

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 09:
Paper Prototyping

James Fogarty
Alex Fiannaca
Lauren Milne
Saba Kawas
Kelsey Munsell

Tuesday/Thursday
12:00 to 1:20



Today

Reading 3 Due Tomorrow

Design Review Tomorrow

Report on Tuesday

Presentations on Thursday / Friday

Paper Prototypes Next Weekend

Bring Prototypes to Following Tuesday

In-Class Inspection Methods

Today

Tips on Effective Presentations

Paper Prototyping

Introduce
Yourself

DisTrack

Refocus yourself

Graeme Britz	-	Project Manager
Max Suffel	-	Writer/User Researcher
Angela Suhardi	-	Writer/Designer
Jackie Chui	-	Writer/Designer
Bryan Djunaedi	-	Writer/Designer

Title
Image
Value Proposition



The recurring subscription management tool that let's you finally take control of your recurring services and payments.

Jen Kang • Vivian Yu • Si Liu • Brendan Lee

Contractions Typos



The recurring subscription management tool that let's you finally take control of your recurring services and payments.

Jen Kang • Vivian Yu • Si Liu • Brendan Lee

Finding

Typography
Consistency

- **Reimbursement is a burden...**
 - More people, more difficult
- **Compiling shopping list**
 - mental note, notepad, or phone
- **Brand and price conscious**

Task

- 1. Making list & budgeting**
- 2. Choosing a store & transportation**
- 3. Shopping**
- 4. Purchasing**
- 5. Storing groceries**
- 6. Managing \$\$\$ & requesting reimbursement**

Summary

Widows
Orphans
Process vs. Results

- Iteration is key
- Understand how users think
- Better design ideas came from more out-of-the-box thinking
- Discretionary spending is easy but discretionary spending tracking is hard
- Users crave positive motivation

Things to Do (Tasks)

1. Ability to record running statistics such as distance run, speed, number of runs, etc.
2. Share statistics with friends
3. Create running events and invite friends
4. Send mass notifications to friends for a spontaneous run
5. Find a SmartMatch (based on various criteria) to run with
6. Write and search for reviews on the route/experience

Overall Problem: Joint Pain & Activity

- Target Audience: Athletes
 - Health conscious
 - Disciplined
- Problem: Overexertion and aggravation of injury among athletes

Sense
Breaks

Running with Friends

Erica Putsche, Heidi So, Luke
Chang, Linsen Wu

Contextual Inquiry - Insights

Johnson (20, undergraduate, CSE 006 Lab)

- Perception ≠ Observation
- Distracted by people talking and noise
- More focused at CSE Labs than at home

Steve (25, graduate, Mercer Court)

- Motivated by seeing people working
- Distracted by people and social media
- Takes breaks often

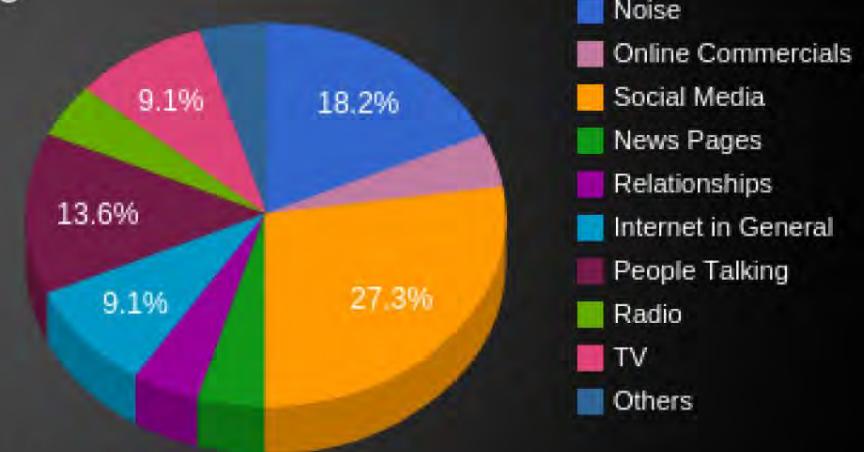
George (25, graduate, Odegaard Library)

- Turns notifications off while studying

Group (4 undergraduates, Yunnie Bubble Tea)

- Distracted by each other and apps
- Use headphones (music) to focus

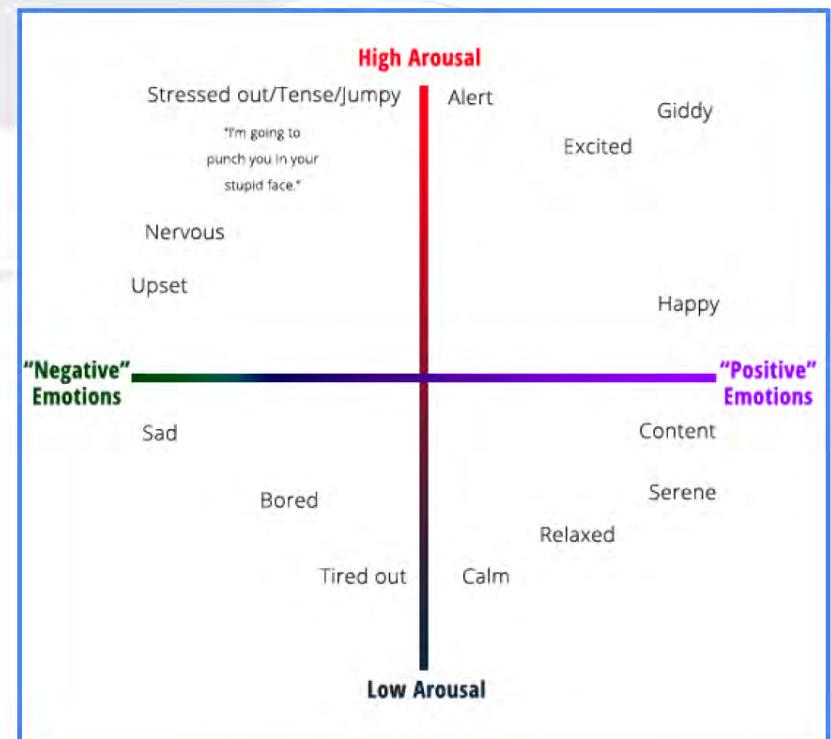
Distraction Sources



Too Much Text Too Much “People”

Our three inquiries showed us:

1. People valued the insights acquired from a mood journal.
2. People thought journaling was a hassle.
3. People were interested in what triggers their mood
4. People want to share information with a mental health professional



Design 1: Running separately

May add some motivation but does not provide the full experience of running with a companion

Design 2: Coordinating running events in advance

Tasks can be accomplished using Facebook events or other similar tools

Design 3: Spontaneous Running

Tasks are unique and they also address the concerns raised in our contextual inquiries. Our chosen design also provides us with an interesting opportunity to explore personal informatics

Summary

Too Much Text

- Iteration is key
- Understand how users think
- Better design ideas came from more out-of-the-box thinking
- Discretionary spending is easy but discretionary spending tracking is hard
- Users crave positive motivation

Having Too Much Text

If you can read it
you probably will
we probably will

Be conversational, engaged
even when not talking

Notes are fine
but do not read them

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Slide Counts as Guidelines Cramming too Much

Parent Contextual Inquiry

Participants:

- Two parents whose children formerly had IEPs
- One parent with two children that currently have IEPs
- One guardian of a student with an IEP

The Process:

- “The lingo and paperwork are confusing, they come with 17 people and you are there by yourself.”

Communication:

- “right now I come in doing all the communications to get information”

Tracking



Have the Right Text
“Overuse Injuries”

Overall Problem: Joint Pain & Activity

- Target Audience: Athletes
 - Health conscious
 - Disciplined
- Problem: Overexertion and aggravation of injury among athletes

Pictures
are Good

Contextual Inquiry

- Dancers
 - Use of entire body
 - Diverse Injuries
- Observation
 - Warmup
 - Preventative Habits



Pictures
are Good

Contextual Inquiry

4 Locations

- Odegaard Library
- CSE Undergraduate Labs
- Mercer Court
- Yennie Bubble Tea (Ave)



3+1 Approaches

- Observation + Interview (3x)
- Interview-only (2x)
- In-group Interview (1x4)
- + Online Survey (16x)



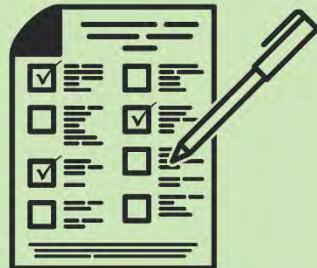
Pictures
are Good

Contextual Inquiry

- People do not want to be interrupted or distracted
- Most people do not have a liquid intake plan
- People often reach for soda, coffee, or other beverages when they feel thirsty



Pictures
are Good

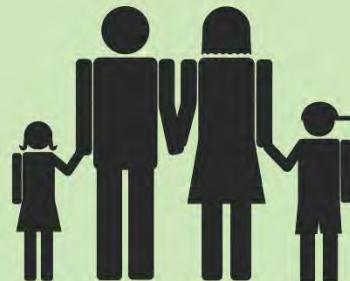


Contextual Inquiry

Professional
(20-40s)



Family



Undergrad
Student



In-Line References Versus Bibliography Slide

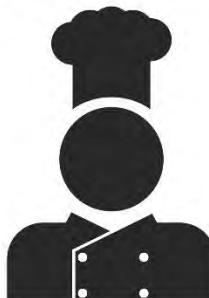
15% of Americans between the ages of 20 and 69 experience hearing loss that may have been caused by **noise at work or during leisure activities.**

Motivation of Participants



Very noisy work environment

Some control over exposure levels



Moderately noisy work environment

Lacks control of his noise exposure



Dartmouth student who is exposed to **noisy social environments** multiple days per week

Has control over exposure levels

Watch the
Selling

We can help

Tasks

- Record mood reflections
- Discover triggers and warning signs
- Discover wellness strategies
- Planning for health
- Quick mood check-ins
- Aid your health professional

Tasks

1

Engage a work session.

2

Record digital and non-digital behavior.

3

Prompt for taking breaks.

4

Reflect on recorded data relative to time and location.

