CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 01:
Introduction and
Personal Informatics

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
What Is This Course?

Time for a Door Quiz:

Say out loud what action you use to open the door

Push
Pull
Door Quiz
Door Quiz
Door Quiz
Door Quiz
Door Quiz
Door Quiz
Door Quiz
Door Quiz
What is so Special about Computers?

Nothing! It is about good designs and bad designs.

We make push/pull decisions many times per day.

We all encounter doors that do this badly.

We all see signs that do not change what we do.
Signs Do Not Help
Signs Do Not Help
What is so Special about Computers?

Yet we blame ourselves

Absolutely everything we encounter in the made world was designed
Too often poorly designed

Read this book

Be warned you cannot unread it, you become angry
Iterative Human-Centered Design

This is a course about process

This is not a course about ‘good’ interfaces or rules that you should follow in design

Rapid iteration and exploration is the most important and effective tool for effective design

“Enlightened trial and error succeeds over the planning of the lone genius” – Peter Skillman, IDEO
Project Overview

The core of this course is a group project

Propose and do an intense end-to-end design
  Getting the Right Design
  Getting the Design Right
  Communicating the Design

Not an implementation course
Design Research & Task Analysis

Observe practices and understand needs

Consumester

FoodWatch
Sketching & Storyboarding

- Post
  - Trips
    - Past
    - Find
  - My Trips
    - Community
      - Friend's Trips
      - Nearby trips
  - Nearby trips

RideAlong
Sketching & Storyboarding

RouteMyRun
Low-Fidelity Prototyping & Testing
Digital Mockup

Balance
Video Prototypes

GetOut

PickUp
Learn by Example from Prior Projects

Autumn 2014 - Aqueous:

Learn by Example from Prior Projects

Autumn 2014 - IEP Connect:

https://courses.cs.washington.edu/courses/cse440/14au/projects/iepconnect/
Learn by Example from Prior Projects

Autumn 2014 - Ka-Ching:

Learn by Example from Prior Projects

Autumn 2014 - Soundscape:
Learn by Example from Prior Projects

Autumn 2015 - Balance:

Learn by Example from Prior Projects

Autumn 2015 - Neat:
Learn by Example from Prior Projects

Autumn 2015 - Poliscope:

Learn by Example from Prior Projects

Autumn 2015 - School View:
Learn by Example from Prior Projects

Winter 2017 - BookWurm:
https://courses.cs.washington.edu/courses/cse440/17wi/projects/bookwurm/
Learn by Example from Prior Projects

Winter 2017 - Dash:
https://courses.cs.washington.edu/courses/cse440/17wi/projects/dash/
Learn by Example from Prior Projects

Winter 2017 - Jasper:
https://courses.cs.washington.edu/courses/cse440/17wi/projects/jasper/
Learn by Example from Prior Projects

Winter 2017 - Wishing Well:

https://courses.cs.washington.edu/courses/cse440/17wi/projects/wishingwell/
Studio Time in Section and Lecture

This course is designed around rapid feedback

Section is primarily studio time with the staff

Groups will be formed within section
Your team always brings a milestone to studio
Participation is a critical component of the course

Tuesday milestones

Your team always has a milestone due
Class may include project time or activity
Seek feedback (e.g., via office hours)
Overview

HCI and the Project Sequence
Course Staff Introductions
Administrivia

Assignment 1: Project Proposal
  Assignment 1a: Due Tonight
  Assignment 1b: Due Monday Night

Some Reflection
Self-Tracking and Relevant Background
Who We Are

James Fogarty

  Prefer: James / He / Him

Background

  BS, Virginia Tech, 2000
  PhD, Carnegie Mellon, 2006
  Joined UW CSE, 2006
  Professor, effective Autumn 2017

Brief Industrial Stints

  IBM, 2000
  IBM Research, 2003
  Microsoft Research, 2007
Who We Are

Cross-Campus HCI

DUB
MHCID

Cross-Campus Digital Health

UW Medicine Digital Health Advisory Committee
UW Population Health Executive Committee

Teaching

CSE 440: Introduction to HCI
CSE 441: Advanced HCI
CSE 510: Advanced Topics in HCI
CSEP 510: Human-Computer Interaction
CSE 332: Data Structures
Who We Are

Computing

You
Who We Are

Kailey Chan

Prefer: Kailey / She / Her

Background

BA, Psychology, UW, 2016
MS, HCDE, UW, 2018

Research

Social Psychology (Social-Identity, Social Media)
Contextual Interfaces

Interests:

Cooking, Traveling, DIY Crafts, Dogs
Who We Are

Dhruv Jain
  Prefer: DJ / He / Him

Background
  B.Tech, IIT Delhi, 2013
  MS, MIT Media Lab, 2016
  PhD, UW, 2017

Research
  Accessible Technologies
  Augmented / Virtual Reality

Interests:
  Scuba Diving (ah well…not anymore)
Who We Are

Nigini Oliveira
Prefer: Nigini / He / Him

Background
BS-MS, UFCG – Brazil, 2007
Entrepreneur/Lecturer, - 2012
PhD, UFCG (+UW), 2017

Research
Cross-Cultural Collaboration Design
Online Experimentation

Interests:
Literature, Bike Riding, Photography, Chatting, Coffee
Who We Are

Jihoon Suh

Prefer: Jihoon / He / Him

Background

BS, KAIST Industrial Design, 2016
MS, UW HCDE, 2018

Research

Spatial User Interfaces
Tangible Interaction

Interests:

Riding Boards (longboard, paddleboard, wakeboard)
Graffiti, Street Art (legal restrictions)
Who We Are

Christopher Seeds
  Prefer: Chris / He / Him

Background:
  BFA, Visual Communication Design, Kent State University, 2010
  Designer in Ohio & NYC, 2010–2016
  MDes, UW SoA,AH,&D, 2018

Research:
  Slow Design, Design + Storytelling

Interests:
  Podcasts, My Boston Terrier, Concrete Things
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Staying in Touch

Web: http://www.cs.washington.edu/440
You are responsible for calendar

Email Us: cse440-staff [at] cs.washington.edu

Email: You are responsible for course email list

Office Hours: Posted on Calendar Also By Appointment

Canvas: I hate Canvas so much but we have to use it for some things

Panopto: I will probably mess it up at least once
Calendar Overview
GitHub Repository

The website, assignments, and other materials are being run from a GitHub repository

https://github.com/uwcse440/web-cse440-au17/

You will contribute when posting your projects

You can otherwise contribute if you see the opportunity
Grading

We provide a grading scale, but it is subjective
  Design is subjective, and so is this course
  Wow us with your work, not with complaining

Entire project process is designed for feedback
  Milestone grades mean you did the milestone

You still must act on feedback as part of
  continuing to refine and develop your project

A focus on “doing the work” and “getting feedback”
  means final grades are more “quality of result”
# Grading

**Group Project:** 65%
- **Assignment 1:** 3%
- **Assignment 2:** 21% — *Getting the Right Design*
  - Final Report: 15%, Milestones: 6%
- **Assignment 3:** 14% — *Getting the Design Right*
  - Final Report: 10%, Milestones: 4%
- **Assignment 4:** 15% — *Communicating the Design*
  - Website: 5%, Video Prototype: 5%, Poster: 5%

**Presentations:** 12%
- Getting the Right Design: 5%,
- Getting the Design Right: 5%, Individual: 2%

**Exam:** 25%

**Individual Readings:** 5%

**Participation:** 5%
Submissions

Many assignments are due “night before class”

Canvas will operationalize this as 11:59pm
A bit more slack, but definitely “before I wake up”

We need your submissions as part of our preparation for in-class feedback

“Day of class”, “just before class”, or “in class” are all unacceptable, risking zero credit

Do not use this to undermine team work
“Now” vs “When You Need It” Content

This course has both, we will try to distinguish

Several assigned readings will be posted
  Intentionally minimal but critical
  May be on exam
  Small reading report assignment

Additional resources will be made available
  If you find others you want to share, email us
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Some Reflection
Self-Tracking and Relevant Background
Project Proposal Schedule

Project Brainstorm Due Tonight
Brainstorming in Section Friday

Project Proposal Due Monday Night
Sponsored Projects Posted Tuesday

Project Bids Due Wednesday Night
Groups Assigned Thursday
Group Brainstorming in Section Friday
Assignment 1a: Project Brainstorm

You have an assignment due tonight:

https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/

Propose 3 project domains, problems, goals:
These are starting points for brainstorming

Submit online:
This proves that you did your preparation
If unable to access Canvas, submit via email

Bring to section Friday:
You have a lot more brainstorming ahead of you
Assignment 1a: Project Brainstorm

1a: Project Brainstorm

Date: Uploaded Thursday, September 28, 2017 (Before section of Friday, September 29, 2017)
Friday’s section will focus on brainstorming potential project directions. You will get started on brainstorming, and will see this brainstorming, with some results below.

1. Propose three starting points for brainstorming: common domains, problems, and goals that might be important and we’ll track.

2. By domains, we mean an aspect of the body. Domains that are already common in softwaring include:
   - Sleep (e.g., tracking sleep patterns, spending)
   - Exercise (e.g., tracking physical activity, weight)
   - Health (e.g., tracking blood pressure, design or other personal factors, lifestyle or weight loss)
   - Mood (e.g., tracking mood disorders, depression)

3. Be sure to focus on problems and goals, not potential design solutions. One way to help yourself identify a hierarchy of problems and goals is to ask “why?” For example:
   - Why is a person using XAPP?
   - Why do they want to know how many steps they spend on leisure activities?
   - What is their goal for their focus on particular metrics?

4. Each idea should be a single sentence, identifying the domain and the problem or goal. At most one of your ideas may come from each of the domains above. You either two ideas should be from domains not on this list, in order to brainstorm more ideas. Ensure the ideas are sufficiently different, not small variations on the same idea.

Submission

Include your name and section number at the top of your submission.
Your file name will be [your initials]_Assignment1a.pdf. Submit via Canvas here.

If you are still not sure how to proceed, or if you plan to access the submission system, submit via the submission email address.

In section, be prepared to contribute your initial ideas as part of a larger brainstorming.

Grading

This course will be graded on a scale of 3 points:

1 point for each unique proposed idea (i.e., do not submit small variations on the same idea).

1b: Project Proposal

Date: Uploaded Monday, October 2, 2017

Propose and analyze a problem that could be solved with the help of a design project for this week.

In one paragraph, describe the design problem and motivation. This description should convince the reader that this is a real-world and meaningful problem, with a high potential for innovation.

In another paragraph, analyze the proposed idea to give more background and context. Do not focus on the negative aspects of the current situation, but also identify some positive aspects that may be beneficial to retain. A few relevant examples from existing systems or practices could be used to support these claims. If appropriate, you may conduct this analysis by describing a scenario that illustrates how someone might encounter and resolve the problem.

1. Ensure your report is appropriately titled and may be read. This includes:
   - title should be clear and concise
   - use bullet points as appropriate
   - include images in the body of the write-up with appropriate figure numbers and captions

2. Be sure to type, speaking, and grammatical errors

3. Be sure your presentation looks good.
   - proper use of colors, fonts, and sizes
   - proper use of whitespace

Samples from Prior Offerings

Samples from prior offerings include:
- Winter 2017 - Proposal that ultimately became Sleep:Wear: http://example.com/sleep_wear.pdf
- Winter 2017 - Proposal that ultimately became Sleep: http://example.com/sleep.pdf
- Winter 2017 - Proposal that ultimately became Sleep: http://example.com/sleep.pdf
Assignment 1b: Project Proposal

You have an assignment due Monday night:

https://courses.cs.washington.edu/courses/cse440/17au/assignments/assignment1/

One page of text:

Problem and Motivation
Analyze the problem or idea (e.g., a scenario)

Submit online:
Sponsored Projects will be posted for bidding
Assignment 1b: Project Proposal

1b: Project Proposal

Due: Uploaded Monday, October 2, 2017

Propose and analyze a project that could come from the basis of a design project for this class.

In each paragraph, describe the design problem and motivation. This description should connect the reader that this is a difficult and interesting problem. Each proposal should be clear, complete, and concise. Write 2-3 paragraphs on each project, or decide on a single, more concise proposal. Each proposal should be self-contained and complete. Do not focus on the negative aspects of the current situation, but also suggest some positive aspects that may be beneficial to the project. A two-sentence description on existing systems or practices could be used to support these claims. If appropriate, you may conduct this analysis by describing a context that illustrates how someone might encounter and resolve the problem.

Ensure your report is appropriately clear and easy to read. This includes:

- text should be clear and concise
- use section headings as appropriate
- insert images in the body of the write-up with appropriate figure numbers and captions
- figure captions in the body of your text
- check for typos, spelling, and grammatical errors

Note your presentation looks good:
- use appropriate colors, fonts, and styles
- your name in the header of the document

Samples from Prior Offerings

Gases from new offerings article:
- Winter 2014 - Proposal that ultimately became Breakdown: Ts_beckow.pdf
- Winter 2014 - Proposal that ultimately became Llu_Plot.pdf
- Winter 2014 - Proposal that ultimately became Working with H2_gif.pdf
- Winter 2014 - Proposal that ultimately became Working with H2_ppt.pdf
- Autumn 2014 - Proposal that ultimately became H2_business.pdf
- Autumn 2014 - Proposal that ultimately became H2_proposal.pdf
- Autumn 2014 - Proposal that ultimately became H2_proposal.pdf
- Autumn 2014 - Proposal that ultimately became H2_proposal.pdf
- Autumn 2014 - Proposal that ultimately became H2_proposal.pdf

Note that details of assignments may change after prior offerings. This year's may not map to the current project. Also note these samples are intended to illustrate a variety of approaches, none of which is to be ideal or exemplary. Go to your understanding and carefully explore project requirements and submission from this course staff in the context of your own work.

