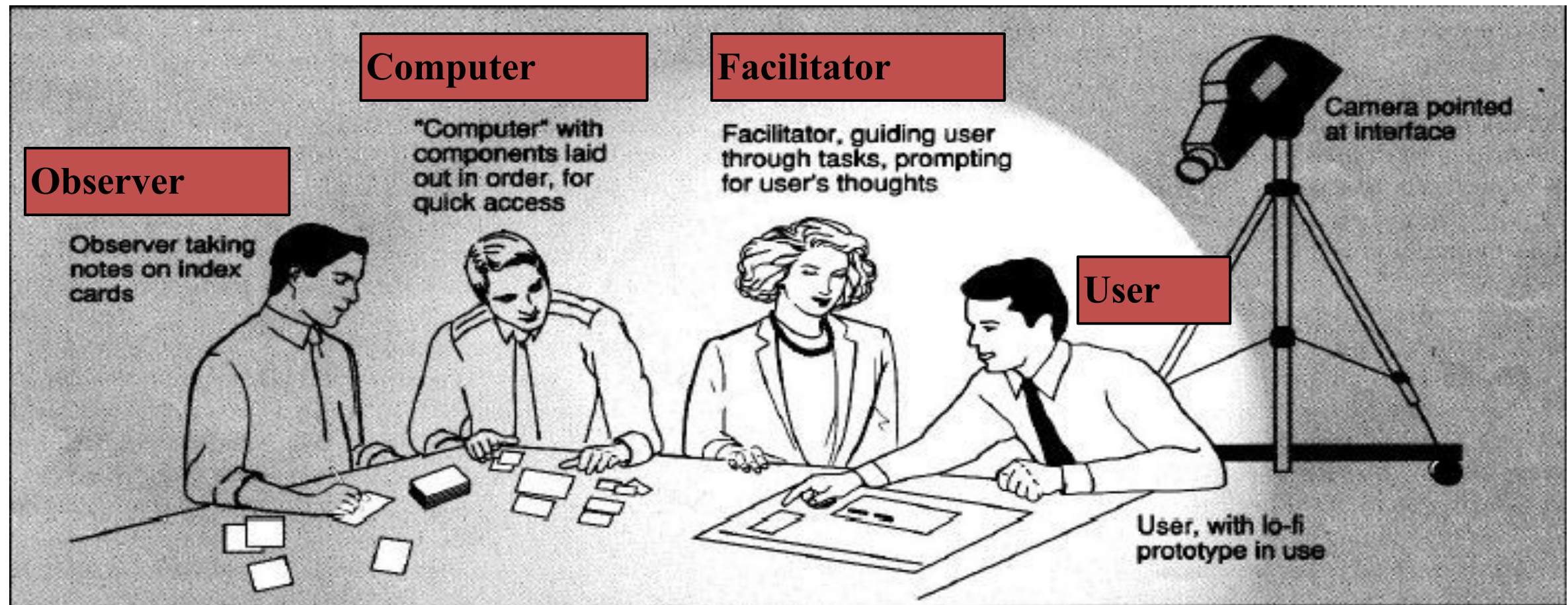
Introducing the Test

Set Expectations for Process

“It is essential you think out loud while working with X. Tell me constantly what you are thinking, looking for, wondering, confused about, surprised, and so on. If you stop talking, I will prompt you to talk.”

“I will not be able to answer your questions when you start using X. Do you have any questions now?”

Conducting a Test



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

You could combine greeter + facilitator into one role

Typical session is 1 hour

30 min is also acceptable, per person

preparation, the test, debriefing

Think-Aloud Prompts

“Tell me what you are trying to do.”

“Please keep talking.”

“Tell me what you are thinking.”

“Are you looking for something? What?”

“What did you expect to happen just now?”

“What do you mean by that?”

Insight Problems

When people are trying to figure something out, talking aloud can prevent needed “insight”

If your participant is really baffled, it might not be the best time to prompt them to keep talking

Wait for a natural break, and then ask
“What were you thinking just there?”