5

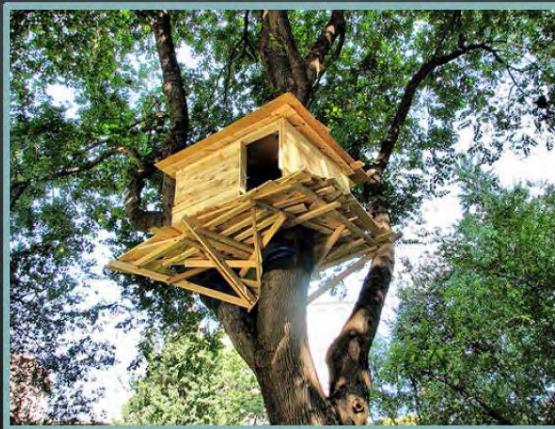
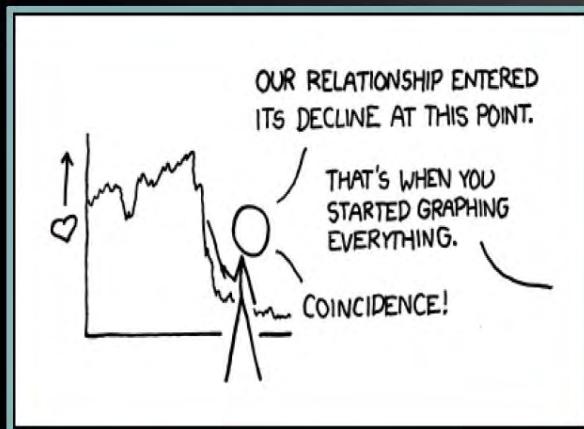
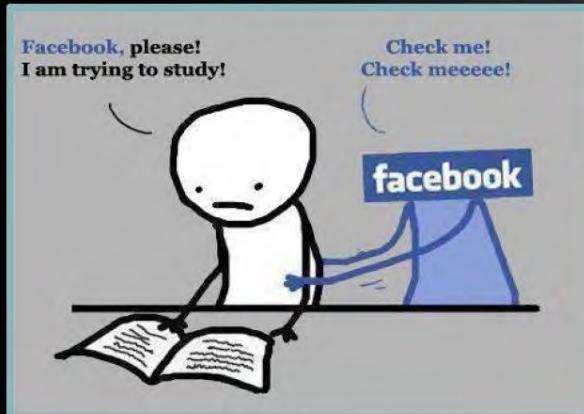
Find a productive work place.

6

Find and implement methods/strategies to stay focused.

Distracting

Tasks



Speaking of Distractions

Whether correct or not, many things distract

Plural possessive

a posteriori

Anything that might be sensitive

Original Tasks

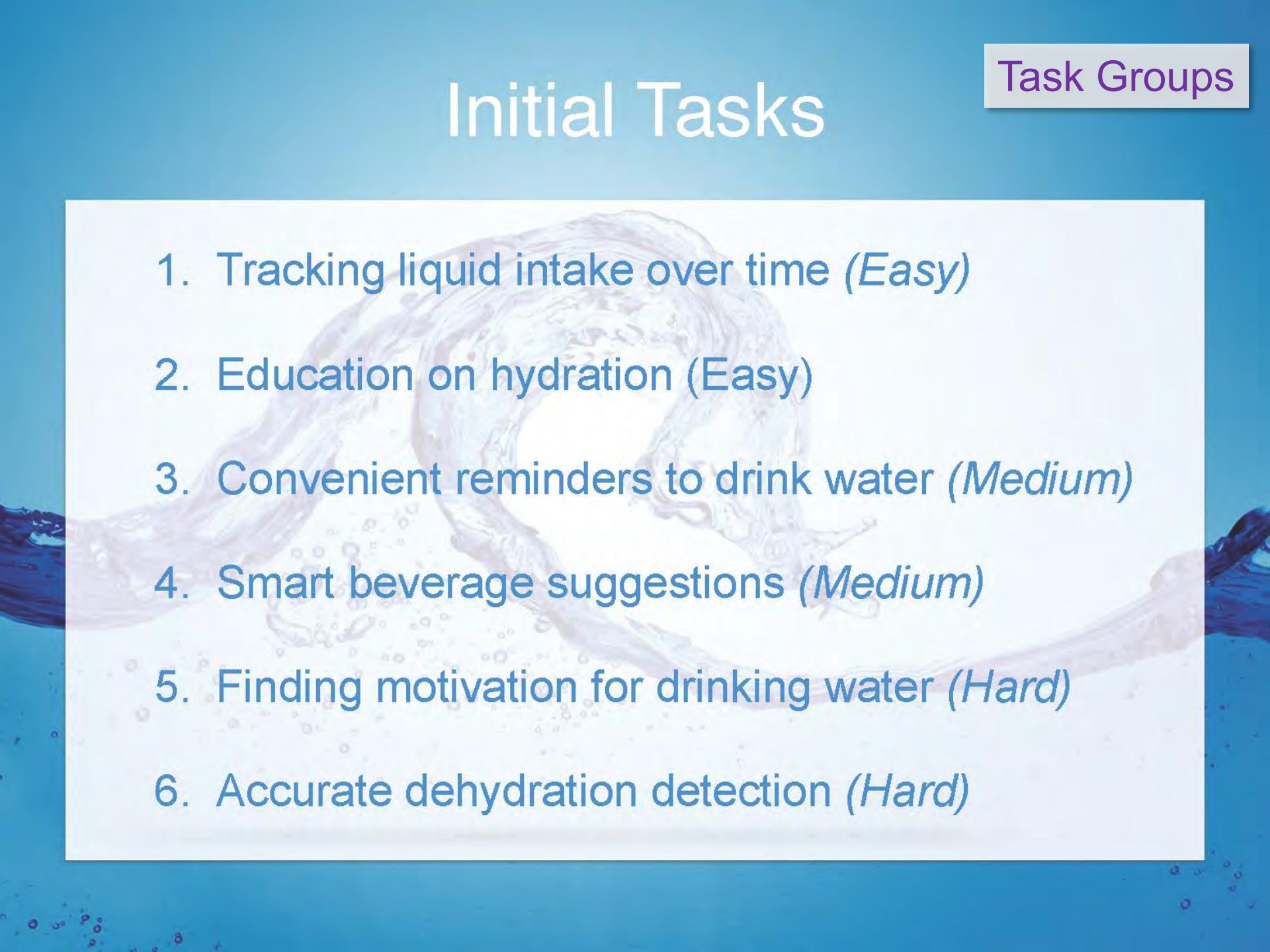
Current Tasks:

- Aggregate and collect all IEP information for continuity and stakeholder accessibility.
- Encourage communication between stakeholders.
- Connect with other parents who have children with similar disabilities.

New Tasks:

- Access mini lessons to support the developmental master of IEP tasks.
- Motivational rewards system to encourage students to be active in their IEP.
- IEP videos for parents to understand how to best advocate for their child.

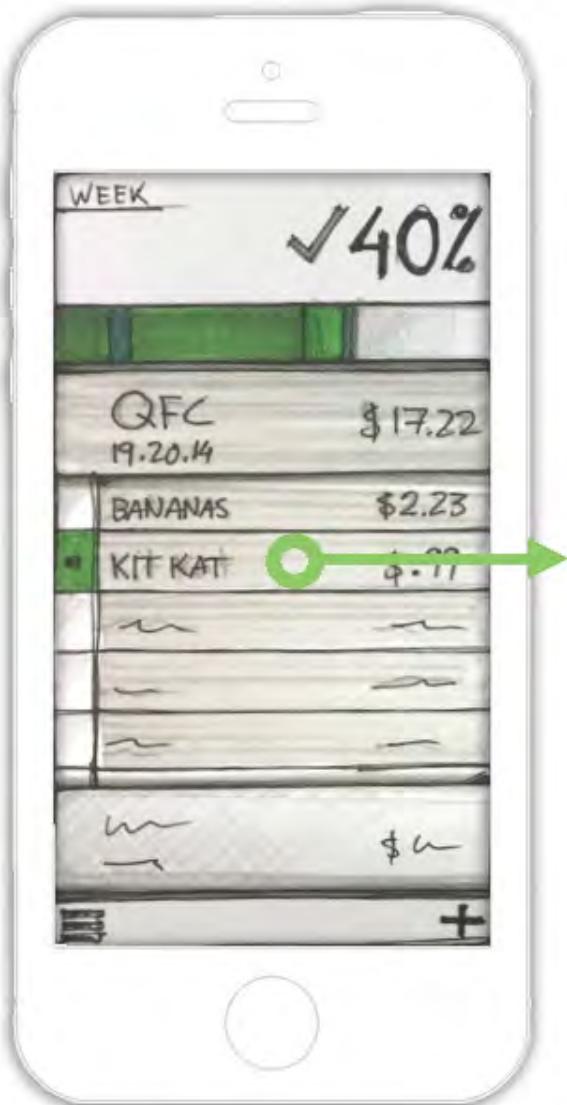
Initial Tasks

- 
1. Tracking liquid intake over time (*Easy*)
 2. Education on hydration (*Easy*)
 3. Convenient reminders to drink water (*Medium*)
 4. Smart beverage suggestions (*Medium*)
 5. Finding motivation for drinking water (*Hard*)
 6. Accurate dehydration detection (*Hard*)



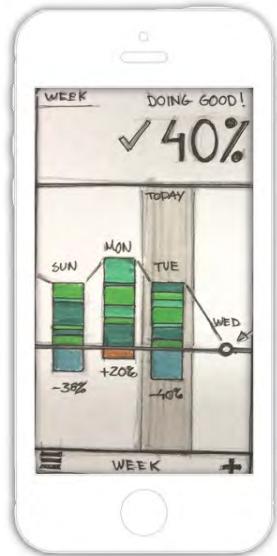
Adjust budget between different categories.

Verb as Task



Designate spending as discretionary.

Verb as Task



Review spending **progress** compared to goals.



Account for **future** spending.



Prevent **unwanted** habitual spending.



Check if a potential purchase **fits the budget**.

Consistency of Emphasis

Many people make **general** budgeting goals.