Submission

Ensure your name and section are at the top of your submission.

No more than one page of text in PDF format.

Readers do not count against your page limit, and are therefore irrelevant. You should embed images throughout your PDF, keeping them near the text that references them. The limit applies to the approximate amount of text you would have if all images were removed.

Submission via Course shell:

Grading

This proposal will be graded on a scale of 10 points:
1. Problem and Motivation (3 points)
2. Analysis of Problem (2 points)
3. Novelty and Creativity (2 points)
4. Report Clarity and Presentation (3 points)

1c: Project Bid

Due: Submitted Wednesday, October 4, 2017

Review the sponsored projects and course staff members organizing those projects.

Submit your bid on projects and potential partners here:

Submission

Submit your bid on projects and potential partners here:
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Some Reflection
Self-Tracking and Relevant Background
Some Reflection

This will not be an easy course
Students have said this was their most intense course
You have two deadlines per week, every week
But I believe in everything that is included

This course challenges some aspects of what the CSE curriculum has taught you is important
It will be what you make it
People Really Get It

“Very good class that every engineer should have to take. Good perspectives and made me think outside my comfort zone.”

“The focus on projects and fieldwork was very well suited to my learning style. I greatly enjoyed this format. The theory and techniques taught in class were directly applicable to the projects we were doing and were usually timed very well. That is, usually the topics presented in lecture were relevant to the current deliverable or the next deliverable.”
People Really Get It

“I can't believe I'm saying this, but I found the lectures a huge part of what I learned in this course. They were useful and organized, and each one had a clear message and topic. The assignments were an excellent extension of these themes.”

“Fieldwork and iterative assignments really taught me how important the design process is.”
Group Work is Hard Work

“the project placed groups in a realistic situation and forced us to work together effectively and practice relevant concepts/strategies”

“The group work was distracting because of the lack of unity and sense of purpose. We all had different priorities and purposes for taking the class and this made it really hard to be on the same page for the project which was the biggest part of this class.”
Group Work is Hard Work

“Have groups do a team charter - outlining what they expect from one another as teammates. I took a project management course and when working in a group with individuals you've never worked with, the team charter may help break the ice easier when everyone can say what their expectations are.”

“... I think that working effectively as a team was the most challenging part of this class ...”
And it is not for Everybody

What aspects of this class detracted from your learning?
Finding strangers in malls & coffee shops was a major hurdle

What suggestions do you have for improving the class?
Don't exclude the two most available sources of people - friends & university students
Adding and Dropping

Attempting to Add

- Must talk to me after class
- Will email today, attempt to finalize quickly
- Must enforce a hard enrollment cap

Considering Dropping

- Do so before we assign teams, and tell us

Section switch availability

- We may need help in balancing sections
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Some Reflection
Self-Tracking and Relevant Background
Thousands of Health Monitoring Apps

<table>
<thead>
<tr>
<th>Rank</th>
<th>App Name</th>
<th>Category</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Run with Map - My Run</td>
<td>Health &amp; Fitness</td>
<td>$0.99</td>
</tr>
<tr>
<td>2</td>
<td>7 Minute - Burn Fat</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>3</td>
<td>GEAR Best Fit - Tabata</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>4</td>
<td>Running for Weight Loss PRO</td>
<td>Health &amp; Fitness</td>
<td>$5.99</td>
</tr>
<tr>
<td>5</td>
<td>Sleep Cycle</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>6</td>
<td>Map My Rider - GPS Cycling</td>
<td>Health &amp; Fitness</td>
<td>$9.99</td>
</tr>
<tr>
<td>7</td>
<td>Fitness for Women who Workout</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>8</td>
<td>7 Minute - Workouts</td>
<td>Health &amp; Fitness</td>
<td>$5.99</td>
</tr>
<tr>
<td>9</td>
<td>Gears</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>10</td>
<td>Map My Rider - GPS Cycling</td>
<td>Health &amp; Fitness</td>
<td>$9.99</td>
</tr>
<tr>
<td>11</td>
<td>7 Minute - Workouts</td>
<td>Health &amp; Fitness</td>
<td>$5.99</td>
</tr>
<tr>
<td>12</td>
<td>Gears</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>13</td>
<td>Fitness Reality - 100% Exercise &amp; Health</td>
<td>Health &amp; Fitness</td>
<td>$3.99</td>
</tr>
<tr>
<td>14</td>
<td>Tune Up! - F.I.T. - Health &amp; Fitness</td>
<td>$5.99</td>
<td></td>
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<tr>
<td>15</td>
<td>5K Runner 5 to 10K</td>
<td>Health &amp; Fitness</td>
<td>$5.99</td>
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<tr>
<td>16</td>
<td>Yoga.cmo - Stretching &amp; Yoga</td>
<td>Health &amp; Fitness</td>
<td>$3.99</td>
</tr>
<tr>
<td>17</td>
<td>Mover - Health &amp; Fitness</td>
<td>$2.99</td>
<td></td>
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<tr>
<td>18</td>
<td>Period Tracker Deluxe</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>19</td>
<td>Yoga Studio - Health &amp; Fitness</td>
<td>$1.99</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>White Noise - Health &amp; Fitness</td>
<td>$1.99</td>
<td></td>
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<tr>
<td>21</td>
<td>Ultra Fitness - Health &amp; Fitness</td>
<td>$2.99</td>
<td></td>
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<tr>
<td>22</td>
<td>Sleep Filter - Sleep while breathing</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>23</td>
<td>All-In-One Pro - Health &amp; Fitness</td>
<td>$2.99</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>10K Runner</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>25</td>
<td>Instant Heart Rate - Health &amp; Fitness</td>
<td>$2.99</td>
<td></td>
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<tr>
<td>26</td>
<td>Pulso Central &amp; Heart Rate</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>27</td>
<td>Cardio - Heart Rate Tracker PRO</td>
<td>Health &amp; Fitness</td>
<td>$3.99</td>
</tr>
<tr>
<td>28</td>
<td>The Wonder Weeks - Workouts</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>29</td>
<td>Log For Pedometers &amp; Pedometer - Health &amp; Fitness</td>
<td>$0.99</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Simply Being - Health &amp; Fitness</td>
<td>$0.99</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>myWOD - All-in-One WOD Log</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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<tr>
<td>32</td>
<td>PBD</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>33</td>
<td>Reptacle PRO - GPS Running</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>34</td>
<td>Points Calculator for Health &amp; Fitness</td>
<td>$0.99</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>30 Day Fat Burner Challenges</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>36</td>
<td>10K Run</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>37</td>
<td>Sleep Timer - Alarm Clock &amp; Sleep</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>38</td>
<td>Full Term - Baby Health &amp; Fitness</td>
<td>$1.99</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Heart Rate Monitor</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
</tr>
<tr>
<td>40</td>
<td>eTreadmill - Treadmill Timer</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>41</td>
<td>Tabata Pro</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
</tr>
<tr>
<td>42</td>
<td>Get &amp; Food Tracker</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
</tr>
<tr>
<td>43</td>
<td>Seconds Pro - Interval Timer</td>
<td>Health &amp; Fitness</td>
<td>$4.99</td>
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<tr>
<td>44</td>
<td>Sleep Machine</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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<tr>
<td>45</td>
<td>Flexor Malocclusion Challenge</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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<tr>
<td>46</td>
<td>7 Minutes - Workouts</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
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<tr>
<td>47</td>
<td>Ultimate Challenge</td>
<td>Sleep Diary</td>
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<tr>
<td>48</td>
<td>workout</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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<tr>
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<td>Workout Professor</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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<tr>
<td>50</td>
<td>Pocket Yoga - Yoga Timer</td>
<td>Health &amp; Fitness</td>
<td>$1.99</td>
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<tr>
<td>51</td>
<td>Belly Burn</td>
<td>Health &amp; Fitness</td>
<td>$2.99</td>
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*Note: Prices are approximate and subject to change.*
Activity and Medical Sensing Devices

- Blood glucose meter
- Thermometer
- Blood pressure monitor
- Heart rate monitor
Medical Implants

NeuroPace
Sustainability Tracking

Kill A Watt

Belkin
WeMo Water

Automatic
Location and Activity

FitBit

Garmin

FitBark

Moves
Time Tracking

RescueTime
Finances

Mint

You Need a Budget
Background in Personal Informatics

Some Definitions

What is the Point?

What is the Problem?

What is Personal Informatics

“We define personal informatics systems as those that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge. There are two core aspects to every personal informatics system: collection and reflection.”

Li I., Dey A., Forlizzi J. CHI 2010.
“A Stage-Based Model of Personal Informatics Systems”
What is Quantified Self

“The Quantified Self is an international collaboration of users and makers of self-tracking tools.”

“Our aim is to help people get meaning out of their personal data.”

“Self knowledge through numbers.”

“Know Thyself: Tracking Every Facet of Life, from Sleep to Mood to Pain, 24/7/365”
What is the Point?

Gnothi seauton
“Know thyself”
Leonardo da Vinci

Odometers on the left
Pedometer on the right

To track troop activities
Benjamin Franklin

Temperance
Silence
Order
Resolution
Frugality
Industry
Sincerity
Justice
Moderation
Cleanliness
Tranquility
Chastity
Humility
**Benjamin Franklin**

![Benjamin Franklin portrait](image)

---

**TEMPERANCE.**

*Eat not to dizziness.*
*Drink not to elevation.*

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</table>
Manpokei

交通巡査
11260歩—6.7 *(8時間)

ビョールのウェーテレス
12550歩—5.5 *(8時間)

エアホステス
9000歩—4.1 *(6時間半)

万歩計
Five-Stage Model of Personal Informatics

PREPARATION | COLLECTION | INTEGRATION | REFLECTION | ACTION

Li I., Dey A., Forlizzi J. CHI 2010. “A Stage-Based Model of Personal Informatics Systems”
Five-Stage Model of Personal Informatics

Alice

20 years old

Has a family history of heart disease

Wants to be more active

Does not know how, because she is busy

Li I., Dey A., Forlizzi J. CHI 2010. “A Stage-Based Model of Personal Informatics Systems”
Preparation

Li I., Dey A., Forlizzi J. CHI 2010. “A Stage-Based Model of Personal Informatics Systems”
Preparation

Li I., Dey A., Forlizzi J. *CHI 2010.*
“A Stage-Based Model of Personal Informatics Systems”
Collection

Li I., Dey A., Forlizzi J. CHI 2010. “A Stage-Based Model of Personal Informatics Systems”
Integration

Li I., Dey A., Forlizzi J. CHI 2010. “A Stage-Based Model of Personal Informatics Systems”
Reflection

Li I., Dey A., Forlizzi J. CHI 2010.
“A Stage-Based Model of Personal Informatics Systems”
Walk in park instead of watching TV

Li I., Dey A., Forlizzi J. CHI 2010.
“A Stage-Based Model of Personal Informatics Systems”
Five-Stage Model of Personal Informatics

Li I., Dey A., Forlizzi J. CHI 2010.
“A Stage-Based Model of Personal Informatics Systems”
What is the Problem?

Examining serious self-trackers, as they represent the early adopters

Quantified Self Talk Format

1. What I did
2. How I did it
3. What I learned

Analyzed 52 videos

Analysis

What do they Track?

A Diabetic Experience with Self-Quantification
Analyzing My Cancer Data
Going Vegan in December
Improving Skin Health
Cognitive Performance
15 Weeks of Self-Tracking
Diabetes, Exercise, and QS
Experience Sampling of My Stress
Hacking Your Subconscious Mind

Self-tracking is more than just buying a FitBit

“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”
## Motivations for Tracking

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<th>Motivations</th>
<th>Sub-categories</th>
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<td>To improve health</td>
<td>To cure or manage a condition</td>
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<td>To achieve a goal</td>
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<td></td>
<td>To find triggers</td>
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<td>To answer a specific question</td>
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<td>To identify relationships</td>
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<td>To execute a treatment plan</td>
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<td>To make better health decisions</td>
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<td>To find balance</td>
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<td>To improve other aspects of life</td>
<td>To maximize work performance</td>
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<td>To be mindful</td>
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<td>To find new life experiences</td>
<td>To satisfy curiosity and have fun</td>
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<td></td>
<td>To explore new things</td>
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<td>To learn something interesting</td>
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## Data Collection and Exploration Tools

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<td>Spreadsheet</td>
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<td>Custom software</td>
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<td>Pen and paper</td>
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<td>Open-source platform</td>
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<td>Custom hardware</td>
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<td>Pen and paper</td>
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Building Custom Tools

Captures smile via wearable sensing
Provides real-time feedback

Captures snoring via mobile app
Provides data visualization

“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”
Custom Visualizations

Why are they Building Custom Tools?

Desirable features are not supported
  Collect and reflect on the data using a single tool
  Perform self-experimentation

Barriers to success
  Tracking too many things
  Not tracking triggers and context
  Lacking scientific rigor

“Understanding Quantified Selfers’ Practices in Collecting and Exploring Personal Data”
Tracking Too Many Things

“I can honestly say that I’ve made the classic newbie self-tracking mistake which is that I track everything. I didn't know exactly what to track, so I tracked caffeine, dairy, wheat, sugar, nuts, fruit, vegetables, meat, chicken, fish, alcohol supplements…”

People burn out on self-tracking

Not Tracking Triggers and Context

“I was trying to track all these symptoms and I was completely ignoring the cause…”

People lack clues on what to track
Missing information on how to improve outcome

They track the wrong information

Lacking Scientific Rigor

Conduct self-experimentations without control or without addressing confounding factors

And they conduct flawed experiments

Barriers and Negative Nudges

“It was too time consuming and tedious. I also did not know what to enter if I ate out, so I often did not enter data and that compounded. I also felt embarrassed to do it in front of friends so I stopped.”