Retrospective talk-aloud

Record session, talk through immediately afterward

Good to keep in mind

Remember the purpose of this test

You would not be there to help “in real life”

You want to see if they can figure it out

You want to see how hard it is

You want to see how catastrophic the outcome is

But you do not want to punish the person or completely undermine the rest of the session

Note any help you provide as a major failure

Do not allow observing engineers to help

Debriefing

Give them more details about what you were interested in discovering, with their help

Answer any questions they have

Now you can show them how to accomplish the tasks,
talk about what you learned from the test

Thank them for their time

Appropriate to give some compensation

Analyzing and Reporting the Results

Summarize the data

Make a list of critical incidents

can be positive and negative

include references back to original data

try to judge why each difficulty occurred

Sort and prioritize findings

what does data tell you

what are the important results

anything missing from test

Prepare script, instructions, checklists

Preparation

- *Make sure you know participant ID number*
- *Make sure you know participant's condition*
- *Make sure you have all the instructional material (user manual, tutorial, video ready to play)* • *Check that the microphone has batteries*
- *Check that all the props are there*
- *Prepare the video camera*
- *Move PR2's arms to the neutral pose*
- *Make sure there is a printed consent form*

Introduction

Thank you for agreeing to participate in our study. This is our robot PR2 (which stands for Personal Robot 2). The goal of our research is to allow end-users of robots like PR2 to be able to program it by demonstrating what they want it to do. Today we will ask you to program several skills on PR2. This involves using speech commands and physically interacting with PR2 to move its arms. At the end, we will ask you to fill in a questionnaire regarding your interaction.

Consent form

Before moving onto the details, please take a look at these forms and sign when you are ready. Let me know if you have any questions.

- *Make sure kill switch is ON*
- *Start the program*

Explain the study

Today we are interested in evaluating the design of our instructional materials for using the robot. We are not evaluating you.

...

Decide what to measure

PARTICIPANT # _____

PART 1

Please rate Simon's questions in terms of **informativeness** for the robot.

		1	2	3	4	5	6	7	
Q1	Not informative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very informative
Q2	Not informative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very informative

Please rate Simon's questions in terms of **unexpectedness**.

		1	2	3	4	5	6	7	
Q1	Predictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unexpected
Q2	Predictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unexpected

Please rate Simon's questions in terms of **ease of answering**.

		1	2	3	4	5	6	7	
Q1	Difficult to answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to answer
Q2	Difficult to answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to answer

Please explain.

Please explain.

Please explain.

PART 2

Please rate Simon's questions in terms of **informativeness** for the robot.

		1	2	3	4	5	6	7	
Q1	Not informative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very informative
Q2	Not informative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very informative

Please rate Simon's questions in terms of **unexpectedness**.

		1	2	3	4	5	6	7	
Q1	Predictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unexpected
Q2	Predictable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Unexpected

Please rate Simon's questions in terms of **ease of answering**.

		1	2	3	4	5	6	7	
Q1	Difficult to answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to answer
Q2	Difficult to answer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Easy to answer

Please explain.

Please explain.

Please explain.

Practice

- And fix:
 - the prototype
 - the setup
 - the tasks (scenarios)
 - the script and checklist
 - the measures

Ethical Considerations

Testing is stressful, can be distressing

make sure they know they are NOT the ones being tested.