Large items are monitored.

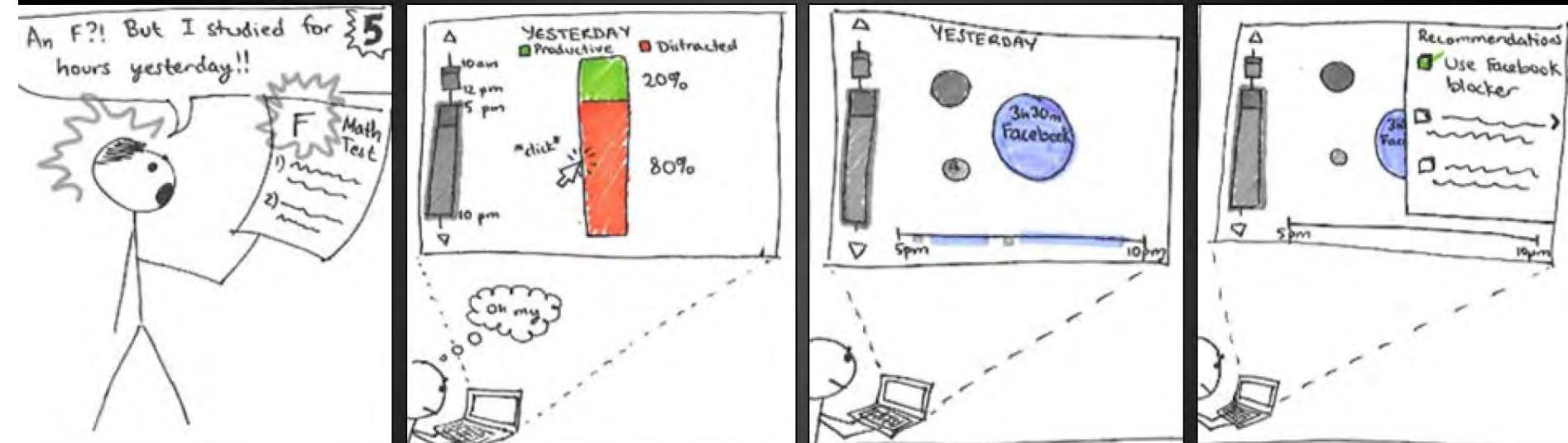
Small items cumulative impact
not considered.

Challenging setting up budgets.

Complicated input leads to **less use**.

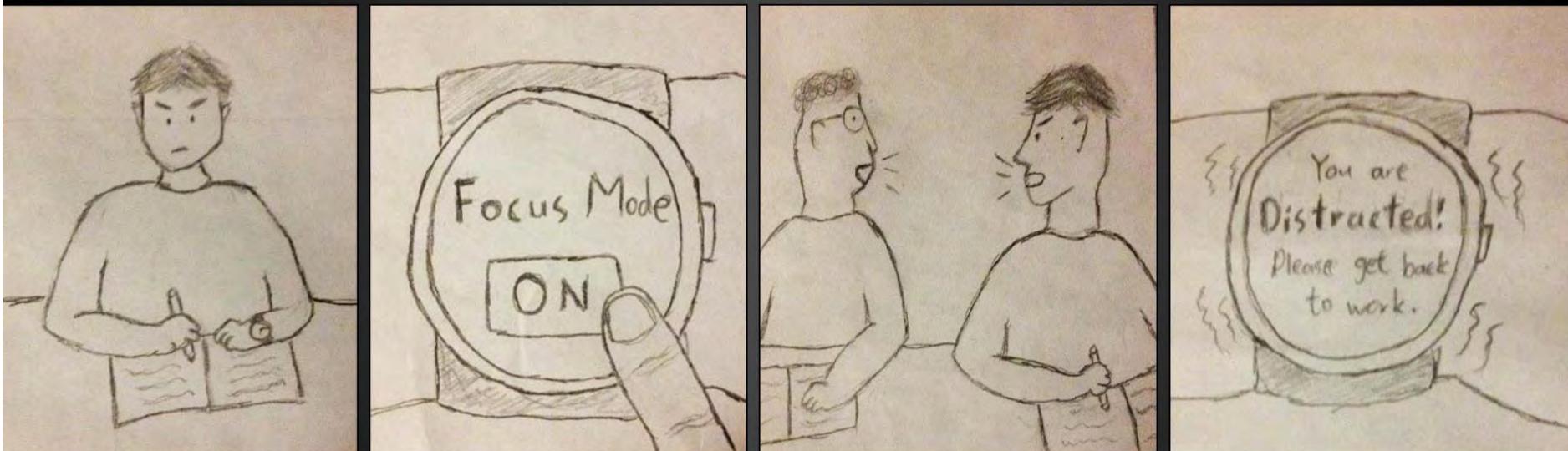
Consistency of Emphasis

Task: Reflect on recorded data relative to time and location



Consistency of Emphasis

Task: Find and implement methods/strategies
to reduce distractions and increase focus



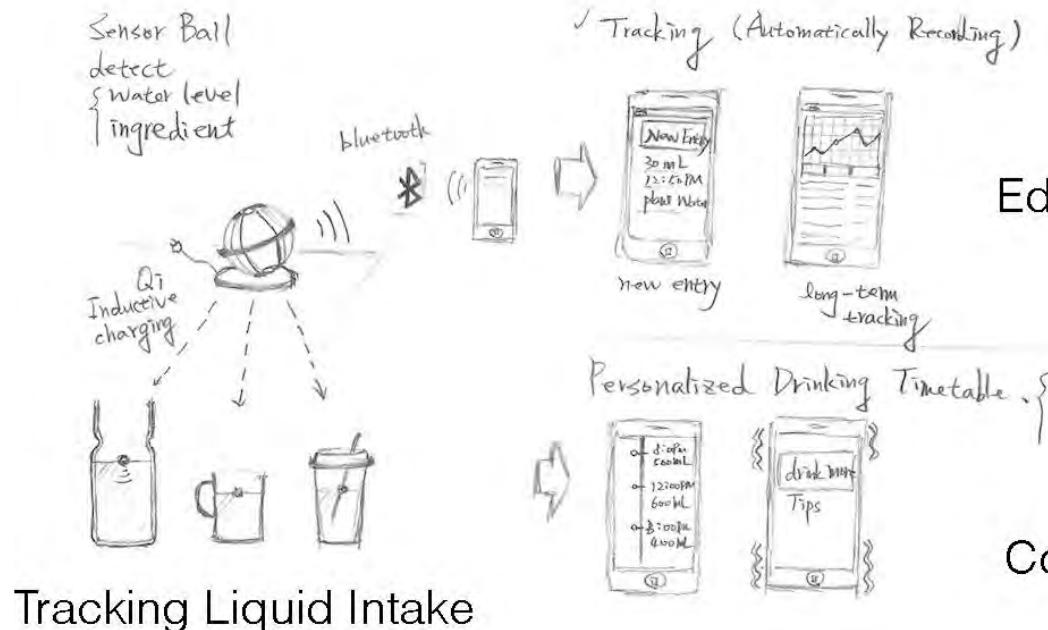
Pre-shopping

Design 1

Naming
Designs



Naming Designs



Tracking Liquid Intake

Convenient Reminders

detect ingredients
& give suggestions

Smart Beverage Suggestions

Naming Designs versus Slide Title Hierarchy of Information

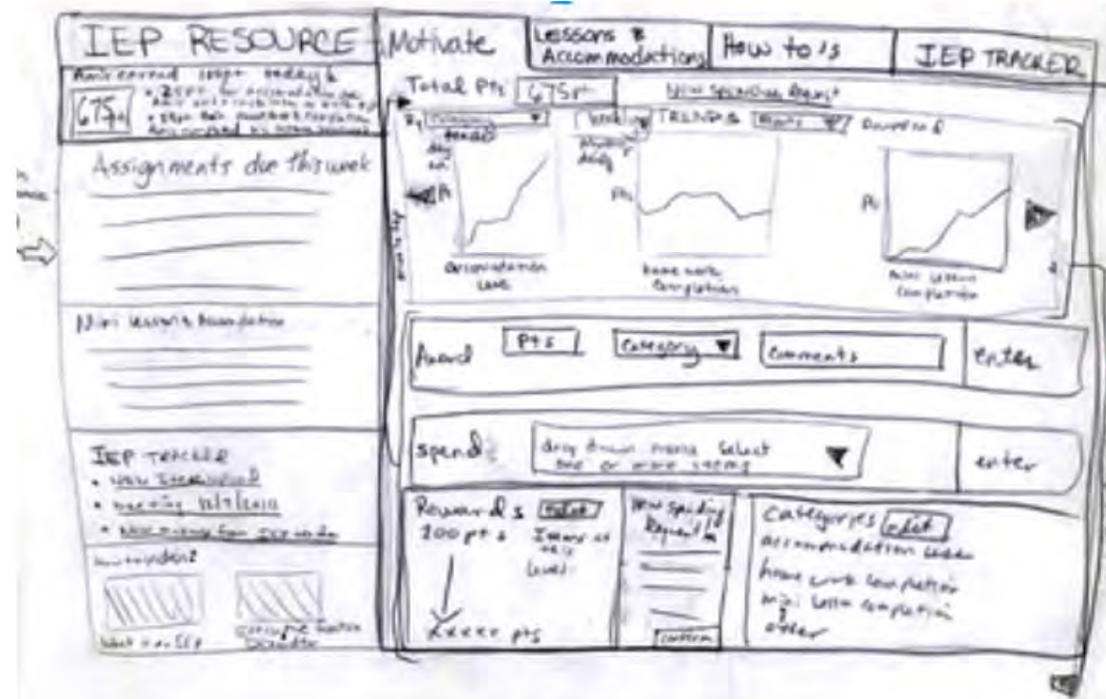
Sketch 3

Main Focus:

- Student Motivation

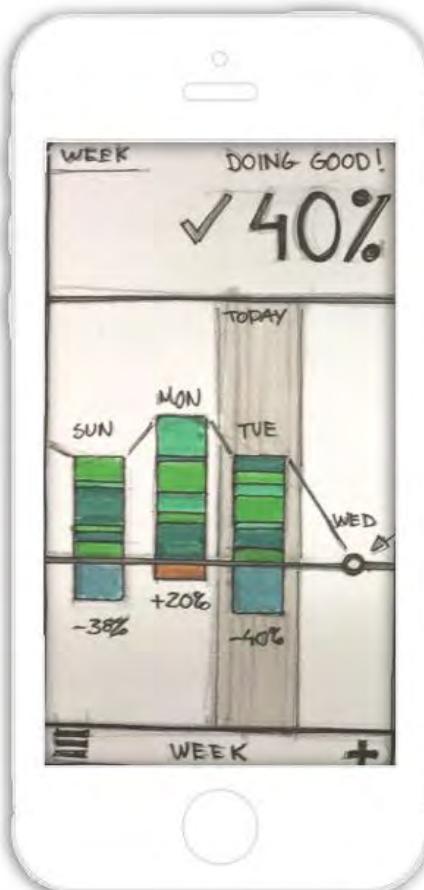
Key Features:

- Mini lessons accessible for the student and parent to work on
- Points awarded for completion of task on the website
- Spending points for various rewards



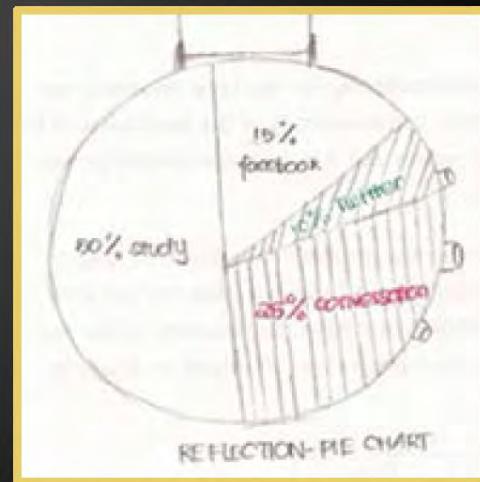
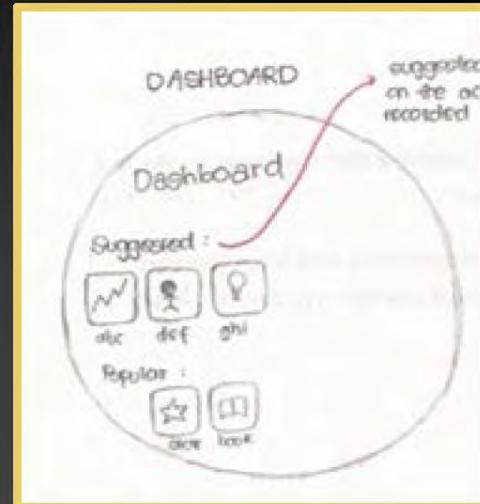
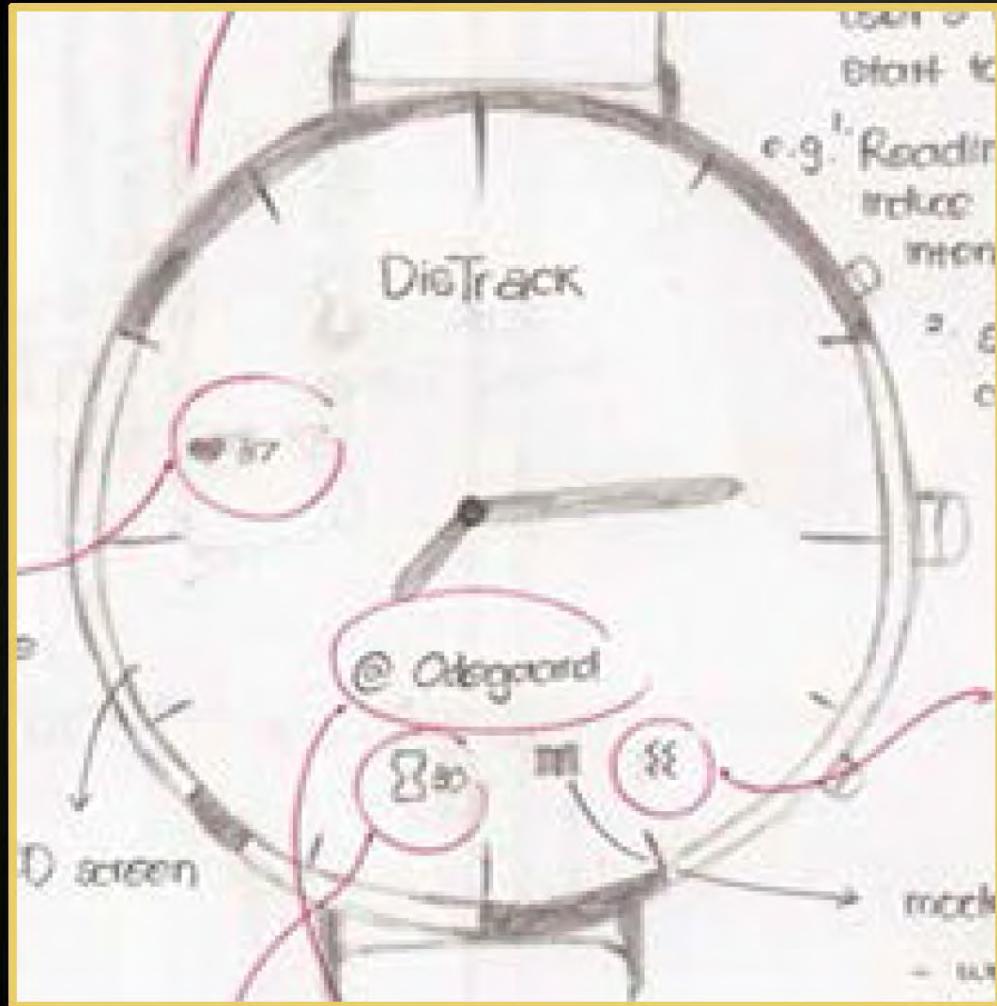
Design 1

Legibility
of Sketches



Blurry Images

Design 3

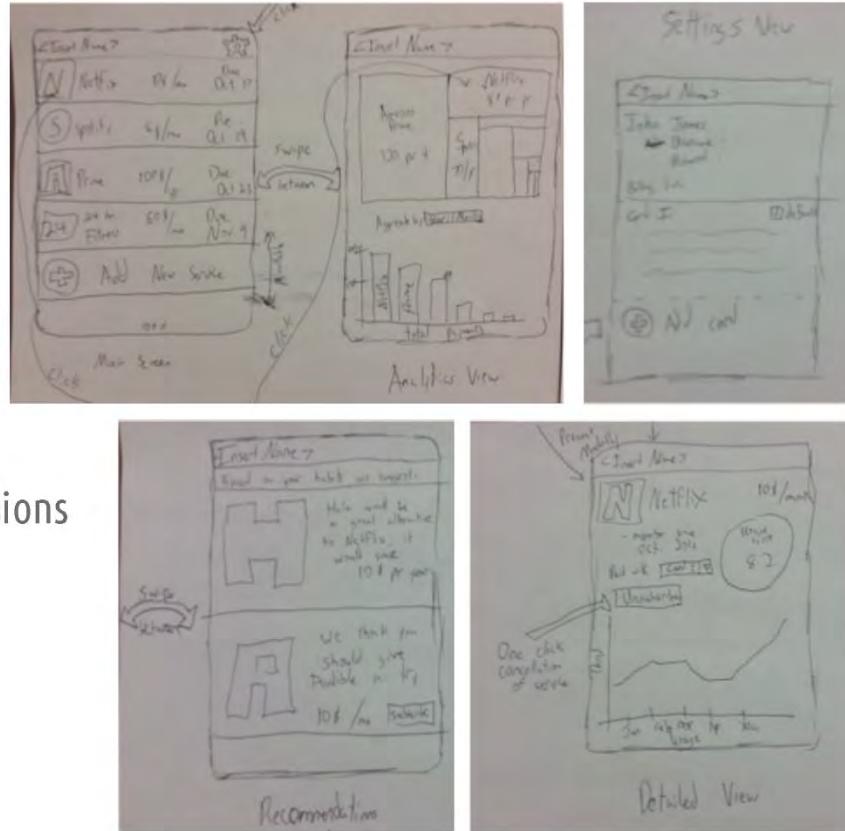


Low Contrast Images Low Contrast Text

Updated Sketch

Two Tasks

- Recurring subscription management
- Insight and informed decisions



Problem

Check the
Projector

A lack of awareness about the long-term
implications of noise exposure

Finishing
Slide

KACHING

Today

Tips on Effective Presentations

Paper Prototyping

Is My Design Good?

This is not a meaningful question

It can and will be answered with “Yes”

At least consider asking:

“What are three good things about this design?”

“What are three bad things about this design?”