Negative Nudges:
Contrasting difficulty of entry
Judgment and choosing not to journal
Stigma and journaling
Lack or decline in social support

A Model of Lived Informatics

Extends 5-stage model to surface additional opportunities and challenges in lifecycle

Returning to a tool (e.g., short/long lapse)

Changing tools (e.g., due to burden)

Changing goals (e.g., due to discovery)

Your Challenge

People invest tremendous effort for little value, are frustrated by failure.

Do better, help people achieve their goals, solve real problems.

Go beyond the data fetish.

Understand the problems people face.
Find the role for interactive technology.
Your Challenge

Explore **tracking beyond the self**:

Many forms:

- wearable sensors, phone and watch applications, appliances and artifacts in the environment, hybrid

Many social contexts:

- co-located relationships, remote relationships, communities organizing, seeking help from peers, seeking help from experts

New forms of interaction:

- conversational interfaces, tangible interfaces, ubiquitous computing interfaces
Some Reflection

We have high expectations
   We want you to do cool stuff
But we are also enthusiastic and we listen
   Email us, point out opportunities, ask questions

If you are not onboard, please drop now
   Please email us so that we know a spot opened

cse440-staff [at] cs.washington.edu
Attempting to Add

Submit this form to me: http://tiny.cc/UWCSE440

I will coordinate with CSE advising about majors

Be sure that you and I have communicated before you leave today
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 01: Introduction and Personal Informatics

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Lecture 02:
Design Diamond

Tuesday / Thursday
12:00 to 1:20
Quantity versus Quality

One class told they will be graded on quality, another on quantity

Bayles and Orland, 2001
Quantity versus Quality

The quantity class produces better pots. Why?

Bayles and Orland, 2001
Quantity versus Quality

The quantity class produces better pots. Why?

“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
Today

Administrative

Assignment 0
Assignment 1c: Project Bid
Section Balance and Movement
Denny 303 on Tuesday 10/10

The Design Diamond

Examining a Design Process
Sketching and Prototypes
Assignment 0: Flash Card

Name
  formal, preferred, pronouns
Majors/Minors
career goals
Year
  1,2,3,4,5,6,…
Hometown
Interesting Fact or
“What I did on my …”

Submit PDF via Canvas
Project Status and Assignments

Proposals to be “Funded” and Posted for Bidding
Bidding Tomorrow, Team Formation Thursday
Please Watch Your Email During This Process

Looking Forward
Ideation on Friday in Section
2b: Design Research Plan due Tuesday 1/17
2c: Design Research Check-In due Friday 1/20
2d: Design Research Review due Tuesday 1/24

Other Assignments
Assignment 0 Due Thursday
Reading 1 Posted, Due Thursday
Section Balance and Movement

9:30  Section:  12 people
10:30 Section:  15 people
11:30 Section:  14 people
12:30 Section:  13 people

Project bidding will include “bid with section” and “bid in another section”, to allow moving

A “switch section” bid dominates your other bids

Most of you will bid “No Desire to Switch”
Denny 303 on Tuesday 10/10
Today

Administrative

Assignment 0
Assignment 1c: Project Bid
Section Balance and Movement
Denny 303 on Tuesday 10/10

The Design Diamond

Examining a Design Process
Sketching and Prototypes
Objectives

Be able to:

- Describe an iterative design process
- Describe the design diamond model of design, its implications, and how it can break down
- Describe properties of a sketch versus a prototype
- Differentiate examples of sketches from prototypes
Sketching User Experiences

"Bill Buxton brings design leadership and creativity to Microsoft. Through his thought-provoking personal examples he is inspiring others to better understand the role of design in their own companies."

Bill Gates—Chairman, Microsoft Corp.
Sketching

Theater: Shattuck Cinemas
Phone: (510) 665-1342
Dist: 1.5 m
Address: 2122 Shattuck Ave
         Berkeley, 94709
Cost: $8.50 normal, $6.00 student, $4.00 matinee

Art of War  ★★★
(10:00)-(1:00) 4:00 - 7:00 - 10:00

Bittersweet Motel  ★★★★
(11:00)-(1:30) 4:00 - 6:30 - 9:00

Godzilla  ★★
(10:30)-(2:00) 5:30 - 9:00

The Cell  ★★★★
(11:00)-(1:00) 3:00 - 7:00 - 9:00

Store for the Style-Challenged

As it is...

As it should be...

Outfit #1
Outfit #2
Outfit #3

(pre-selected so you don't)

(have to choose)
Sketching

MAP SHOWING PARKING AVAILABILITY BASED ON INPUTTED DATA, INPUTTED ON MAP

- Different colors
- Highlights availability
Sketching
Sketching

UBIGITOUS RICE COOKER

1. LCD display shows number of cups and time remaining
2. Pad for cups of rice input
3. Eject button opens drawer

"Just another drawer in your kitchen"

The uncooked rice is stored in a hidden reservoir. Water is acquired through a hose attached to your water source (similar to an espresso machine).
Sketching

A process that enables you to think through ideas and convey design ideas to others very early in the design phase.
Quintessential Activity of Design
Design as Choice
ABC News and IDEO’s Deep Dive

Things to see in this video:

- brainstorming
- design research
- sketching
- critique

Why build a shopping cart with no bottom?

A highly iterative design process with a variety of intermediate artifacts
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
IDEO’s Deep Dive (ABC News, 1999)
Perfect Shopping Cart?
Perfect Shopping Cart?

Several design flaws

- Kids will slide and fall out of that seat
- Where to put bags of dog food, cases of beer?
- Hook design with reusable bags
- Self-scanning challenges with theft

Focus on the design process

- Designs always have limitations and tradeoffs
Design as Choice
Design as Choice

In the diamond, what are two openings for creativity?

Why is your design research so important?
"Design as Choice"

"the creativity that you bring to enumerating meaningfully distinct options from which to choose"
Sketching in Design (2007)

“Design as Choice”

“the creativity that you bring to defining the criteria, or heuristics, according to which you make your choices”
Design as Choice

In the diamond, what are two openings for creativity?

- Palette of choices
- Heuristics to choose

Why is your design research so important?

- What you learn directly informs both of these, shaping everything you do this entire quarter
Design as Choice

Elaboration
palette of choices

Reduction
heuristics to choose
The Design Diamond

- start
- generate
- intentional!
- select
- danger!
Properties of Sketches

Quick
Timely
Inexpensive
Disposable
Plentiful
Clear Vocabulary

Distinct Gesture
Minimal Detail
Appropriate Refinement
Suggest and Explore
Ambiguous
Quick

A sketch is quick to make, or at least gives that impression
Timely

A sketch can be provided when needed
Inexpensive

Cost must not inhibit the ability to explore a concept, especially early in design.
Disposable

If you cannot afford to throw it away, then it is not a sketch

Investment is in the process, not the physical sketch

But they are not "worthless"
Plentiful

Sketches do not exist in isolation

Meaning and relevance is in the context of a collection or series
Clear Vocabulary

The way it is rendered makes it distinctive that it is a sketch (e.g., style, form, signals)

Could be how a line extends through endpoints

Physical sketches have their own vocabulary
Distinct Gesture

Fluidity of sketches gives them a sense of openness and freedom

Opposite of engineering drawing, which is tight and precise
Minimal Detail

Include only what is required to render the intended purpose or concept.
Minimal Detail

When we abstract an image through cartooning, we're not so much eliminating details as we are focusing on specific details.

By stripping down an image to its essential "meaning," an artist can amplify that meaning in a way that realistic art can't.
Appropriate Degree of Refinement

Make the sketch as refined as the idea

If you have a solid idea, make the sketch look more defined

If you have a hazy idea, make the sketch look rougher and less defined
Suggest and Explore Rather than Confirm

Sketch should act as a catalyst to the desired and appropriate behaviors, conversations, and interactions.
Ambiguity

Intentionally ambiguous

Value comes from being able to be interpreted in different ways, even by the person who created them

Sketches have holes
Sketching as Conversation

Mind
knowledge, new knowledge

Sketch
representation

Create

Interpret

Requires ambiguity
## Sketch vs. Prototype

<table>
<thead>
<tr>
<th>Sketch</th>
<th>Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invite</td>
<td>Attend</td>
</tr>
<tr>
<td>Suggest</td>
<td>Describe</td>
</tr>
<tr>
<td>Explore</td>
<td>Refine</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>Propose</td>
<td>Test</td>
</tr>
<tr>
<td>Provoke</td>
<td>Resolve</td>
</tr>
<tr>
<td>Tentative, non committal</td>
<td>Specific Depiction</td>
</tr>
</tbody>
</table>

The primary differences are in the intent.
ABC News and IDEO’s Deep Dive
Sketching is Not Defined by Ink

Although sketching can often be done in ink, these properties can be found in other forms.

Those other forms are therefore sketches.
Sketching the Mouse

Making the Macintosh:
http://www-sul.stanford.edu/mac/index.html
Sketching the Mouse

Making the Macintosh: http://www-sul.stanford.edu/mac/index.html
Physical Sketching
Physical Sketching

Mueller, WirePrint, UIST 2014
Physical Sketching

traditional workflow
3D model

low-fi fabrication
3D model
low-fi fabricated
low-fi fabricated
hi-fi fabricated
WirePrint (2014)

WirePrint
Fast 3D Printed Previews

Stefanie Mueller
Sangha Im
Serafima Gurevich
Alexander Teibrich
Lisa Pfisterer
François Guimbretière
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Physical Sketching

Mueller, Fabrickation, CHI 2014
faBrickation (2014)

Stefanie Mueller, Tobias Mohr, Kerstin Guenther, Johannes Frohnhofen, Patrick Baudisch
faBrickation (2014)

Mueller, Fabrickation, CHI 2014
Physical Sketching

(a) Laser cutter

(b) Camera

(c) Laser pointer

(d) Laser cutter setup

Mueller, Constructable, CHI 2012
Constructable (2012)
Constructable (2012)
The Design Diamond

start

generate

select

intentional!

danger!

danger!

danger!
Idea Oscillation

start \rightarrow generate \rightarrow intentional! \rightarrow select \rightarrow select

danger! \rightarrow danger! \rightarrow danger! \rightarrow danger!
Critiquing Sketches is Important

Ideas are both good and bad

Both are useful in design

By making clear what is a bad design, we can avoid actually implementing it

Bad ideas help you justify your good ideas

Feedback can turn a good idea into a great idea

Sketching generates too many ideas to implement
Idea Oscillation
Iteration Toward a Design

![Diagram illustrating the process of ideation and usability in design with investment over time and weight of design criteria. The diagram shows a triangular graph with cycles labeled Ideation and Usability, indicating the iterative process. The graph also includes color-coded sections for Sketch and Prototype.]
Exploration of Alternatives
... a designer that pitched 3 ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). ... if you are pushing one you will be found out, and also fired. ... it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!

Alistair Hamilton
VP Design
Symbol Technologies
The Converging Path
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Task:
Create a web banner ad for Ambidextrous magazine.
Feedback in Parallel or Serial

Parallel condition

Serial condition

Dow et al. TOCHI 2010.
Procedure

serial prototyping condition

parallel prototyping condition

Dow et al. TOCHI 2010.
Parallel: more diverse, better, more clicks

Dow et al. TOCHI 2010.
Share one or share your best?

- Share multiple condition
- Share best condition
- Make one condition

Dow et al. TOCHI 2010.
Share Multiple: better, more clicks

Dow et al. TOCHI 2010.
Some Evidence

Greater divergence in designs
   Prevents sticking with the first idea
   Allows mashing ideas together

Alternatives facilitate feedback
   Enable comparison
   Can improve tone of critique
Sketching and the Design Diamond

The design diamond is fundamental to understanding what you are doing here.

Much of your education, including in CSE, has taught you to focus on having the right answer.

Here it matters what you do long before the end.

Most ideas get thrown out, including yours.

Better ideas are great criticism, and frequently would never have come about otherwise.
Lecture 02: Design Diamond

Tuesday / Thursday
12:00 to 1:20
Lecture 03: Contextual Inquiry and Design Research

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Amazing Color Changing Card Trick

The colour changing card trick
Why did I show you that?
Why did I show you that?

If we are focusing on the wrong thing, we can completely miss other important things.

Assumptions and pre-conceptions play a huge role in how we focus our attention.

Today is about this danger when understanding the context for which you design technology.
“You Are Not the Customer”

Seems obvious, but…

- You have different experiences
- You have different terminology
- You have different ways of looking at the world

Easy to think of self as typical

Easy to make mistaken assumptions
Today

Administrative

Project Status
Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

Ethnographic Principles
Contextual Inquiry Principles and Practice
Additional Design Research Methods

Project Team Formation
Project Status and Assignments

Team Formation Today

Reading 1 Due Today
Team Ideation in Section Tomorrow

Looking Forward

2b: Design Research Plan due Monday 10/9
2c: Design Research Check-In due Thursday 10/12
2d: Design Research Review due Monday 10/16
Denny 303 on Tuesday 10/10
Objectives

Be able to:

Enumerate and describe ethnographic principles.

Describe master/apprentice relationship in contextual inquiry, contrast it to other relationships with a participant.

Enumerate and describe contextual inquiry principles.

Describe stages of a contextual inquiry, including withdrawal and return.

Give examples of other design research methods, be able to consider how they might be applied to different design research needs.
Today

Administrative

Project Status
Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

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Project Team Formation
Ethnography

Emerged in 1920s as a new anthropology method, exploring why groups think and act as they do.

Learn local language, record myths, customs, and ceremonies in much greater detail than prior work.