You have a responsibility to alleviate

make voluntary with informed consent

avoid pressure to participate

let them know they can stop at any time

make collected data as anonymous as possible

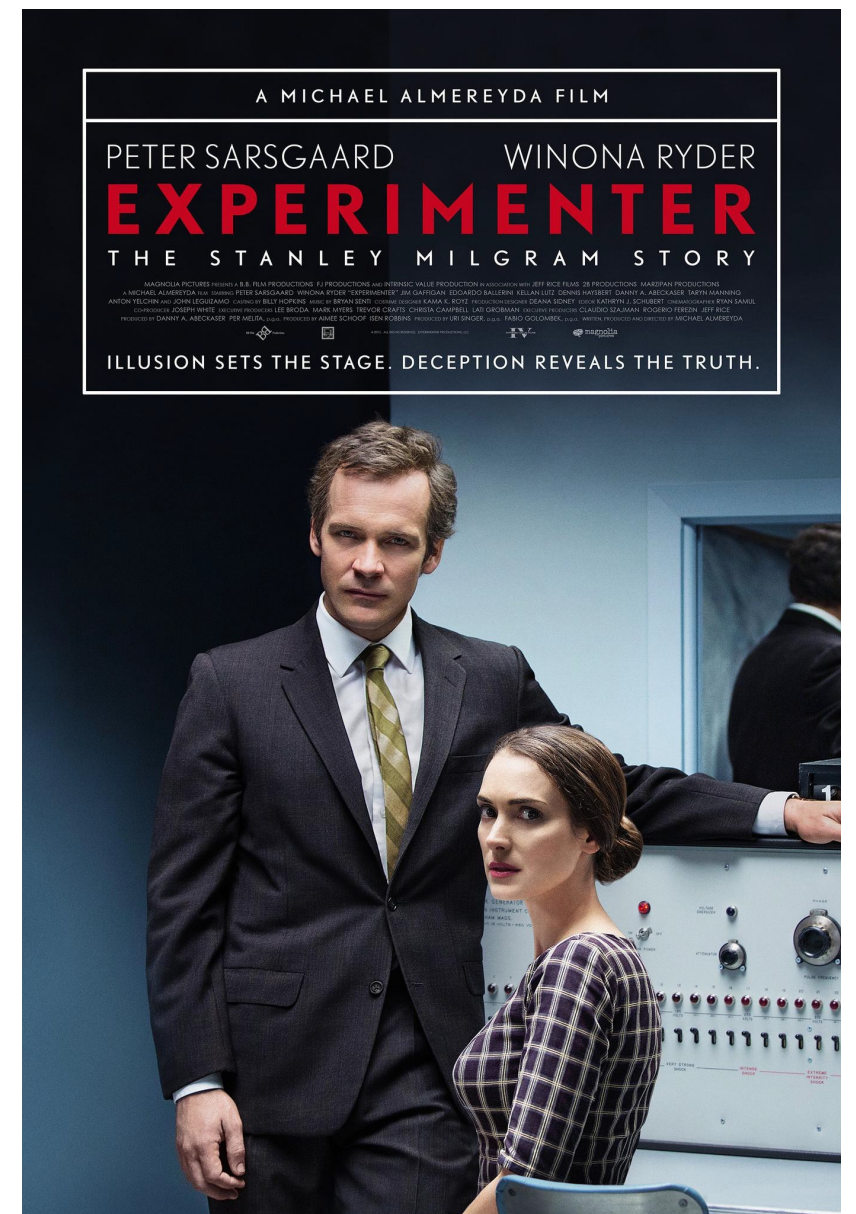
Human Subjects Approvals

Research requires human subjects review of process

This does not formally apply to your design work

But understand why we do this and check yourself

Companies are judged in the eye of the public



Task Design is Important

The goal of a test is to figure out how a person interacts with an interface in the wild...

There are two possible explanations for why a test does not find significant problems:

The interface does not have significant problems

The test itself has significant problems

Bad: Artificial Subgoals

People using the design “in the wild”
may not necessarily form these same subgoals

The task should give one top-level goal, people should form their subgoals while pursuing this

Now you want to choose the type of paper you want to print your document on. Lets imagine that Bin “B” has the paper you want to print your paper on, please complete this task.

Now set the darkness of your copies to about 50% dark. After setting the darkness, you decide you want to print 2 sides of copies on two sides of paper. Please complete this task.

Bad: Artificial Ordering

With an artificial ordering of information or subgoals, people might not proceed in this order

The ordering might also be biased towards the layout of the interface, which would conceal any problems with finding the appropriate control

- Enter in 10 copies, with lightness set to 10%.
- Choose 1 sided to 2 sided, use paper source bin A.
- Cover sheet needed, using paper bin B for cover sheet.
- Set stapling feature on and collating on.
- Start printing.

Bad: Giving the Answers

Tells the person what terminology the interface uses, which they might not otherwise know

lighten = contrast, sorted = collated?

You are a teacher and are trying to make 40 copies of a one-sided magazine article that is 10 pages long for your class tomorrow. Due to the large number of copies, you print the article double-sided, in other words 10 page article would be printed on 5 sheets of paper. Due to the high contrast of the article, you must lighten the copy, in other words change the contrast. You then want the copies to be collated and stapled.

Good: Giving Context

Giving realistic context through scenarios can reduce the artificiality of the task

It's your first day in the office, starting a new job. You would like to make some copies of several documents that your boss gave you to browse through. Your colleague in the next cubicle tells you that you need an access code to make copies. The code is 5150. You walk over to the copy machine at the end of the hall and realize that it is not the Xerox copier that you are accustomed too... Make 2 copies of the "Company Annual Report".

Consider: Under-Specified Tasks

Many realistic goals are under-specified, as people have only a general idea what they want

By under-specifying the task, you can elicit realistic confusion and decision-making

You just finished fixing up the old hot rod in the garage and now its time to sell her. Make a couple copies of the pictures you took to send into the used car sales magazines. It's ok that they're in black and white but maybe you should lighten them up a bit. Your account billing code is 5150.

Task Design Summary

Task design is difficult and important

Poorly designed tasks mask interface failures

If you are not confident in your task descriptions, have others help you “debug” them before testing

Activity (15 min)

- Build a paper prototype for an alarm clock
- Support the following tasks:
 - Setting the clock time
 - Setting up an alarm
 - Snoozing (when the alarm goes off)
 - Turning the alarm off

Questions