But really the answer is “it depends”

Remember that designs are used for tasks

We should ask this in the context of tasks

Fidelity in Prototyping

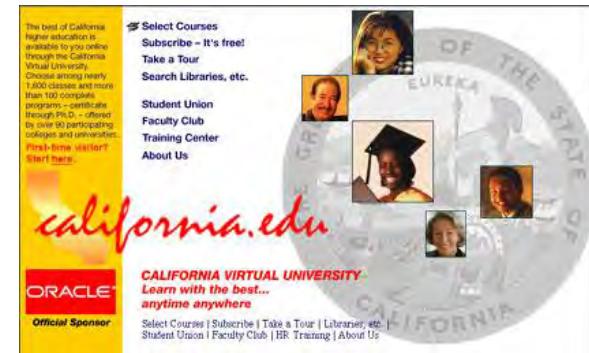
High Fidelity

Prototypes look like
the final product

Low Fidelity

Designer sketches
with many details missing

We have discussed the
value of staying lightweight
in sketching, but this also
applies to prototyping



High-Fidelity Prototypes Warp

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 → Prototype → Evaluate → Iterate

Instead simulate the prototype

Sketches → Evaluate → Iterate

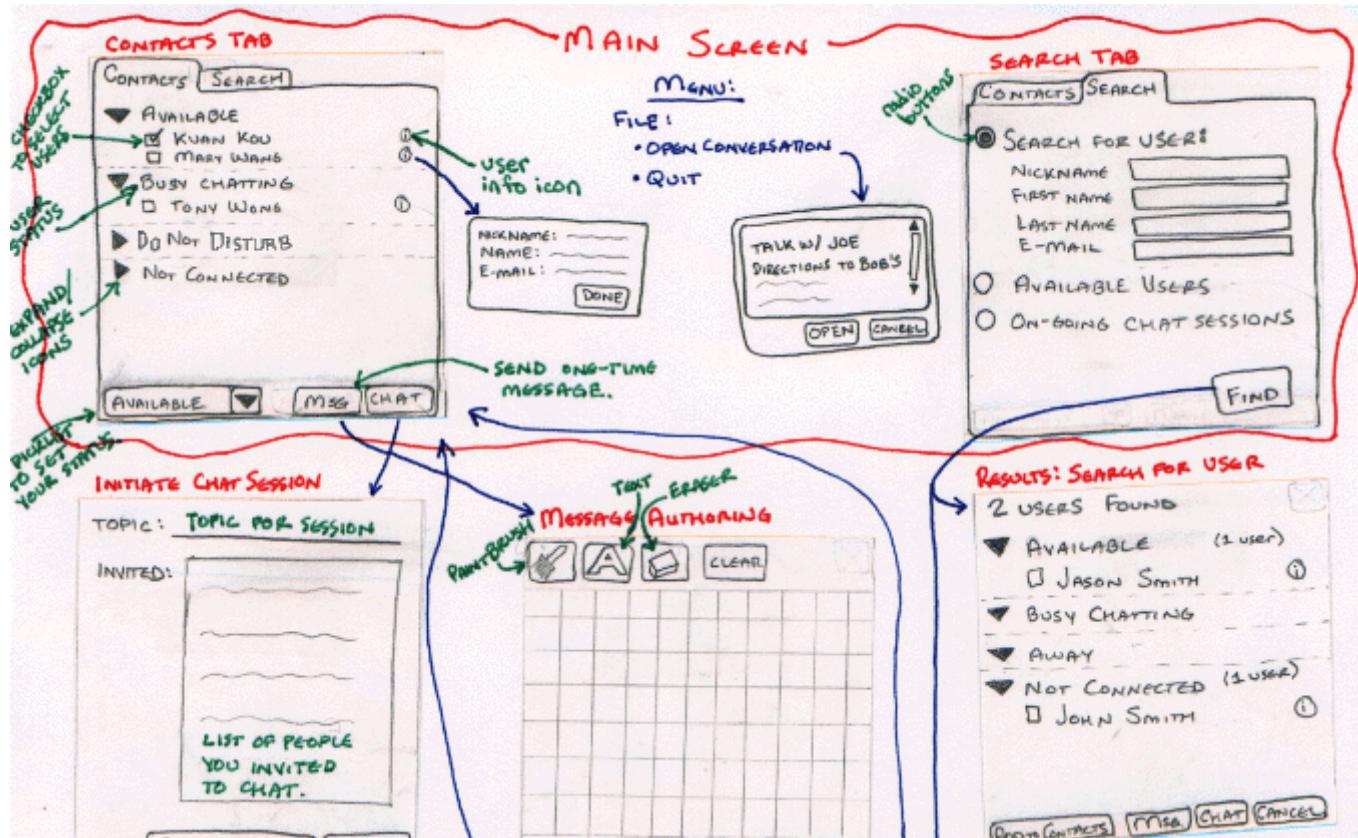
Sketches act as prototypes

A designer “plays computer”

Other design team members observe & record

Kindergarten implementation skills reduce barriers to participation in design and testing

Sketches



Paper Prototype



Basic Materials

Heavy, white paper

Index cards

Post-its

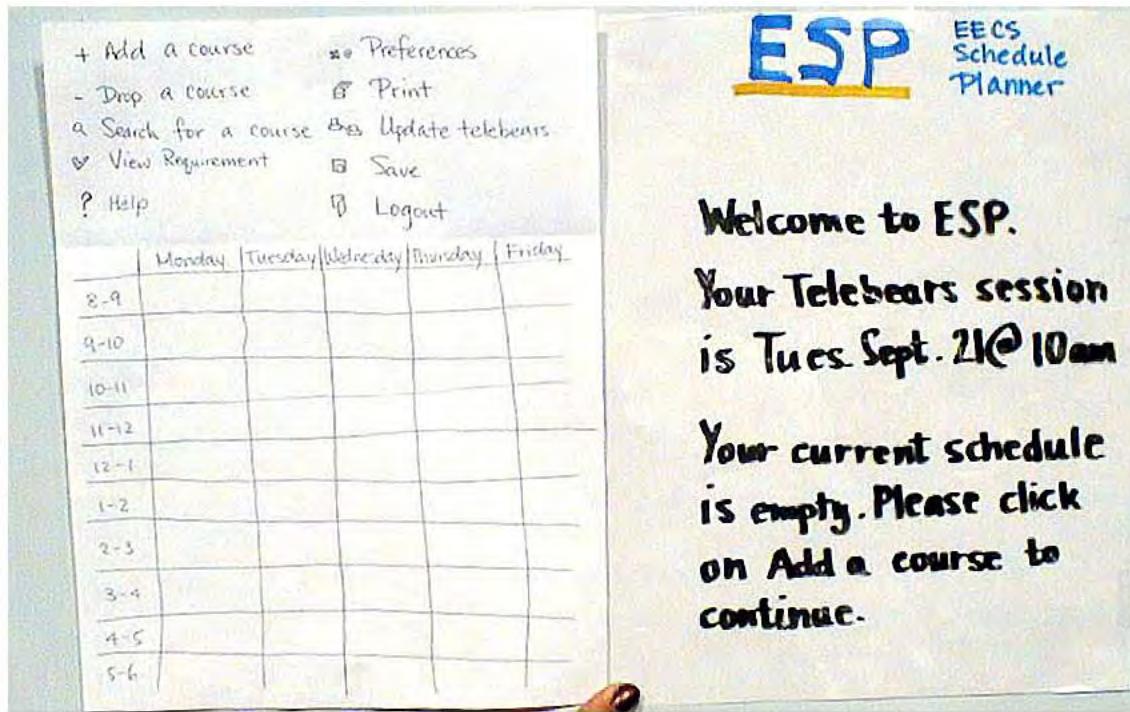
Tape, stick glue, correction tape

Pens and markers in many colors and sizes

Overhead transparencies

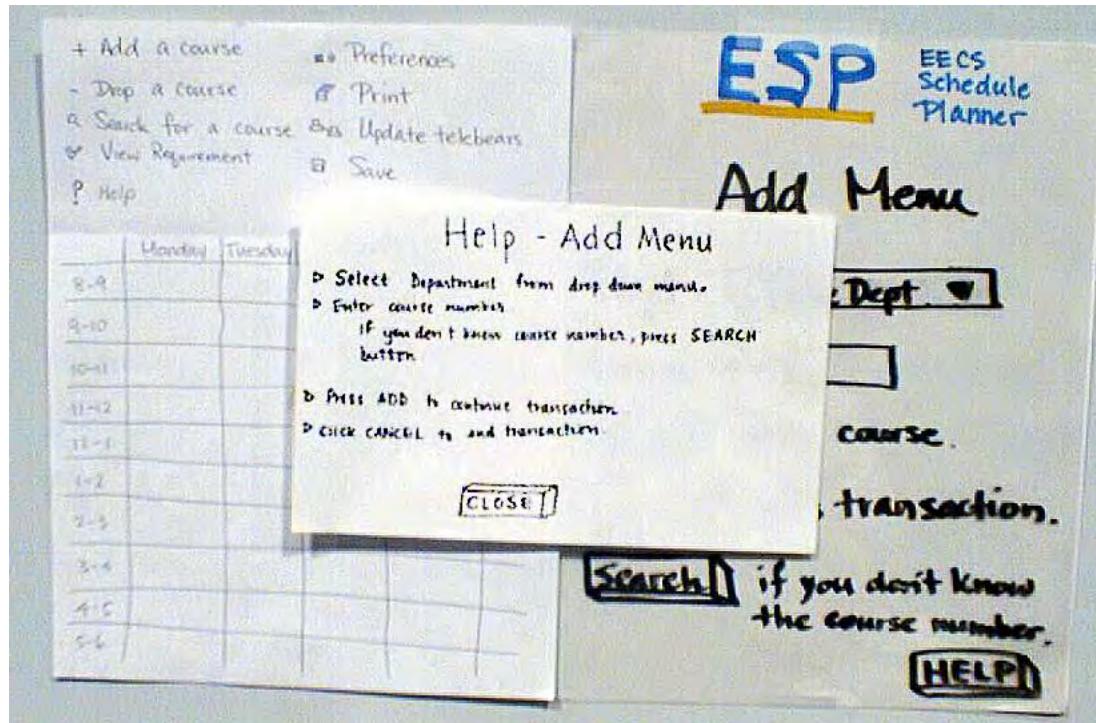
Scissors, X-Acto knife

Paper Prototype



“Screen” faked with
pre-constructed pieces

Paper Prototype



New pieces added in response to interaction

Paper Prototype

The image shows a hand-drawn paper prototype of a website page. At the top, there is a horizontal row of six rectangular buttons labeled "Back", "Forward", "Stop", "Home", "Search", and "Print". Below this, the header "Kool Clothes" is written in a stylized font, with a curly brace underneath it labeled "Logo". To the right of the logo are menu links: "Guys", "Gals", "Kids", and "Customer Service". The main content area is titled "Shopping Cart". A table lists items in the cart:

Item	Description	Color	Size	Status	Qty	Price	Total
42773	Cashmere sweater	Green	M	In Stock	1	\$79.99	\$79.99
23476	Breakaway belt	BR	S/M	In Stock	1	\$24.00	\$24.00