You will likely never perform an ethnography.
Ethnography

Traditional science attempts to understand a group or individual objectively

Understand the subject of study from the outside in a way that can be explained to “anyone”

Ethnography attempts to understand a group or individual phenomenologically

Understand the subject of study as the subject of study understands itself
Four Ethnographic Principles

Natural settings
Holism
Descriptive
Member point-of-view
Four Ethnographic Principles

Natural Settings

Conducted in the setting of the participant

Focus on naturally occurring, everyday action

Cannot use laboratory, experimental settings, or a phone call to gather this type of data

You really do have to go out there and see it
Four Ethnographic Principles

Holism

Behavior can only be understood in its larger social context; that is, holistically.
Four Ethnographic Principles

Descriptive

Study how people actually behave, not how they ought to behave.

Defer judgment.
Four Ethnographic Principles

Member Point-of-View

See through participant eyes in order to grasp how they interpret and act in their world.
Four Ethnographic Principles

Member Point-of-View

See through participant eyes in order to grasp how they interpret and act in their world.
Design Ethnography

Quicker than traditional ethnography
Days, weeks, or months, not years

Sometimes “concurrent ethnography”
The ethnography is being done
at the same time that design is under way

Goal is to generate insights informing design
Sometimes “ethnographically inspired methods”

Translating from raw field observation
to design ideas can be a difficult process
Today

Administrative

   Project Status
   Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

   Ethnographic Principles
   Contextual Inquiry Principles and Practice
   Additional Design Research Methods

Project Team Formation
Contextual Inquiry

Applied design ethnography

“The core premise of Contextual Inquiry is very simple: go where the customer works, observe the customer as he or she works, and talk to the customer about the work. Do that, and you can’t help but gain a better understanding of your customer.”

Hugh Beyer and Karen Holtzblatt
User, Subject, or Participant?

Only two groups refer to their customers as “users”

In traditional science, “subjects” are “subjected to” experiments as researcher develops understanding.

In ethnographically-oriented design methods, “participants” instead “participate” in helping the researcher develop understanding.

This is not simple correctness, nor only about respect, it is a mindset that matters for being open.
What is your relationship?

In a scientist/subject relationship:

The scientist does stuff

The subject responds in some way

The scientist collects data, goes back to their office, and analyzes the data to gain understanding

This is not very appropriate for gaining phenomenological understanding
What is your relationship?

In an interviewer/interviewee relationship:

- The interviewer asks a question
- The interviewee responds immediately
- At a pause, the interviewer asks the next question from their list
- When all the questions are answered, the interview is complete

This would support gaining phenomenological understanding if you knew what questions to ask

Implying you have phenomenological understanding
What is your relationship?

In a master/apprentice relationship:
- The master is doing stuff
- The master explains what they are doing
- The apprentice asks clarification questions
- The master answers

This relationship is at the heart of contextual inquiry
Master/Apprentice Relationship

Seeing the work reveals structure

Many instances and interviews reveal the picture

Every current activity recalls past instances

A customer describing how she learned a feature told us, “I looked it up in the documentation.” But when we asked her to look it up again, she was able to show us: “I looked the function up in the index and scanned the section. I saw this icon in the margin that I recognized from the screen, so I read just this paragraph next to it. It told me all I needed to know.” The documentation provided the context she needed to recover a detailed story, and the detail revealed aspects that had been overlooked—that the icon was her visual cue to the relevant part of the page.
Unique or One of Many?

“Take the attitude that nothing any person does is done for no reason; if you think it’s for no reason, you don’t yet understand the point of view from which it makes sense. Take the attitude that nothing any person does is unique to them, it always represents an important class of customers whose needs will not be met if you don’t figure out what’s going on.”

(p. 63, Contextual Design)
Not Quite Master/Apprentice

The goal is not to learn to do the task

Instead, the goal is to learn how the participant does the task in order to learn how to support it

And for the researcher to enlist the participant’s active assistance in understanding the task
Not Quite Master/Apprentice

In a contextual inquiry relationship:

- The participant is doing stuff
- The participant explains what they are doing
- The researcher offers an interpretation
- The participant agrees or corrects

Partners

- Not really an interview
- Not really an apprentice
Principles of Contextual Inquiry

Context
  Must be done in the setting of the participant.

Partnership
  Master/apprentice model; investigator is humble.

Interpretation
  Observed facts must be regarded for their design implications. Raw facts without interpretation are not very useful.

Focus
  Themes that emerge during the inquiry. You cannot pay attention to all facets of someone’s work at all times.
Context

Go to the workplace & see the work as it unfolds
People summarize, but we want details
Keep it concrete when people start to abstract
“Do you have one?  May I see it?”
Context

Imagine studying how a student writes a paper

Why not just ask?
Context

Imagine studying how a student writes a paper

Why not just ask?

May not remember details
  Getting roommate to read drafts

May skip critical difficulties
  Trouble locating references on the Web
Context

Avoid summary data by watching work unfold

We once asked a secretary how she started her day. Her answer was, “I guess I just come in and check my messages and get started.” She wasn’t able to go beyond this brief summary overview. It was the first thing in the morning and she had just arrived at the office, so we asked her to go ahead and do as she would any other morning. She unhesitatingly started her morning routine, telling us about it as she went: “First I hang up my coat, then I start my computer. Actually, even before that I’ll see if my boss has left something on my chair. If he has, that’s first priority. While the computer’s coming up, I check the answering machine for urgent messages. There aren’t any. Then I look to see if there’s a fax that has to be handled right away. Nope, none today. If there were, I’d take it right in and put it on the desk of whoever was responsible. Then I go in the back room and start coffee. Now I’ll check the counters on the copier and postage meter. I’m only doing that because today’s the first of the month. . . .”

Have them think aloud..
Context

“One customer said he would not use a manual’s index to find the solution to a problem: ‘It’s never in the index.’ He could not say what led him to this conclusion, what he had looked up and failed to find. All his bad experiences were rolled up into one simple abstraction: it’s not there. But when we watched him looking things up, we could see that he was using terms from his work domain, but the index listed parts of the system.”
“A customer was unable to describe how she made her monthly report. When asked to create it, she pulled out her last report and started filling in the parts.”
Context

If cannot observe, ground in an instance

Span time by replaying past events in detail

Look for holes

Ask questions to fill them

Use artifacts for context

If story has not yet ended, go back to a story that did

Customer: When I got this problem report I gave it to Word Processing to enter online—

(Why did she decide to give it to Word Processing? Did she do anything first?)

Interviewer: So you just handed it on automatically as soon as you got it?

C: No, it was high priority, so I read it and decided to send a copy to the Claims department.

(How did she decide it was high priority? Is it her decision?)

I: How did you know it was high priority?

C: It has this green sticker on it.

(Someone else made the decision before the report ever got here. Who and when?)

I: Who put on the green sticker?

C: That's put on by the reporting agency. They make the decision about whether it's high priority and mark the report.

(We can better pursue how the reporting agency makes the decision with them; we'll only get secondhand information from this user. Instead of trying to go further backward, look for the next missing step forward: doesn't Claims get a more personal communication than just the report?)

I: Did you just send it on to Claims, or did you write them a note about why they needed to see it?

C: Oh, I always call Claims whenever I send them one of these reports.
Partnership

Traditionally, interviewer has too much power
  You do not know what will turn out to be important
Apprenticeship model tilts power back too far
  You are not there to learn the skill

Interviewer should create a partnership
  Alternate between watching and probing
Withdrawal and Return

Key in partnership

Researcher observes action that indicates something meaningful

The researcher asks about this, and the pair withdraw from the task

Discuss the question

Then return to the task
Partnership

Do not squash design ideas if they arise
This is design, not dispassionate science

Get instant feedback

If it works, you understand the work practice and have a solution

If it fails, you can improve your understanding of the work

Find the issues behind design ideas
Partnership

Avoiding Other Relationship Models

Interviewer / Interviewee
   You are not there to
   get a list of questions answered

Expert / Novice
   You are not there to answer questions

Guest / Host
   Move closer, ask questions, be nosy
Interpretation

Chain of Reasoning

- Fact, Hypothesis,
- Implication for Design, Design Idea

Design is built upon interpretation of facts

- Design ideas are end products of a chain of reasoning
- So interpretation had better be right

Share interpretations with users to validate

- Will not bias the data
- Teaches participant to see structure in the work
Interpretation

Instead of asking open ended questions…

“Do you have a strategy to start the day?”
“Not particularly.”

… give participants a starting point

“Do you check urgent messages first, no matter where they are from?
“Actually, things from my boss are important, because they are for me to do. Messages or faxes may be for anybody.”

Participants fine-tune interpretations

Probe contradictions until assumptions fit
Interpretation

Non-verbal cues can confirm or negate

Yes and Nos

“Huh?” – way off

“Umm, could be” – probably no, just being polite

“Yes, but…” or “Yes, and” – depends what follows

Commit to hearing what people actually say

Most have not ever had people actually pay careful attention to what they are doing
Focus

Everybody has a focus, you cannot prevent it

1. Entering focus
2. Project focus

Because you will have a focus, be mindful of that focus and use it to your advantage

3. Brainstorm and define your focus
Focus

Focus defines the point of view

Clear focus steers the conversation
Everyone in the team has an entering focus

Focus lets the interviewer sees more

Focus reveals detail

Focus conceals the unexpected

Focus on one, and lose the other

Start with a focus and then expand
Focus

Opportunities to expand focus:

Surprises, contradictions, idiosyncrasies

Nothing any person does is for no reason

Nods

Question assumptions even if they match
“Do they really do that? Why would they do that?”

What you do not know

Treat interview as an opportunity to learn new stuff
Even if the participant is not knowledgeable, extent of their knowledge / misinformation can be useful
The Stages of a Contextual Inquiry

1. Interview / Warm Up
2. Transition
3. Observe Behavior
4. Share Interpretation
5. Refine Interpretation
6. Wrap-up
7. Withdraw / Return
Explain the Rules

Be sure you explain “the rules” of how you’ll be interacting during the contextual inquiry.

If this isn’t completely clear, the encounter may devolve into a traditional interview (since this relationship is more familiar to people).
How to Screw it Up

Slipping into abstraction
   Keep it concrete, in the work, in the details

Not being inquisitive or nosy enough
   If you have the impulse to ask, do it right away

Being too pushy with interpretation
   If you ignore corrections, participant will shut down
How to Screw it Up

With the wrong person

They need to be willing to partner with you

Turning it into a regular interview

If you could have done it in a coffee shop, then you did not do a contextual inquiry

Multiple people present

Can be good if they talk, surface their thoughts
Bad if they do not talk, are not forthright
How to Screw it Up

Overly disrupting the task

If you change the task, your data is less useful
Withdrawal and return, maybe on a schedule
Retrospective methods might be necessary
(e.g., going through artifacts, prior critical incident)

Being stuck in your focus

Important to have a focus,
expectations of what you expect to be important
But you learn by attending to misconceptions
When All Else Fails

Remember Master/Apprentice

Remember Context

Remember Withdraw & Return
Affinity Diagrams

Generated during group session

Each observation, idea, note to a post-it

Notes are hierarchically organized into themes, based on project focus
Today

Administrative

Project Status
Denny 303 on Tuesday 10/10

Contextual Inquiry and Design Research

Ethnographic Principles
Contextual Inquiry Principles and Practice
Additional Design Research Methods

Project Team Formation
Many Design Research Methods

Many other design research methods are available, with different strengths.

Often apply multiple methods for complementary perspectives.

Fundamental goal remains to gain design insight through improved understanding of problems.
Interviews

Similar to contextual inquiry, but lacking context of direct observation

- Set a focus, record, take notes, have two people
- Can be Structured / Semi-Structured

Avoid leading questions

Interpret responses

- Repeat and rephrase, probe terms and concepts
- “can you give an example”, “tell me more”, “what do you mean”, “why was that important”
- Ask when it did not happen as expected

Pair with questionnaires for depth / to humanize
Focus Groups

Moderated conversation among peers
  Moderator helps establish this, participants share experiences, wants/needs

Researcher benefits from their conversations

Prompts discussion topics
  Explanations of problems in status quo
  Underlying emotions in a process
  Desires / disagreements for new designs
Diary Study

Participants keep a diary

Possibly as primary data
Possibly to create mindfulness before interview
Diary Study

Participants keep a diary
Possibly as primary data
Possibly to create mindfulness before interview
Diary Study

Participants keep a diary
  Possibly as primary data
  Possibly to create mindfulness before interview
Experience Sampling

Emerges from “beeper study” method

Can be random, can be context-aware

Can gather self-report, photos, sensor data
Many Design Research Methods

Personal Inventories

“collections of artifacts selected by the participant”

Cultural Probes

“materials designed to inspire people to thoughtfully consider personal context and circumstance”

“maps … asked the elderly to mark zones for meeting others, being alone, dreaming…”
Many Design Research Methods

Behavior Mapping

“place-centered mapping”
“individual-centered mapping / traces”

Graffiti Wall

“candid feedback on behaviors and perceptions of current spaces”
Shadowing

“observational method that involves tracking somebody in their role”

“not intended to be covert … however subtle instances might be completed in public spaces …”

Useful reminder to be thoughtful and safe

multiple groups have been asked to leave be safe, be mindful of people
Value Sensitive Design

To be useful or usable is not the same as supporting important human values

Examples?
Value Sensitive Design

To be useful or usable is not the same as supporting important human values

Examples?