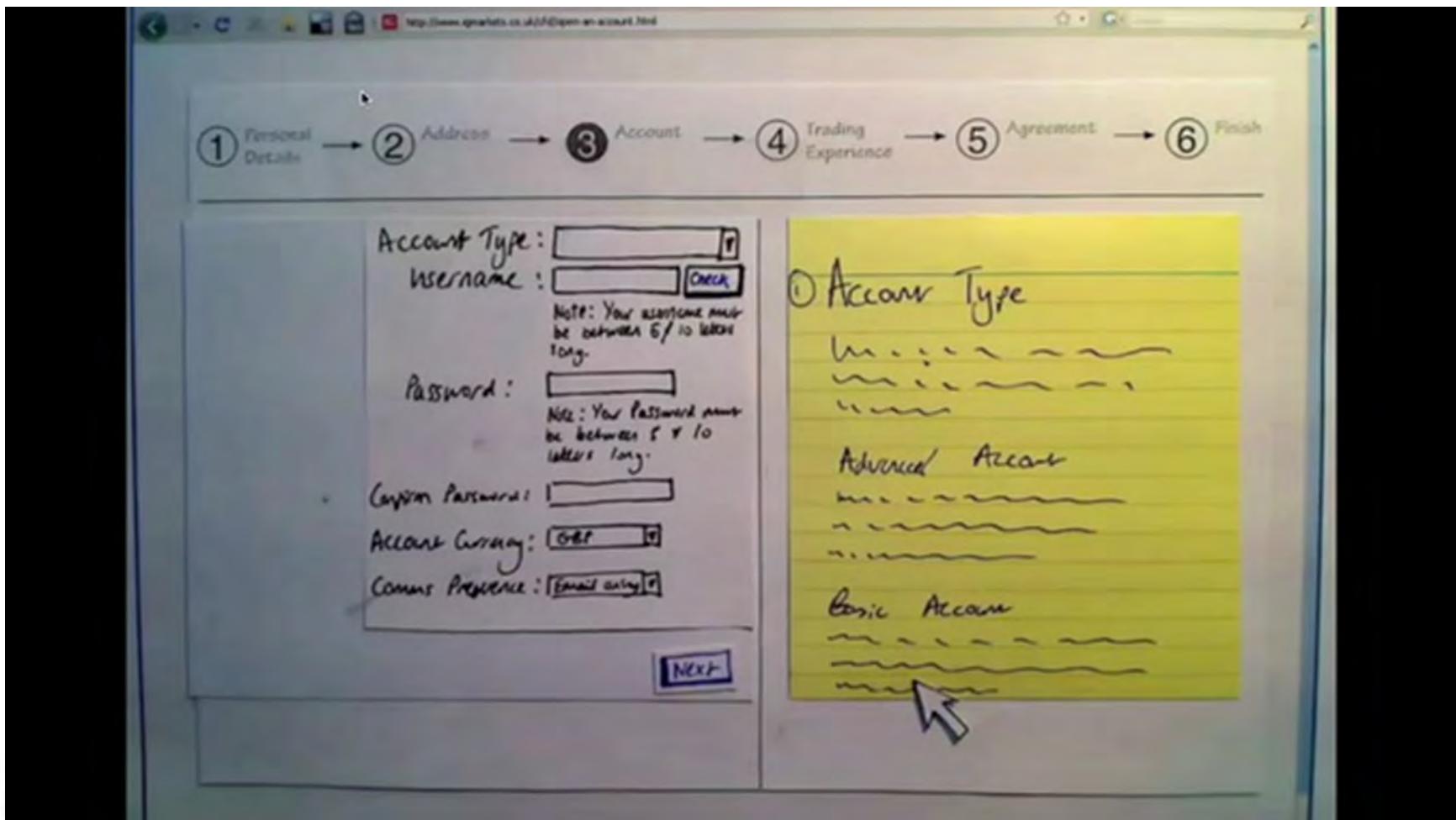
On the left side of the cart table, there is a note: "Check out our no-hassle Return Policy". On the right side, there is a breakdown of the total cost:

Subtotal	207.99
St H	12.95
Tax	0.00
Total	220.94

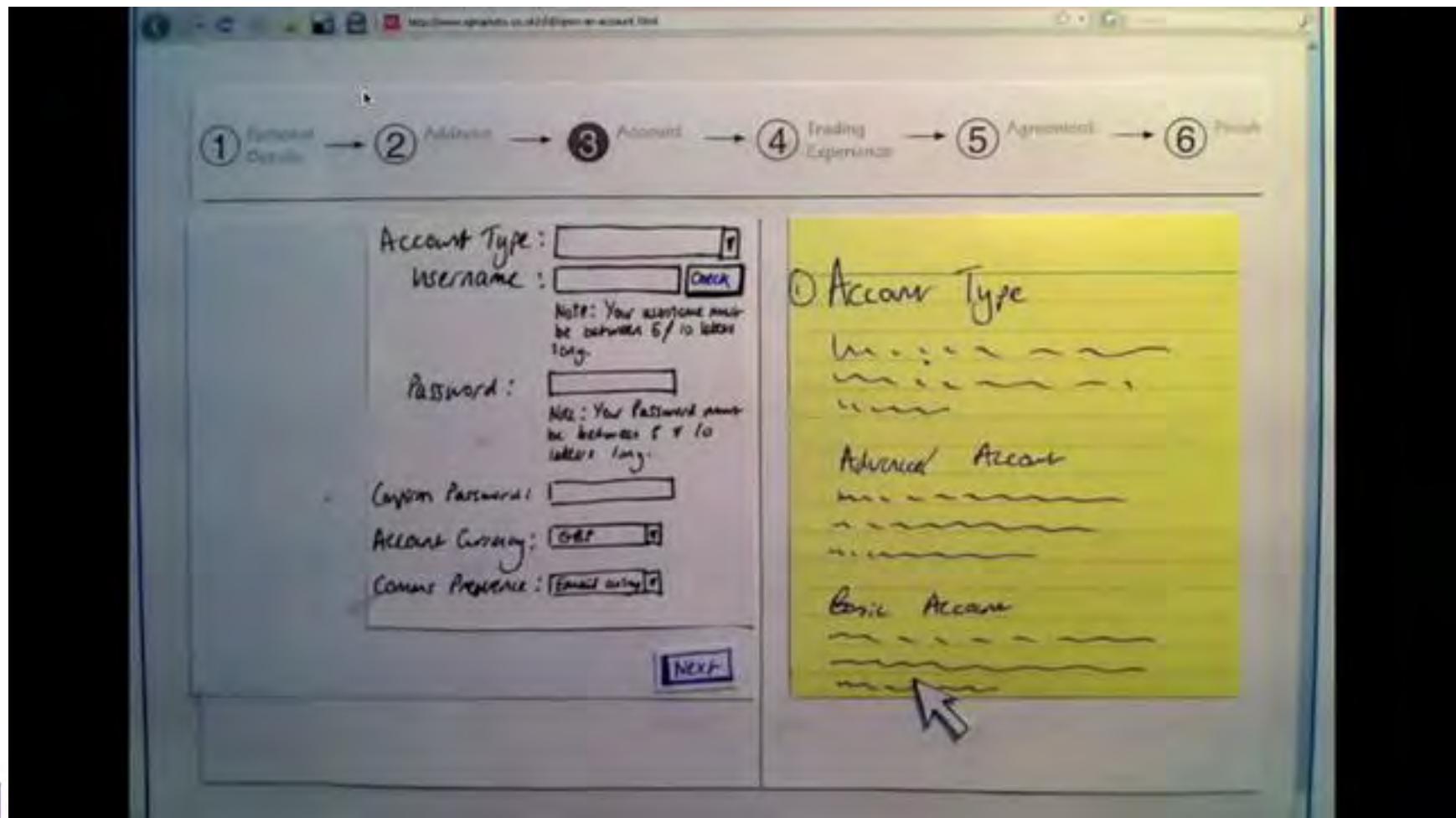
At the bottom, there are two buttons: "Continue Shopping" and "Checkout".