<table>
<thead>
<tr>
<th>Independence</th>
<th>Fairness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy</td>
<td>Freedom from Bias</td>
</tr>
<tr>
<td>Trust</td>
<td>Human Safety</td>
</tr>
<tr>
<td>Accountability</td>
<td>Universal Access</td>
</tr>
<tr>
<td>Ownership and Property</td>
<td>Sustainability</td>
</tr>
</tbody>
</table>
Value Sensitive Design is an interactional theory

Values are not inherent in a given technology
But a technology is not value neutral
Some technologies are more suitable
than others for supporting given values

Value Sensitive Design investigates
stakeholders, values, and value suitabilities
Direct and indirect stakeholders
Tripartite Method

Conceptual Investigations
Analyses of the values involved in a system

Technical Investigations
Identify or develop technical mechanisms
Investigate suitability to support values

Empirical Investigations
Investigate who the stakeholders are, which values are important to them, and how they prioritize these values
Today

Administrative

Project Status
Denny 303 on Tuesday 10/10

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Denny 303 on Tuesday 10/10
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 03: Contextual Inquiry and Design Research

Tuesday / Thursday
12:00 to 1:20

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Kailey Chan
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Nigini Oliveira
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User Interface Design, Prototyping, and Evaluation

Lecture 04: Critique
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Functional Fixedness

Functional Fixedness

Duncker's (1945) Candle Problem  The subjects are asked to attach a candle to the wall and are given a box of tacks, candles, and matches, as shown in panel A. The solution is shown in panel B.

$5 Challenge

Teams of students “funded” with $5

Allowed several days to plan
After they open the envelope, allowed two hours
Make as much money as possible

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge
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Lottery tickets, car washes

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Lottery tickets, car washes
Line waiting service, bicycle tire pressure check
  Evolved with experience (e.g., pagers, donations)

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Line waiting service, bicycle tire pressure check
  - Evolved with experience (e.g., pagers, donations)

Winner made $650…

https://www.psychologytoday.com/blog/creativityrulz/200908/the-5-challenge
Why Critique?

Critique helps evaluate early, often, and cheaply

Applicable to artifacts of many types
Compare to other expert inspection methods

You are not your own worst critic

We collectively know more than any one of us
It is hard to see past your own decisions
Design requires getting past our own infatuation

A design can feel like our love, our baby...
Learning to Give and Receive Critique

You will learn to both give and receive critique

    Each is important
    Each is a skill developed through practice

Many activities will consist of group critiques

    Each group will present an artifact
    Other class members and staff will offer critique

Starting today with critique of
Assignment 2b: Design Research Plan
Why Critique?

Critique is not just for design

It applies to many artifacts and domains

Examples?
Why Critique?

Critique is not just for design
It applies to many artifacts and domains

Examples?
visual art, writing, design, code (i.e., code review)

Over time, you should gather people who can give you high-quality critique in everything you do
You may meet some of those people in this class

We do not insist on deploying flawed code...
Critique is About Improvement

http://alistapart.com/article/design-criticism-creative-process
What is Critique?

Critique is a method for feedback

It is not just a list of complaints

1. Presenters sit down with critics
2. Quickly explain their artifacts (e.g., less than 2 minutes)
3. Critics give feedback, ask questions
4. Presenters respond, take notes on what is discussed
Critique is Neither Criticism nor Design

Seriously, not just a list of complaints

Critics offer honest feedback
Both positive and negative

Presenters should be able to learn what works well and what is problematic about their artifact

It is then presenter’s responsibility to sort through feedback, decide what is important, how to act

You must take notes for later review
Tips for Presenters

Critique can be hard, especially at first

Try to avoid being defensive

You are not your work, separate yourself

Remember the expertise you bring

Even if “the room” knows more about design, you know more about your problem / artifact and your rationale for the current design
Tips for Presenters

Taking advice is not giving up authorship

You still make the final decisions
A half-baked suggestion does not contain all the details of a finished solution

Design your critique

What you show invites different forms of feedback
Verbally indicate what kind of feedback you want, but also provide an artifact of appropriate form

This course will guide you in a variety of forms
Tips for Presenters

Design your critique:
1) establish clear roles

Presenter: presenting, not convincing

Audience: understand problem and context, ask lots of questions

Facilitator: watch schedule, stay on agenda, take notes to help presenter, ask key steps for moving forward

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3
Tips for Presenters

Design your critique:

2) ensure agreement on the problem

State the problem and context for feedback

I am showing [early/mid/late] work
Around [the problem]
Because [why it’s a problem]
And am looking for feedback around [specific focus for feedback]

State what is not the current focus

Ensure understanding and check for clarity

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dc299ce3
Tips for Presenters

Design your critique:
3) focus on feedback, not criticism

Criticism
passes judgement
finds fault
is personal
is vague
tears down
is ego-centric
is adversarial
belittles the designer

Critique
poses questions
uncovers opportunity
is objective
is concrete
builds up
is altruistic
is cooperative
improves the design

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3
Tips for Presenters

Design your critique:

4) keep laptops and phones put away

   Exception for the presenter, but prefer paper whenever possible

   Exception for the facilitator / note taker

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3
Tips for Presenters

Keep an eye out for design rationale

You probably made some decisions without thinking through good reasons at the time.
Critique can help give a rationalization for past decisions as you explain the artifact to others.

Exploit failure

A “failed” artifact should teach you about the design space, what won’t work, and why.
The goal is to improve, this requires failure.
Tips for Critics

There are many strategies for giving critique

  Hamburger method
  I like, I wish, what if
  Socratic method

These provide ways to give critique that can help the conversation go smoothly

  Can give you a question to ask when you do not have one, provide a way to ask that is productive and less likely to create defensive reaction
Tips for Critics: Hamburger Method

“Bun, meat, bun”

Bun:
    Something fluffy and nice

Meat:
    How to improve

Bun:
    Something fluffy and nice

Not a “shit sandwich”
Positives need to be genuine, enable learning from both positive and negative aspects of the artifact
Tips for Critics: I Like, I Wish, What If

I Like:

Lead with something nice

I Wish:

Often leading from what you like

What If:

An idea to spark further conversation, better than: “I think you should have…” or “Why didn’t you …”

Gives the presenter benefit of the doubt if they did already think of your idea, can present rationale
Tips for Critics: Socratic Method

Identify an aspect of the design and ask “Why?”

- Can be good if unsure what else to say
- Forces presenter to give, or develop, explanations for design decisions, which can help build up the design rationale
- Not fundamentally negative, hard to get defensive
Tips for Critics

Limit your use of personal pronouns (e.g., “you”)
    Critique is about the artifact, not the designer

A designer deserves honest feedback
    Both positive and negative
    Including clarity and rationale

Help with actionable suggestions
    But it is not your design
    Perhaps several possible ways of thinking
Summary

Fall out of love with the things you build
   Let others help you see past the infatuation
Get feedback early, often, and cheaply
Focus on improvement
   In brainstorming, we were not criticizing
   In critique, we are not defending
You will learn to both give and receive critique
   If you are having difficulty, please come talk to us
Design Research Plan Critique

With your group, find another group

   Decide which group will present first
   Swap half the audience group to another table

Present your Design Research Plan

   Decide who is taking notes
   Remind project context
   Present proposed methods
   Present details via design research artifact
Design Research Plan Critique

Some things to look for:

Are questions open enough, avoiding the presumption of a particular design?

Are questions specific enough, offering a potential to gain new insights?

Are there other participants to consider?

Are there other methods to consider?

Is the proposal feasible for 1 to 2 weeks?
Considering an Effective Critique

Is there a set agenda for work being shown?

Are there clearly defined roles in each session?

Has the facilitator kept conversation focused?

Have presenters accurately shared the scope of their problem?

Did everyone in the room understand the problem framework, enough where each person felt equipped to ask questions?

Was feedback provided in the form of questions or criticism?

Did the critique feel like a cooperated effort to improve a design, problem outline, or individual process?

https://medium.com/facebook-design/critique-is-an-important-part-of-any-design-process-whether-you-work-as-part-of-a-team-or-solo-ef3dcb299ce3
Resources

On Critique

Four Things Working at Facebook Has Taught Me About Design Critique

How to Survive a Critique: A Guide to Giving and Receiving Feedback
http://www.aiga.org/how-to-survive-a-critique

On Interviewing

User Interview Techniques: Guidelines for Obtaining Better Results
https://canvas.uw.edu/files/44191347/download?download_frd=1
Resources

Guidelines for design research interviews

Structured in a format to use for critique of the interview process itself
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 04:
Critique

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

DESIGN USE BUILD
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 05:
Task Analysis

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
The Homer
Project Status

Looking Forward

2c: Design Research Check-In due Tonight
2d: Design Research Review due Monday 10/16
2e: Task Review due Thursday 10/19
2f: Design Check-In (3x4) Due Monday 10/23
2g: Design Review (1x2) Due Thursday 10/26
“Getting the Right Design” Report and Presentation

Other Assignments

Readings to be Posted Soon
Design at Large: real-world, large scale, and sometimes disruptive

Scott Klemmer (UCSD)
Host: Froehlich
Paul G. Allen School Distinguished Lecture
Thursday, October 12, 2017, 3:30 pm
EEB-105
Maps and directions

Abstract

In recent years, my group—and probably many of you—have experienced a dramatically-increased ability to do Design at Large: creating research that is widely-used by real people and learning a ton from the experience. When moving from designing artifacts in the lab to designing experiences at large we inevitably shift to studying complex sociotechnical systems. A lot of the behavior is emergent, and sometimes completely unexpected. The successes in this new world are tremendously exciting, but like all creative endeavors, there are lots of flops. One source of failure is that designers often receive guidance that’s based on faith rather than insight. This leads to designs that ‘solve’ nonexistent problems, miss important needs, hold onto misguided assumptions for too long, or waste time relearning known insights. To help sketch where a shift to Design at Large may take us, I’ll share insights from our research systems and their real-world usage, experiences with online learning, former students’ adventures, and what we’re up to in the Design Lab.

Bio

Scott is a Professor of Cognitive Science and Computer Science & Engineering at UC San Diego, where he co-founded the Design Lab. He previously served as Associate Professor of Computer Science at Stanford, where he co-directed the HCI Group, held the Bredt Faculty Scholar chair, and was a founding participant in the school. He has a PhD in CS from Berkeley and a dual BA in Art-Semiotics and Computer Science from Brown (with work at RISD). His former graduate students include leading professors, researchers, & founders. He leads the Interaction Design Specialization on Coursera; it introduced peer assessment to online education. He has been awarded the Katayanagi Emerging Leadership Prize, Sloan Fellowship, NSF CAREER award, Microsoft Research New Faculty Fellowship, and Nine best-paper or honorable mention awards. He is program co-chair of Learning@Scale ’18, on the editorial board of HCI and TOCHI; was program co-chair for UIST, the CHI systems area, and HCIC. He advises university design programs globally. Organizations worldwide use his group’s open-source design tools and curricula.
Design Research Reminders

You are not doing science

You seek design insight,
not knowledge, truth, or generality

Do the best design work you can

May find that self-tracking is not the opportunity

We designed the project sequence, but be flexible

Capture and keep your raw work products

Dedicate a note keeper, consider recording

Our collection is minimal, but you will want them
Structure of Section and Critique

Focus on peer feedback and learning
- Bring your artifacts, be ready to present them
- Bring paper, keep the laptops put away

Critique progression
- Reminder of your project
- What you have done
- What you have learned
- Your plan going forward
- Feedback from peers / staff
- Questions you have for peers / staff
Structure of Section and Critique

With 3 Project Groups:
- 2 groups in peer critique
- 1 group with course staff
  Rotate at about 12 minutes

With 4 Project Groups:
- 2 groups in peer critique
- 2 groups each with member of course staff
  Rotate at about 17 minutes

Time at end to huddle, follow up with anybody
Developing Insight Is Hard

Design research yields a lot of data
   Does not reduce to a statistical test

Need to get from data to design insight
   But this is fundamentally difficult

Although project sequence separates research from design ideas, you will be exploring ideas as your do the research
Objectives

Be able to:

Describe how taking different perspectives on design research data can help to surface design insights.

Given design research data, be able to analyze that data in terms of people and their tasks.

Describe personas, their purpose, how and why we emphasize design research data in their creation.

Define and describe relationships between tasks, personas, and scenarios.
Affinity Diagrams

Generated during group session

Each observation, idea, note to a post-it

Notes are hierarchically organized into themes, based on project focus
Affinity Diagrams
Affinity Diagrams
Developing Models

Distilling models that summarize data
  Highlights gaps in understanding
  Identify breakdowns and workarounds

Many types of models
  e.g., Flow, Sequence, Artifact, Cultural, Physical
None is perfect, they highlight different things

No model is perfect or guarantees insight
Flow Model: Creative Work

- Test user
  - Run software and use documentation
  - Report all problems

- Problem reports
  - Discussion of problems

- Documentation

- U2 (Documentation writer)
  - Create documentation from specifications and the actual product
  - Validate documentation with developers and the actual product
  - Test all examples

- Drafts for review
  - Discussion of assignments
  - Discussion of review

- Editor
  - Check drafts for accuracy, consistent layout, grammar, and terminology
  - Assign writing tasks

- Marked-up drafts
  - Discussion of system problems
  - Discussion of review

- Work assignments

- Writing standards

- Marked-up drafts
  - Drafts for review

- Product versions

- Specifications

- Developer
  - Write the software
  - Review documentation for accuracy and completeness
Sequence Model: Doing Email

**Intent:** Handle emergencies

- Trigger: Return to the office
  - Scan message list for important message—Use sender, subject
    - Choose urgent message
      - Read message about unhappy user
        - Decide more info needed
          - Make phone call
            - Had to put off issue of unhappy user

**Intent:** Get back to people easily

- Leave phone message
  - File in phone folder
    - See list of messages
      - Choose message 9: subject indicates university news relevant to department
        - Read message
          - Delete message
            - See message 10 automatically
              - Read message 10
Sequence Model: Equipment Audit

- Assigned to do equipment audit
  - Retrieve required form from database
    - Print form
    - Collect data at site
      - Record data on paper form
      - Type data into form on computer
  - Print completed form
    - Leave hardcopy of form with customer
    - Send electronic form to supervisor
      - Store electronic form on form database
Cultural Model: Developer

Marketing

Our new features are top priority
If I say do X, you figure out what that means

Competitors

We have 50 new features; catch up

U9
(Developer)

You aren't our primary user; we'll fix bugs for you in our own time
Our technology is standard; use it even if it doesn't work

Base technology group

Our bug reports are top priority

Customer support
Cultural Model: Department Store

Department store company culture

- Do everything you can for the customer
- We sell socks
- The PC user is your customer
- We sell socks
- Don’t enforce any standards
- Standards make my life easier

Users
- We are a no-risk interface
- Support whatever I choose to buy
- We are your one-stop shop
- We go out of our way for you
- We help you sell socks
- Customers

External technology vendors
- Use whatever new net HW we create
- Use these de facto standards
- We run on integrity and trust
Artifact Model: Calendar

- Past (seldom accessed)
- Future (quick access)
- Scheduled events
- Unscheduled but associated with the day
- Reminders (storage with quick access)
- Meetings
- Appointments
- Reminders
- Strike out a day
- Notes
- Never used

Business cards (storage for later)

Rubber band
Physical Model: Work Site

- Maybe outside
- Large area (up to square mile)
- Tight spaces
- Climbing
- Awkward positions

Approximately a 5 minute walk. If doing an audit at a site under construction, then safe path frequently changes and may need to wait for construction equipment to pass.
Designing with Tasks

We will primarily emphasize designing with tasks
Tasks Matter

System will fail if:

- It is inappropriate for the person
- It does not meet a person’s needs

Your contextual inquiries will emphasize getting to know people and their needs

Can you then just make ‘good’ interfaces?
Why Task Analysis?

‘Good’ has to be interpreted in the context of use
Might be acceptable in office, but not for play
Infinite variety of tasks and customers

Guidelines are too vague to be generative
  e.g., “give adequate feedback”
Can be used to critique, but not to generate

Design is often about tradeoffs

Example of gestures to navigate display
Why Task Analysis?

Task analysis is a lens on the information you obtain through design research methods.

Use what you learned in your research to answer the questions in the task analysis.

Project sequence orders the two, but in practice you should iteratively decide how to best draw upon all relevant methods throughout a process.
11 Task Analysis Questions

Who is going to use the system?
What tasks do they now perform?
What tasks are desired?
How are the tasks learned?
Where are the tasks performed?
What is the relationship between people & data?
What other tools do people have?
How do people communicate with each other?
How often are the tasks performed?
What are the time constraints on the tasks?
What happens when things go wrong?
Question 1

Who is going to use the system?

Identity
In-house or specific customer is more defined
Broad products need several typical consumers

Background
Existing systems, training

Skills
Work habits and preferences

Physical characteristics and abilities
Seattle Parking Meter

Who is going to use the system?

Identity?
People who park in Seattle
Business people, students, elderly, tourists

Background?
Have used parking meters before
May have an ATM or credit card
Have used other fare machines before
Seattle Parking Meter

Who is going to use the system?

Skills?
May know how to put cards into ATM

Work habits and preferences?
Park several times a week, a month, a year

Physical characteristics and abilities?
Varying heights, do not make it too high or too low

Anything else?
There are limits, a tradeoff in this design
Question 2 and Question 3

What tasks do they now perform?
What tasks are desired?

Important for both automation and new functionality
Relative importance of tasks?
Observe people, see it from their perspective

Automated Billing Example
small dentists office had billing automated
assistants were unhappy with new system
old forms contained hand-written margin notes
e.g., patient’s insurance takes longer than most
POPOVERS

2 cupfuls flour  2 eggs
2/3 teaspoonful salt  2 cupfuls milk
2 teaspoonfuls melted fat

Beat eggs slightly. Sift flour and salt, and add alternately with milk to eggs. Add melted fat. Beat with egg beater until smooth and full of bubbles. Fill hot greased cast aluminum or iron pans or glass or earthenware custard cups, 2/3 full of popover batter. Place immediately in a hot oven of 450° F. and bake for 30 min. Then lower temperature to 350° F. and bake for 15 min. longer. Makes 9 popovers.

CORNBREAD

2 cupfuls cornmeal  2 cupfuls sour milk
1 teaspoonful soda  2 eggs, beaten
1 1/2 teaspoonfuls salt  2 tablespoonfuls melted fat
3 tablespoonfuls sugar

Sift dry ingredients together. Mix milk with beaten eggs and add to dry ingredients. Stir well together and add melted fat. Pour into a hot greased baking pan or muffin tins and bake in hot oven of 400° F. for 20-25 min. Makes 24 pieces.
Question 4

How are the tasks learned?

What does a person need to know?

Do they need training?

academic
general knowledge / skills
special instruction / training
Question 5

Where are the tasks performed?
Office, laboratory, point of sale?
Effects of environment on customers?
Are people under stress?
Confidentiality required?
Do they have wet, dirty, or slippery hands?
Soft drinks?
Lighting?
Noise?
Question 6

What is the relationship between people & data?

Personal data
Always accessed at same machine?
Do people move between machines?

Common data
Used concurrently?
Passed sequentially between customers?
Remote access required?
Access to data restricted?
Does this relationship change over time?

Patient-provider curation example, Fitbit example
Question 7

What other tools does a person have?
More than just compatibility

How customer works with collection of tools

Automating lab data collection example:
how is data collected now?
by what instruments and manual procedures?
how is the information analyzed?
are the results transcribed for records or publication?
what media/forms are used and how are they handled?

Enhanced Field Biologist Notebooks, Navigating by Sextant
Question 8

How do people communicate with each other?
Who communicates with whom?
About what?
Follow lines of the organization? Against it?

Old Email Adoption Example, Contrasted to Current Expectations
Question 9

How often are the tasks performed?
Frequent use likely remember more details
Infrequent use may need more help
Even for simple operations
Make these tasks possible to accomplish
Which function is performed
Most frequently?
By which people?
Optimizing for these will improve perception of performance
Careful about initial use scenario
Question 10

What are the time constraints on the tasks?

What functions will people be in a hurry for?

Which can wait?

Is there a timing relationship between tasks?

Target example, versus Pregnancy in Web Search
Question 11
What happens when things go wrong?
How do people deal with task-related errors?
practical difficulties?
catastrophes?
Is there a backup strategy?
What are the consequences?
Plantr Task Analysis

Example abbreviated task analysis

Be sure to see other examples on website

As with models, no question promises insight
Plantr Task Analysis

1. Who is going to use the system?

Anyone who owns indoor plants is a potential user of Plantr. All of the plant owners that we interviewed forgot to water their plants at some point regardless of age, experience, and background. Even Lucy, who spent most of her time at home because she worked from home, struggled with timely watering.
Plantr Task Analysis

2. What are the currently possible tasks?

When people purchase a plant, they often look up information about the proper lighting and temperature conditions for their plants. Additionally, people must find out how much and how frequently to water and fertilize their plants.
Plantr Task Analysis

3. What are currently unavailable, desired tasks?

People want a way to remember to water and care for their plants. Forgetting to water plants was the most cited reason for plant death, and the only task that participants in our inquiries mentioned completing on a regular basis.
Plantr Task Analysis

4. How are tasks learned?

Most people learned how to take care of their plants through trial and error. Some consulted the Internet, nursery staff, or friends for more information on plant care.
Plantr Task Analysis

5. Where are the tasks performed?

Tasks like watering and fertilizing are performed at the plant's location. People keep plants in their workplace, like Jack, or at home, like Lucy and Caroline. Getting information about plant care was performed in a variety of places. People who consult the Internet could be anywhere with a platform that supports web browsing. Those who go to the nursery to talk to plant experts are required to go to a specific location to talk to someone in person.
Plantr Task Analysis

6. What is the relationship between a person and data?

We identified three different types of data: a plant’s current state, information about plants, and data that reflects the person’s plant care history.

A plant's current state is data on the moisture level of its soil and the general appearance of the plant (e.g., color, stiffness/limpness of leaves). People use this information to determine the plant's needs. Caroline and Lucy watered their plants when the soil felt dry or the leaves began to droop.
Plantr Task Analysis

6. What is the relationship between a person and data?

People consulted various plant care information databases when they wanted to know how to care for their plants.

People used their personal history of plant care to determine how to take care of plants. Caroline said that she used to underwater plants, but she learned from her mistake and now tries to water them more often. People also base their buying decisions based upon their plant care history. Caroline noted that she tries to buy plants that require minimal water.
Plantr Task Analysis

7. What other tools do people have?

Caroline, Lucy, Jack, and Kacy all have phones and computers. People also have a water source, pots, and soil for their plants. Most people probably have access to a nursery or library.
Plantr Task Analysis

8. How do people communicate with each other?

Plant owners communicate on online forums and message boards. People who happen to be in the nursery at the same time might talk to each other about plant care. Likewise, people who have friends with indoor plants may share plant care tips.
Plantr Task Analysis

9. How often are the tasks performed?

Watering is performed with a frequency between twice a week (Jack) and twice a month (Caroline). Fertilizing is performed less frequently, between once every two weeks to once every three months. Plants do not become sick often enough to make a good estimate about how often people try to get help.
Plantr Task Analysis

10. What are time constraints on the tasks?

Plants must be watered with some regularity, so if people do not water their plants for long enough, the plants will start to die. Likewise, if plants are in need of attention for other reasons - pH imbalance, environment too dry - and they do not receive attention within some amount of time, they will die. Watering, caring, and learning how to care for a plant takes time. People who are very busy might not have the time or attention required for plant care.
Plantr Task Analysis

11. What happens when things go wrong?

When plants became "sick", people take action, seek help, or ignore the problem until the plant dies. When people forget to water plants, they usually notice that the plant needs water and give it water. Sometimes people may not realize that a plant needs water until it is too late.
Combine with Other Methods

Personas
Concept Mapping
Competitive Analysis

“If you want to create a product that satisfies a broad audience …, logic will tell you to make it as broad in its functionality as possible to accommodate the most people. Logic is Wrong.”
Personas

Archetypal character meant to represent a group of people in a role who share common goals, attitudes, and behaviors when interacting with a particular product or service.

NAME: Vivica Parker
AGE: 32
OCCUPATION: Journalist
PROFILE:
Born in Washington, DC
Lives and works in New York City (far from family)
Lives by herself in a small apartment
Has a driver’s license
Calls parents and older brother on weekends
Works for an online art magazine and is currently in charge of writing a blog about graffiti. In order to do that she needs to do the following tasks:
- Walk/drive around the city
- Take pictures
- Talk with artists and keep record of that info (place, time, people)
- Work day/night
- Share the collected information with editor and magazine’s readers
To do her job, usually carries notebooks, camera and cell phone to keep in touch with her editor.

INTERESTS:
Amateur theater actress since she was 23
Travel and merge in different cultures
Architecture
ACTIVITIES:
Did research on ancient Egyptian architecture
Member of the Art Society of NY

TECH EXPERIENCE:
Basic knowledge about operating systems
Uses the Internet frequently either for personal or business purposes

TECH ATTITUDE:
Always open to new technology, but she feels annoyed with complex applications and discards them very often
Tends to feel numb using the latest high-tech gadgets and needs time to get used to them

GOALS & SITUATED BLOGGING NEED:
Needs to keep track of her location and time when she finds and photographs graffiti and street art for her blog and (b) conducts audio interviews of artists and enthusiasts
Needs to have a quick way of keeping track of content gathered from separate locations in order to post articles before editorial deadlines.

“This is what I need in order to do my job.”
Personas

Purpose

Empathy: characters to engage and relate to

Focus: can focus on specific people and needs, versus always attempting to design for everybody

Communication: conveys range of data, can help make assumptions more explicit

Multiple Types

Primary, Secondary, Supplemental, Customer, Served, Negative
Personas

Goals

Life Goals: personal aspirations
e.g., to retire before the age of 50

Experience Goals: how to feel with a product
e.g., to be competent while using the product

End Goals: tangible outcomes with a design
e.g., to be updated about finances over last month
Personas

Roles

Personas do not necessarily equal roles
  e.g., parent, doctor, programmer, actor

People can have multiple roles

People in a role can have different needs and goals
  e.g., new programmer vs. experienced programmer
  e.g., parent of 1 vs. parent of 8
  e.g., oncologist vs. podiatrist
Personas

Critical to avoid using stereotypes as personas

“The whole point in creating personas is to get past our personal opinions and presuppositions.”

Goodwin, 2002

Not a substitute for design research, but a tool for summarizing and conveying that research

Collect design research data
Segment people
Create personas for segments
Personas

Parxat Practical
Primary Motivation to acquire phone: I got my mobile phone to make calls when I am away from work or home
Associated motivations: I got a good price on my phone and mobile phones are cheaper than landlines.

Personal Profile
“Mobile phones are part of your communications infrastructure”

For Parxat, mobile phones have provided a key way to stay in contact with work, family and friends.

He owns and manages a small computer game club with eight computers. His club does not yet have internet or a landline; however, he would like to add the internet and more computers when he can afford them.

Currently, Parxat maintains all of the computers but knows he may need help with some computer problems in the future. Other club owners that he has known have had to shut down after two to three years because the equipment has broken down and the owners cannot get the old equipment fixed or afford new. Right now he is not sure who he would ask for help if one of his computers needed maintenance that he could not perform himself.

Parxat has always relied heavily on a system of personal recommendations when looking for professional services. He feels that one should trust the advice of friends because they are to be trusted.

Parxat’s Goals for MoSoSo Directory
- Would seek recommendations for professional help such as plumbers and computer maintenance
- Would like to create a public recommendation for his computer club
- Groups he would join or create: Family, Clients from his computer club, Friends through work.