Transparencies allow
flexible use of text

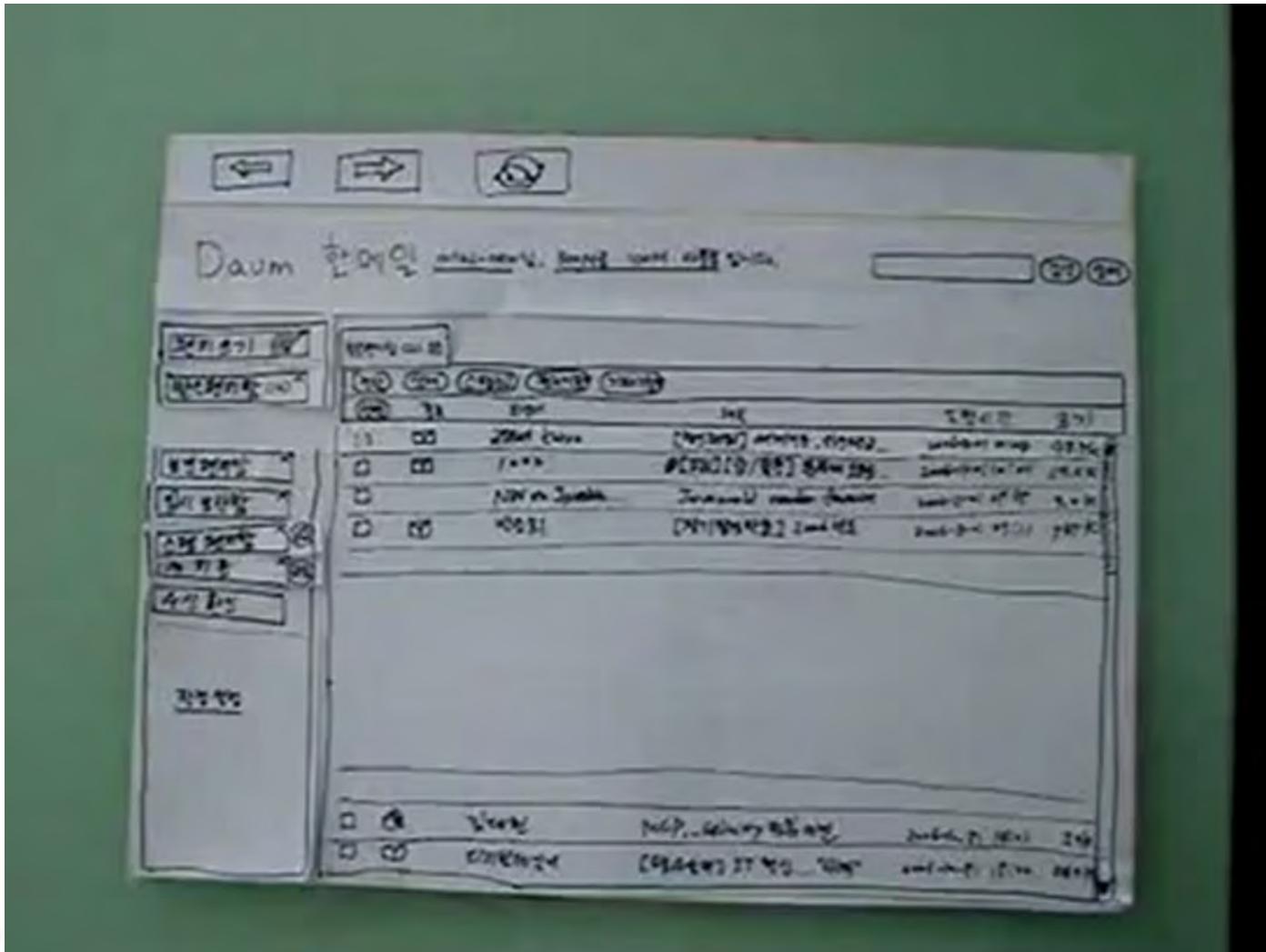
Paper Prototype as Communication



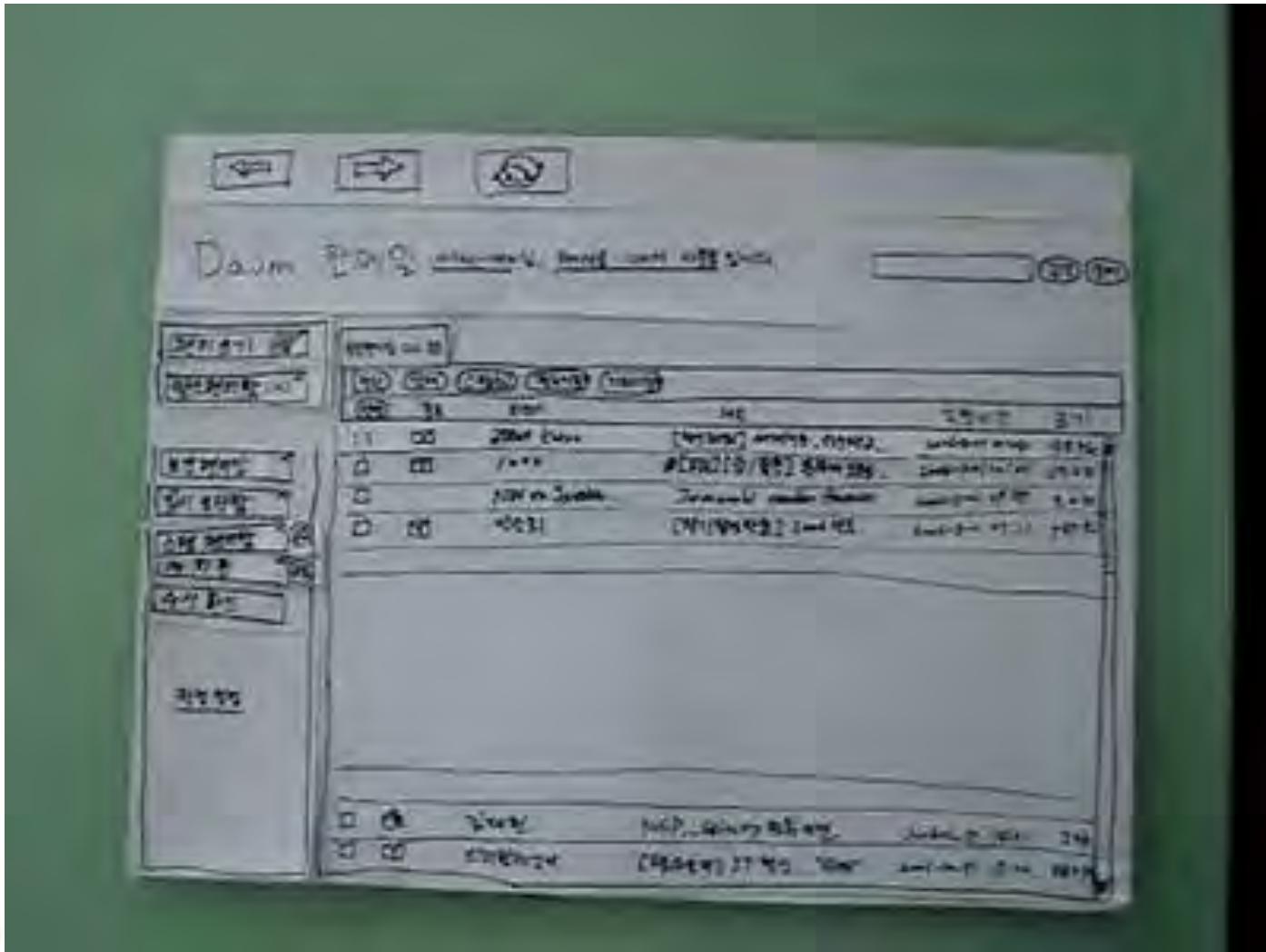
Paper Prototype as Communication



Paper Prototype as Evaluation



Paper Prototype as Evaluation



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

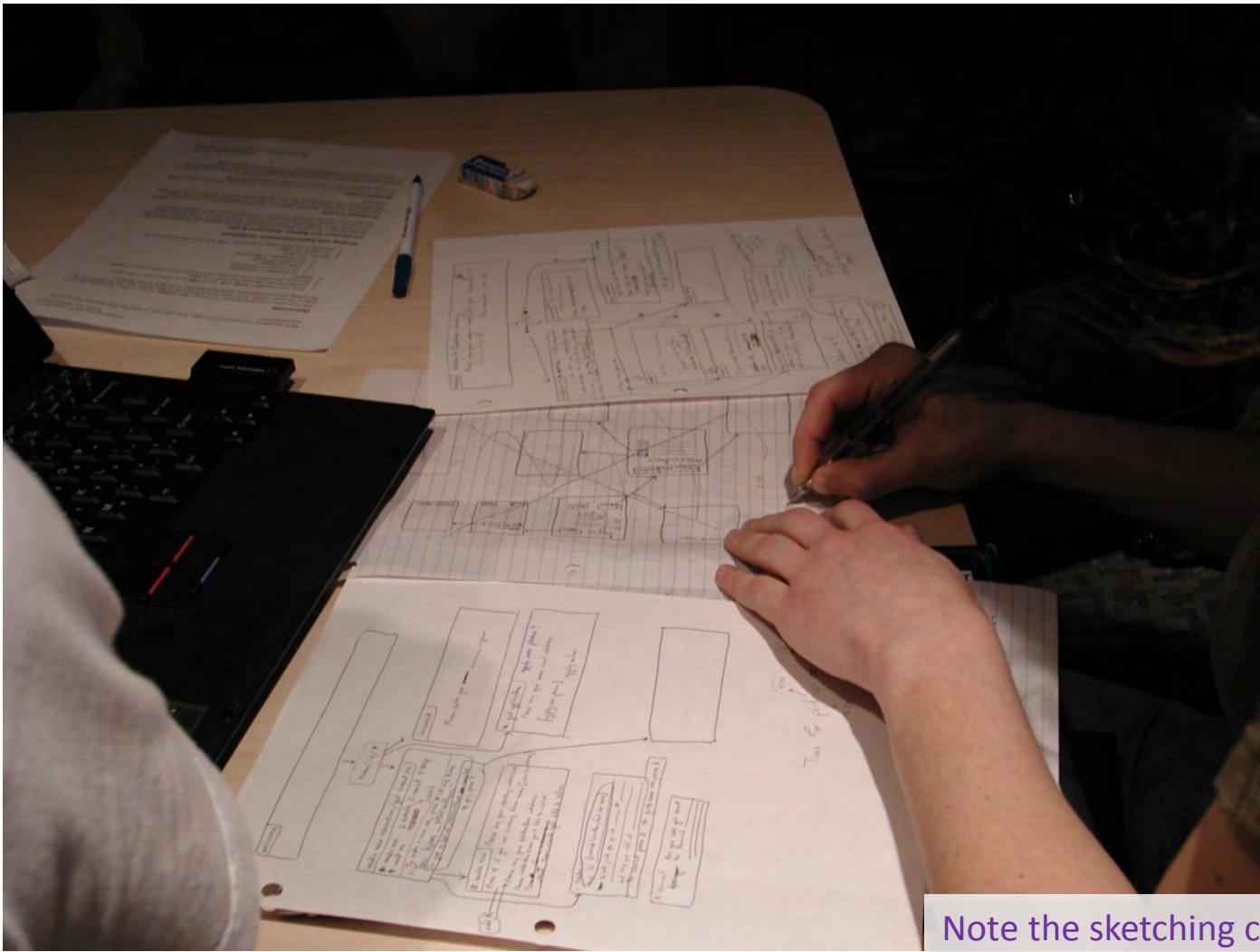
Ready responses for actions

- Have those pull-down menus already made

- Planned tasks can guide this

Use photocopier to make many versions

Constructing the Prototype



Note the sketching continues

Constructing the Prototype



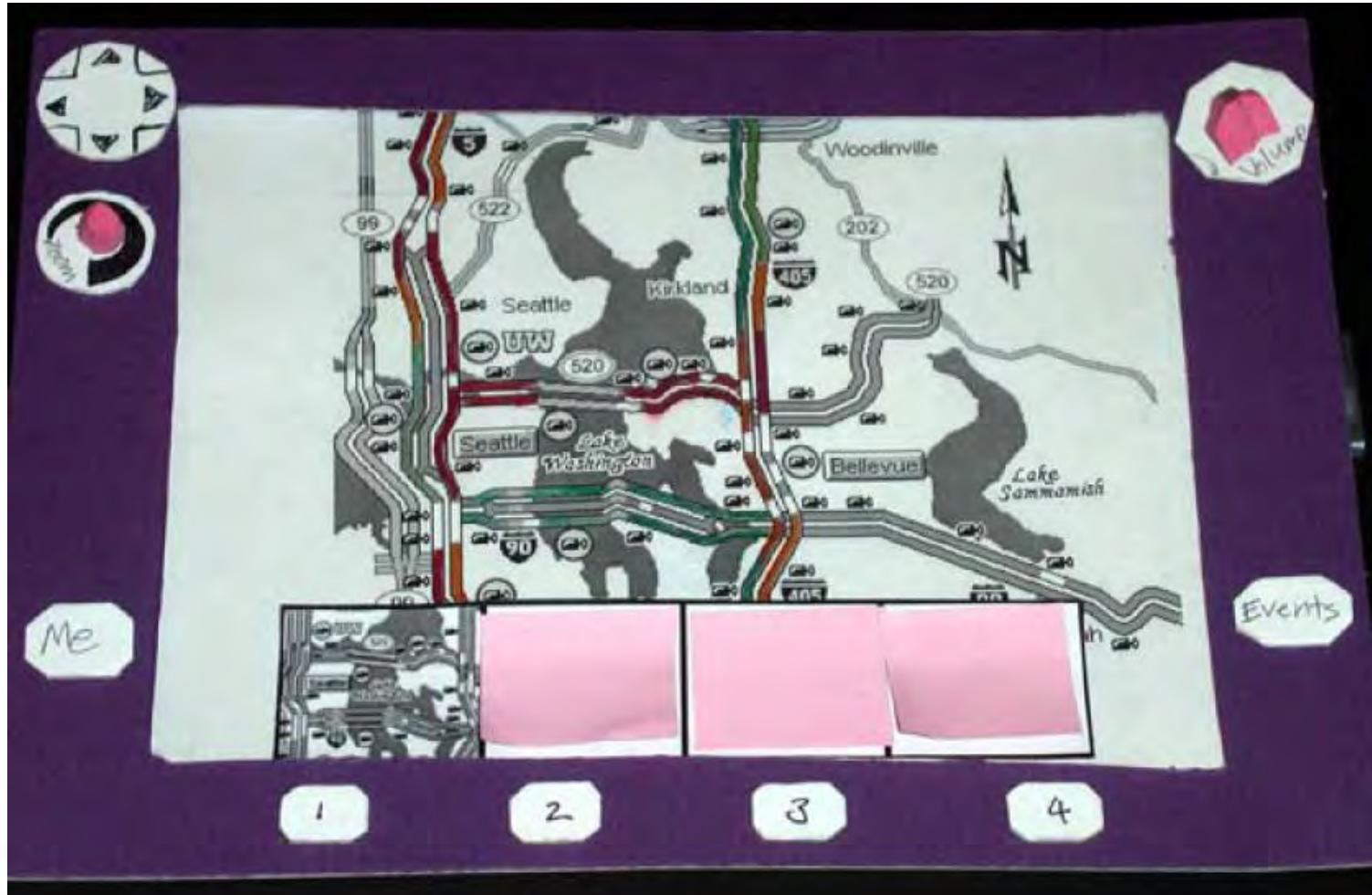
Planning what is needed given tasks

Constructing the Prototype



Prototyping physical form

Constructing the Prototype



Prototyping physical form

Constructing the Prototype



Remember your target platform constraints

Why Usability Test?

Find and fix problems in a design

- Removes the expert blind spot

- Obtain data to unify team around changes

- Uncover unexpected behaviors

Results drive 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

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

Focus on process data

Gives overview of where the problems are

More useful than “too slow” or “too many errors”

Not a Scientific Experiment

Focus is on improving the design

- Experimental control is not as necessary

- Data measurement is not as precise

- Number of participants is fairly small

Changes can be made

- Fix the obviously broken design

- Quickly explore alternatives

- Modify the focus of testing between participants

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

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

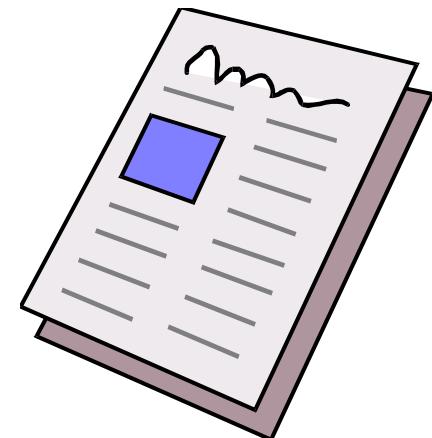
Prepare tasks and paper prototype

Practice to avoid “bugs” in your prototype

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.”

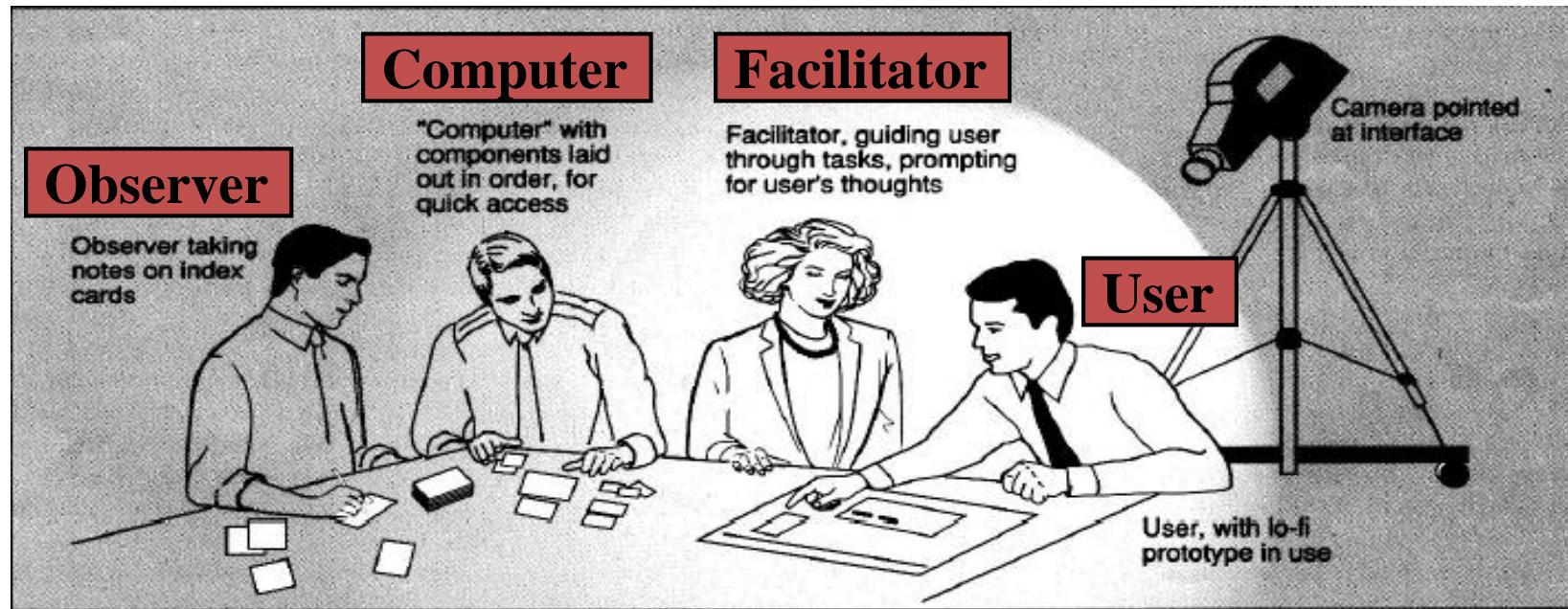
Introducing the Test

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



See the Gommol reading tips on a test session

Talk-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?”

“Talk-aloud” is similar but distinct from “think-aloud”

Most do not know or care about the difference,
so you may see the terms used interchangeably

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

Answering Questions

Remember the purpose of this test

- You would not be there “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

Tests yield many forms of data

Quantitative counts

- time, success/failure
- confusions, errors, workarounds

Observations

- notes about when, where, why, how above occur