Key Significant Differences
- Uses the phone for work calls
- Bought his mobile phone (not a gift)
- Tech savvy compared to other groups

Personal Information
Age: 43 years
Profession: Owns and manages computer game club with eight computers
Lives: In the capital city of Bishkek
Home Life: Lives with his wife and two sons
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Russian
Schooling: Has a degree in economics focused on finance and credit from Kyrgyzstan Slavic University
Income: 5200 soms a month (approx $140.00)

Technical Information
Internet Use: Yes, at least occasionally
Length of use: 28 months
Use how often: 1-2 days a week
Where use: Most often at a friend’s internet cafe

Computer User: Yes
How often: Several times a day at work
Cable or Satellite TV: Yes
Home Landline: Yes

Mobile Phone Use
Length of use: 28 months
How acquired: Bought his phone new
Use how often: Usually a few times a day
For: 60% personal calls, 40% work calls
SMS: Yes: 70% voice, 30% text
Feelings and concerns: Concerned that mobile phone activity is monitored
Would miss his phone very much if he did not have it (rated 4 on a scale of 1-6)
Feels mobile phone access is too expensive

Primary persona: represents 56% of survey respondents who own mobile phones
Personas

Parxat Persona Data Detail

**Photo:** Other male participant from Interview KS, R1. The participant is actually a field worker from Kefa Balls. His personal data was actually used for a woman's husband.

**Motivation:** We placed the 400 survey participants with mobile phones in one of the three major groups based on their response. We found that 50% of those respondents claimed motivations that fell into one of the three final motivation groups without overlap.

There were 144 individuals in the practical motivation group. Almost all members of this group (98%) gave a need to make calls away from home or work as the motivation for acquiring a mobile phone. 2% were also motivated by mobile phones being cheaper than landline and 2% by getting a good price for the phone.

**Name:** Parxat is the name of a top party member in the Krzyg parliament.

**Key Differences:**
- 41% of the practical motivation group used their phones for work - this was significantly more in the other two groups.
- 41% of the practical motivation group bought their phones new — more than any other group (most survey respondents received their phones as gifts).
- The practical group had more experience with computers and internet than any of the other two groups: 46% used computers, 35% owned a computer (significant difference, 39% used the internet).
- Age: Actual mean age of the group was 36.9. This was the oldest mean age, but it showed higher here to emphasize the differences with the other groups.
- Profession: This profession is based on one of the male friends from Interview KS, R1. 50% of the practical group was employed which was significantly higher than any other groups.
- Lives: 60% of practical cases live in an urban environment at the time of the interviews.
- Home Life: Most family size was 3 people for the practical group.
- Russian: 95% of the practical group speaks and reads Russian.
- Primary Work Language: 50% claimed their primary language at home was Krzyg. This was the highest of any language.
- Primary Work Language: 45% of those employed spoke Russian at work.
- Schooling: This degree is also based on male friends. The computer club from Interview KS, R1. Also, the practical group had significantly more education (avg. 12.5 years) than the other two group (avg. 10.7 years).
- Income: This is slightly higher than the average income of 475 euros (GBP) (based on August 2008 exchange rate and data from http://revenues.brighton.ac.uk). The average income of the practical group was 524 euros (GBP) (based on August 2008 exchange rate and data from http://revenues.brighton.ac.uk).
- Internet Use: 20% of this group used the internet - the highest of any group.
- Length of use: Use how often, Where use - Most numbers based directly on survey data.
- Computer Use: 40% of this group used computers - the highest of any group.
- How Often: mean number from the survey data.
- Cable or Satellite TV: 20% of this group had cable or satellite TV - the second most of any group.
- Home Landline: 55% have home landlines - the second most of any group.
- Mobile Phone: Length of Use: mean number from the survey data.
- How acquired: 41% of the practical motivation group bought their phones new — more than any other group (most survey respondents received their phones as gifts).
- Use how often: mean number from survey data.
- Free: All groups used their phones freely for personal calls. 40% of the practical motivation group used their phones for work. This was significantly statistically more than the other two groups.
- SMS: 2% of the practical group used SMS. This split was based on the numbers given by the other group participants from Interview KS, R1.
- Feelings and concerns: 41% felt mobile activity was monitored. This was significantly higher than any other group (no other group was higher than 45%). 52% claimed they would miss any phones if they were lost or damaged - this was the most of any group.
- 88% felt mobile service was too expensive.
Personas

Shirin Social
Primary Motivation to acquire phone:
I like people to reach me at all times
Associated motivations:
My friends all have mobile phones

Key Significant Differences
Uses the phone to primarily to call friends
Least likely to feel mobile access is too expensive
Somewhat tech savvy

Personal Information
Age: 20 years
Profession: Student and works part time as a bartender in a local café
Lives: In the capital city of Bishkek
Home Life: Lives with her dad and an older brother.
She also has around 30 cousins in towns.
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Kyrgyz
Schooling: She is a full time student (junior) at the American University of Central Asia studying business administration
Income: 2000 soms a month (approx $5.00)

Technical Information
Internet Use: Yes, at least occasionally
Length of use: 33 months
Use how often: About once a week
Where use: Most often at an internet café
Computer User: Yes
How often: A few times a week at school
Cable or Satellite TV: Yes
Home Landline: Yes

Mobile Phone Use
Length of use: 25 months
How acquired: Was given the phone by a cousin
Use how often: Several times a day
Fac: 80% personal calls, 20% work calls
SMS: Yes: 65% voice, 35% text
Feelings and concerns:
The least likely of any group to feel that mobile phones are too expensive
Feels that mobile phones are important to her future career

Personal Profile
“We just talk to our friends...things like did you hear that this or that happened - in our communication rumors are the official news, and gosip works”

For Shirin, keeping in contact with friends is the most important thing about mobile phones.
She is a full time student (junior) at American University of Central Asia (AUCA), studying business administration. She also works part time as a bartender in a café.
Shirin is part of an unregistered student association at school that organizes cultural and historical meetings at a local café. She also enjoys arranging parties for her friends.
She is interested in social networking applications on the internet, but has found it boring, stating “the first time is interesting than you get bored because you already know everybody.”

Shirin’s Goals for MoSoSo Directory
• Would use the service mostly to create groups of friends
• Would like to broadcast messages to particular groups, or to tell people where there will be social gatherings
• Would like to receive messages from other members of a group
• Groups she would join or create
  Family
  Friends from work and school
  Associations through her unregistered student organization

Primary persona: represents 32% of survey respondents who own mobile phones
Personas

Shirin Persona Data Detail

**Photo:** Younger female participant from the interview with three urban young friends (K1, U1, and K2). The participant actively lives in Bishkek, is eighteen years old and is a student at the American University of Central Asia.

**Motivation:** We placed the 40 survey participants with mobile phones in one of three groups based on their responses. We found that 32% of these respondents claimed motivations that fall into one of the three final motivation groups without overlap.

There were 113 individuals in the social motivation group. A majority (60%) wanted to reach their friends at all times, 19% of this group got their mobile phone because their friends all had them, and 4% wanted to receive text messages.

**Name:** Shirin is a somewhat common female name in Kyrgyzstan. It is of Persian origin.

**Key Differences:**
- 39% of the social motivation group used their phones for work - this slightly more than the other two groups
- 47% of the social motivation group felt that mobile phone access was too expensive while the other two groups over 66% felt it was too expensive. This was a statistically significant difference.
- The social group had the second most experience with computers and internet: 43% used computers, 23% owned a computer, 23% used the internet.

**Age:** Actual mean age of the group was 35.1. This was the youngest mean age, but was interesting lower here to emphasize the difference with the other groups.

**Profession:** This profession is based on three interviews where selected a total of seven younger people under the age of 27. Three were students. The part-time job was based on the profile of an urban male student in K3, U1, and K1.

**Linus:** 80% of urban areas live in an urban environment - this is also the urban environment location of the interview.

**Home Life:** Most family size was 3.8 people for the social group. The multiple-case reference point was the information from the social interview participant.

**Russian:** 73% of the social group speak and read Russian.

**Primary Home Language:** Kyrgyz was claimed by the interviewee.

**Primary Work Language:** 56% of those employed spoke Kyrgyz at work.

**Schooling:** The degree and university are based on the male friend from the K1, U1, interviewee, the same participant that we based the part-time job upon. Members of the social group on average have 12.8 years of schooling - the most of any group.

**Income:** This is lower than the average income of 4775 euros ($175.01) based on August 2004 exchange rate data and from http://www.fergana.ru/news. Since our persons was a student working part time we assumed a lower than average income.

**Internet Use:** 28% of this group used the internet - the second highest of any group.

**Length of use:** How long it was - All are new numbers based directly on survey data.

**Computer Use:** 73% of the group use computers - the second highest of any group.

**How Often:** How often from the survey data.

**Cable or Satellite TV:** 31% of this group had cable or satellite TV - the most of any group.

**Home Landline:** 54% have home landlines - the most of any group.

**Mobile:**
- Length of use: mean number from the survey data.
- How acquired: 42% of the social motivation group received their phones as gifts from family members - this was the most common way to acquire a phone for this group.
- Use here after: mean number from survey data.
- For: While all groups used their phones mostly for personal calls, 60% of the social motivation group said their phones for personal calls the most of any group.

**SMS:** 21% of the social group used SMS. This split was based on the numbers given by the group and participants in K1, U1.

**Feelings and concerns:**
- 55% felt that mobile phones were too expensive which was significantly less than the other two groups who were 65% felt they were too expensive.
- 63% felt mobile phone an important to their future career - the most of any group.
Personas

Roza Replacement
Primary Motivation to acquire phone: I have no home phone
Associated motivation: It takes too long to get a home phone

Personal Profile
“There are only so many services provided, but not enough for middle class people... it would be nice if there was the one service that gave the information about everything that was needed for marshukas (houses) and other things.”

For Roza, who does not have a landline at home, a mobile phone is a very important device that allows her to stay in contact with her friends and family; however, she would like to see more affordable mobile phone services for “middle class” people like her.

There is only one landline in a community building in her village that closes at 5 PM every day.

While Roza herself is not tech savvy, she does not use the internet or computers. However, she recognizes the importance of technology for her daughters, and would like to have a computer at home while they are in school.

Roza and her husband rely on their friends and family to find specialists to complete services they need. Recently, she needed to find a mechanic and used her social network, stating “...it’s better to find someone through your friends.”

Roza’s Goals for MoSoSo Directory
- Would be more likely to seek a recommendation for services than to make one
- Would want to access the service without using text
- Would like to find recommendations for professional services from other members of a group
- Groups she would join: Family
- Neighbors
- May look in the public area for professional services

Key Significant Differences
Least likely to use the phone for work
Lives in a rural area
Not tech savvy

Personal Information
Age: 30 years
Profession: Housewife - her husband is a driver for an agricultural corporation (for 23 years)
Lives: In Ceraguak, a rural village
Home Life: Lives with her husband, son and two daughters
Russian: Can speak and read Russian
Primary Home Language: Kyrgyz
Primary Husband's Work Language: Kyrgyz
Schooling: Completed secondary school
Income: (Husband's income) 4200 soms a month (approx $110.00)

Technical Information
Internet Use?: No
Computer Use?: No, but she would like to get a computer for her two daughters who are still in school
Cable or Satellite TV: No
Home Landline: No

Mobile Phone Use
Length of use: 17 months
How acquired: Was given the phone by her brother
Use how often: Three to five days a week
For: Primarily for personal calls
SMS: No, but has considered it
Feelings and concerns:
She feels it is difficult to use a mobile phone when you do not know English
She is concerned that mobile phones represent a threat to local culture and ways
She feels strongly that mobile phones allow her access to important and relevant information

Secondary persona: represents 12% of survey respondents who own mobile phones
Personas

Roza Persona Data Detail

- **Name**: Roza, from the same derivative as Roza, is somewhat common in Kyrgyzstan. The spelling reflects the French, Slavic, or Yiddish influence.
- **Photo**: Middle age female participant from interview KB, RF1. This participant was one of the three participants in the interview who had a husband and a younger brother. She lives in a village, an area outside of Bishkek.
- **Motivation**: We placed the 408 survey participants with mobile phones in one of three groups based on their responses. We found that 92% of these respondents claimed motivations that fell into one of the three motivation groups without oversampling. There were 87 individuals in the replacement motivation group, a large majority (92%) of this group claimed to have a phone at home, 3% said they called their own phone line was bad quality and 9% felt that home phones cost too long to install.
- **Age**: Actual mean age of the group was 25.6. This was the middle mean age when compared to the other two groups.
- **Languages**: 30% of replacement group speaks and reads Russian, 30% of the same group speaks and reads Kyrgyz, and the remaining 40% speak and read both.
- **Primary Home Language**: 68% of this group claimed their primary language at home was Kyrgyz, 12% Russian, and 20% both Russian and Kyrgyz.
- **Primary Work Language**: 85% of those employed spoke Kyrgyz at work.
- **Schooling**: 80% of the replacement group claimed secondary school as their highest level of education. Members of the replacement group on average have 11.1 years of schooling which is statistically significantly lower than the other two groups but still more than non-mobile phone users at 10.2 years.
- **Income**: This is lower than the average income of 679$ some (657.80$ based on August 2006 exchange rates and data from http://www.kgstat. ru/news. Since replacement users tend to live in rural areas we made them less affluent than the average.
- **Interest User**: 20% of this group used the internet – the lowest of all groups.
- **Computer Use**: 3% of this group used computers - the lowest of any group. The additional information about the desire for a computer is from the mother in the rural family interviewed (KB, RF1).
- **Cable or Satellite TV**: 9% of this group had cable or satellite TV. This is statistically significantly lower than any other group.
- **House Landline**: 7% of the replacement group, which makes sense since a lack of a landline is the primary motivation for the group. Not surprisingly, this is statistically significantly lower than any other group.
- **Mobile Phone**:
  - **Length of Use**: mean number from survey data
  - **How acquired**: 92% of the replacement motivation group had their phones as gifts from family members. This was the most of any group.
  - **Use by whom**: number from survey data
  - **For 99%**: of the replacement motivation group used their phones for personal calls.
  - **SMS**: 99% of the replacement group used SMS. This was the lowest of any group.
- **Feelings and concerns**:
  - **90%** expressed concerns that one needs to learn English to use a mobile phone. This was statistically significantly higher than any other group.
  - **30%** were concerned that mobile phones presented a threat to local culture and values. This was higher than the other two groups.
  - **10%** expressed that mobiles allowed access to relevant information. This was the highest of any group.