Participant comments and feedback

- during session or via a questionnaire

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

Ethical Considerations

Testing is stressful, can be distressing

people can leave in tears

You have a responsibility to alleviate

make voluntary with informed consent

avoid pressure to participate

let them know they can stop at any time

stress that you are testing the system, not them

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

Public Announcement

WE WILL PAY YOU \$4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid \$4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid \$4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

TO:
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY,
YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in
this study of memory and learning. I am between the ages of 20 and
50. I will be paid \$4.00 (plus 50c carfare) if I participate.

NAME (Please Print).

ADDRESS

TELEPHONE NO. Best time to call you

AGE OCCUPATION SEX
CAN YOU COME:

WEEKDAYS EVENINGS WEEKENDS

In-Class Design, Prototype, Test

Design and prototype a new touchscreen alarm clock to be deployed in a very high end hotel brand. Your alarm clock should be immediately usable for tired, busy, or just-don't-want-to-be-bothered travelers who will spend zero time learning your interface.

In addition to displaying the current time, your alarm clock should include basic functionality for:

- turning the alarm on/off
- setting the wake-up time
- anything else you think is appropriate

Guests will interact with your alarm using a touch panel.

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

Task Design is Important

Testing is not entirely in the wild

As a part of focusing the test, you often need to give a person a somewhat artificial task

The artificiality of the task may influence how people interact with an interface...

...and thus may influence the outcomes and insights gained through user testing

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, a 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: Changing the Task

The task is to make copies, and this happens to involve entering information in the copier interface

But this task description is an data entry task,
“Here is some information. Put it in the interface.”

- Make 23 copies
- With collate
- Cover sheets
- Default darkness
- 1 Sided-> 1 Sided

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

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 09:
Paper Prototyping

James Fogarty
Alex Fiannaca
Lauren Milne
Saba Kawas
Kelsey Munsell

Tuesday/Thursday
12:00 to 1:20