Key Differences:
- **Only 18%** of all replacement motivation group used their phones for work - this is the lowest of any group.
- **82%** of the replacement motivation group lives in rural area. This is statistically significantly more than any other group.
- **Replacement**: the replacement group is the most tech savvy of all groups. 38% used computers, 7% own a computer, 30% lead the Internet.
- **Age**: Actual mean age of the group was 25.6. This was the middle mean age when compared to the other two groups.
- **Languages**: 30% of replacement group speaks and reads Russian, 30% of the same group speaks and reads Kyrgyz, and the remaining 40% speak and read both.
- **Primary Home Language**: 68% of this group claimed their primary language at home was Kyrgyz, 12% Russian, and 20% both Russian and Kyrgyz.
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Combine with Other Methods

Personas
Concept Mapping
Competitive Analysis

Method 16
Combine with Other Methods

Personas
Concept Mapping
Competitive Analysis

Method 16
Combine with Other Methods

Personas
Concept Mapping
Competitive Analysis

Method 15
Project Status

Looking Forward

2c: Design Research Check-In due Tonight
2d: Design Research Review due Monday 10/16
2e: Task Review due Thursday 10/19
2f: Design Check-In (3x4) Due Monday 10/23
2g: Design Review (1x2) Due Thursday 10/26
Selecting Tasks

Real tasks people have faced or requested as supported by your design research
collect any necessary materials
Should provide reasonable coverage
compare check list of functions to tasks
Mixture of simple and complex tasks
easy tasks (common or introductory)
moderate tasks
difficult tasks (infrequent or for power use)
What Should Tasks Look Like?

Say what person wants to do, but not how
   allows comparing different design alternatives

Be specific, stories based in concrete facts
   say who person is (e.g., using personas or profiles)
       design can really differ depending on who
       give ‘names’ (allows referring back with more info later)
       characteristics of person (e.g., job, expertise)
   story forces us to fill in description with details

Sometimes describe a complete “accomplishment”
   forces us to consider how features work together
Task: Park in a New Neighborhood

Peter is going to brunch on a Sunday with his roommates. He is trying a new place he found on Yelp. He has the address for the place and he is using his phone’s GPS for directions. He leaves the apartment with his roommates at 8:30am and he wants to beat the crowd so they won’t have to wait in line. He is driving a Toyota Corolla that he has owned for five years. It is a rainy day and he doesn’t have an umbrella.
Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)

- park in new neighborhood
  - determine destination
  - drive to destination
  - locate parking spot
  - secure parking spot
  - park
  - enter address in GPS
  - follow directions
  - arrive at destination
  ...

...
Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)

- park in new neighborhood
  - determine destination
  - drive to destination
  - locate parking spot
  - secure parking spot
  - park
  - enter address in GPS
  - follow directions
  - arrive at destination

... Or step back a level and motivate ridesharing
Using Tasks in Design

Write up a description of tasks formally or informally run by people and rest of the design team get more information where needed

Manny is in the city at a restaurant and would like to call his friend Sherry to see when she will be arriving. She called from a friend’s house while he was in the bus tunnel, so he missed her call. He would like to check his missed calls and find the number to call her back.
Using Tasks in Design

Rough out an interface design
discard features that do not support your tasks
or add a real task that exercises that feature
major elements and functions, not too detailed
hand sketched

Produce scenarios for each task
what person does and what they see
step-by-step performance of task
illustrate using storyboards
Scenarios

Scenarios are design specific, tasks are not

Scenarios force us to show how things work together settle arguments with examples but these are only examples, and may need to look beyond flaws

Show people storyboards topic for next Thursday
Tasks, Personas, and Scenarios

**Task**: a design-agnostic objective

**Persona**: a fictional person with a backstory

**Scenario**: narrative that demonstrates a persona completing a task using a particular design

**Use Case**: in software engineering, describes requirements using one or more scenarios
Tasks in Your Projects

Say what is accomplished, not how

Real tasks that people currently encounter, or new tasks your design will enable

Reasonable coverage of the interesting aspects of your problem and your design space

Range of difficulty and complexity

- Park at the zoo
- Park Friday night in Ballard
- Park at the airport
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 05: Task Analysis

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Lecture 06: Design of Everyday Things

Tuesday / Thursday
12:00 to 1:20
Project Status

Looking Forward

2d: Design Research Review due last night
2e: Task Review due Thursday 10/19
2f: Design Check-In (3x4) Due Monday 10/23
2g: Design Review (1x2) Due Thursday 10/26
“Getting the Right Design” Report and Presentation

Other Assignments

All Reading Assignments Now Posted
Reading 2 Due this Saturday 10/21
Reading 5 Can Be Done Anytime, Sooner is Better
Denny 303 on Tuesday 10/24
James Away on Tuesday 10/24
Today

Finish with tasks, personas, and scenarios

Review core design terminology
Selecting Tasks

Real tasks people have faced or requested as supported by your design research
collect any necessary materials

Should provide reasonable coverage
compare check list of functions to tasks

Mixture of simple and complex tasks
easy tasks (common or introductory)
moderate tasks
difficult tasks (infrequent or for power use)
What Should Tasks Look Like?

Say what person wants to do, but not how
allows comparing different design alternatives

Be specific, stories based in concrete facts
say who person is (e.g., using personas or profiles)
design can really differ depending on who
give ‘names’ (allows referring back with more info later)
characteristics of person (e.g., job, expertise)
story forces us to fill in description with details

Sometimes describe a complete “accomplishment”
forces us to consider how features work together
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Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)

park in new neighborhood

- determine destination
- drive to destination
- locate parking spot
- secure parking spot
- park

- enter address in GPS
- follow directions
- arrive at destination

...
Hierarchical Task Analysis

Steps of the task execution (detailed in a hierarchy)

park in new neighborhood

- determine destination
- drive to destination
- locate parking spot
- secure parking spot
- park

- enter address in GPS
- follow directions
- arrive at destination

... Or step back a level and motivate ridesharing
Using Tasks in Design

Write up a description of tasks formally or informally run by people and rest of the design team get more information where needed

Manny is in the city at a restaurant and would like to call his friend Sherry to see when she will be arriving. She called from a friend’s house while he was in the bus tunnel, so he missed her call. He would like to check his missed calls and find the number to call her back.
Using Tasks in Design

Rough out an interface design

discard features that do not support your tasks
or add a real task that exercises that feature

major elements and functions, not too detailed
hand sketched

Produce scenarios for each task

what person does and what they see

step-by-step performance of task

illustrate using storyboards
Scenarios

Scenarios are design specific, tasks are not

Scenarios force us to show how things work together settle arguments with examples but these are only examples, and may need to look beyond flaws

Show people storyboards topic for next Thursday
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**Use Case**: in software engineering, describes requirements using one or more scenarios
Tasks in Your Projects

Say what is accomplished, not how

Real tasks that people currently encounter, or new tasks your design will enable

Reasonable coverage of the interesting aspects of your problem and your design space

Range of difficulty and complexity

- Park at the zoo
- Park Friday night in Ballard
- Park at the airport
Today

Finish with tasks, personas, and scenarios

Review core design terminology
Design of Everyday Things reviews a common and useful vocabulary of design.

We will use these in feedback and conversations without even realizing that we are doing it.

You should know these terms and recognize them in practice.
Objectives

Be able to:

Describe Norman’s execution-evaluation cycle, including the Gulfs of Execution and Evaluation.

Define implementation, manifest, and mental models, describe their relationships and how they are created.

Describe and identify examples of affordances, including false and hidden affordances.

Describe and identify examples of metaphors.
Objectives

Be able to:

In terms of mental models, describe and differentiate affordances, metaphors, and idioms.

Describe and identify examples of visibility, constraints, and mappings.

In terms of mental models, describe and identify examples of consistency, including internal and external consistency.

In terms of mental models, describe the effect of modes.
Norman’s Execution-Evaluation Cycle

1. Establish the goal.
2. Form the intention.
3. Specify the action sequence.
4. Execute the action sequence.
5. Perceive the system state.
6. Interpret the system state.
7. Evaluate the system state with respect to the goals and intentions.

Revise Goals
Turning on the Light

1. Establish the goal
   Increase light in the room
2. Form the intention
   To turn on the lamp
3. Specify the action sequence
   Walk to the lamp, reach for the knob, twist the knob
4. Execute the action sequence
   [walk, reach, twist]
5. Perceive the system state
   [hear “click” sound, see light from lamp]
6. Interpret the system state
   The knob rotated. The lamp is emitting light. The lamp seems to work
7. Evaluate the system state with respect to the goals and intentions
   The lamp did indeed increase the light in the room [goal satisfied]
Norman’s Execution-Evaluation Cycle

- Goals
- Evaluate Goals
- Form Intention
- Interpret State
- Observe State
- System Change
- Develop Action Plan
- Execute Actions
- Evaluate Goals
Norman’s Execution-Evaluation Cycle

Gulf of Execution

Goals

Form Intention

Develop Action Plan

Execute Actions

System Change

Observe State

Interpret State

Gulf of Evaluation

Evaluate Goals
Bridging the Gulfs

Gulf of Execution: “How do I do it?”
Commands and mechanisms need to match the goals, thoughts, and expectations of a person

Gulf of Evaluation: “What does it mean?”
Output needs to present a view of the system that is readily perceived, interpreted, and evaluated

People build mental models to anticipate and interpret system response to their actions
What can I do? How do I do it?
What result will it have? What is it telling me?
Cooper’s Mental Model Terminology

Implementation Model
How it works
(Design Model, Designer’s Conceptual Model)

Manifest Model
How it presents itself
(System Image)

Mental Model
How a person thinks it works
(User Model, User’s Conceptual Model)
Cooper’s Mental Model Terminology

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How it works
(Design Model, Designer’s Conceptual Model)

Manifest Model
How it presents itself
(System Image)

Mental Model
How a person thinks it works
(User Model, User’s Conceptual Model)

These terms are sloppy and ambiguous out in the world
Manifest and Mental Models

Designer projects their model into an artifact
Person forms their model based on interaction
People struggle until model matches manifest model
Update mental model in response to breakdowns
Matching the implementation model is not necessary
Mental Models

Problem: freezer too cold, fresh food just right
What if I want to make just the freezer warmer?
A Sensible Mental Model

“The Freezer Control controls the freezer temperature and the Fresh Food Control controls the fresh food temperature”
The Implementation Model
A Problem with Feedback

1. Set both controls.

2. Allow 24 hours to stabilize.
The Implementation Model

Why is there a problem?

Can you fix the problem?
The Implementation Model

Why is there a problem?

Cost constraints

Can you fix the problem?

Make controls correspond to a person’s mental model

Make controls correspond to the implementation model

“Design depends largely on constraints.”

Charles Eames
Building the Right Model

Having the right model helps people bridge the Gulf of Execution and the Gulf of Evaluation

How can we help people build the right models:

Affordances  Metaphors
Visibility     Knowledge in the World
Constraints   Mapping
Consistency   Modes
Affordances

Visual clue to interaction

- knobs afford turning
- levers afford moving
- buttons afford pushing
Affordances

“The affordances of the environment are what it offers animals, what it provides or furnishes, for good or ill.”

Gibson, ecological approach to psychology

“The term ‘affordance’ refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.”

Norman
What’s the Affordance?
Affordances
Affordances

Technology affordances are often based in affordances from the physical world.
Affordances
What is the affordance here?

Where does it come from?
Affordances

What is the affordance here?

Where does it come from?
Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances.

Figure 4. Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).
Sequential Affordance

Acting on a perceptible affordance leads to information indicating new affordances.

![Diagram showing sequential affordances.](image)

**Figure 4.** Sequential affordances: one affordance leads to another. Visual information indicates grasping (A & B); tactile information indicates turning (B & C).

Now does the door push or pull?
Nested Affordances

Affordances due to spatial relationships revealing what actions can be done

Proximate to, contained in, part of
In Other Words

An affordance is what a thing communicates about how it can be used, often by its appearance.

“In general, when the apparent affordances of an artifact matches its intended use, the artifact is easy to operate. When apparent affordances suggest different actions than those for which the object is designed, errors are common.”

Gaver

Challenges arise if there is a mismatch between implied use versus intended use.
False Affordances

When there is perceptual information suggesting an implied use that does not exist

(Just an image of a button, not one that responds)
False Affordances
False Affordances
False Affordances
False Affordances
Hidden Affordances

When there is no perceptual information suggesting an actual intended use
Hidden Affordances
Hidden Affordances

Logos linking to home is a convention, but not afforded by the page.
Confusion of the Term

“Note also that affordances are not intrinsic, but depend on the background and culture of users. Most computer-literate user will click on an icon. This is not because they go around pushing pictures in art galleries, but because they have learned that this is an affordance of such objects in a computer domain…”

Dix

I disagree. Icons do not afford “pushability” or “clickability” by their attributes. They do not give an indication of their intended use, except by convention.
Clarification on Convention

“Designers sometimes will say that when they put an icon, cursor, or other target on the screen, they have added an ‘affordance’ to the system. This is a misuse of the concept. … It is wrong to claim that the design of a graphical object on the screen ‘affords clicking.’ … Yes, the object provides a target and it helps the user know where to click and maybe even what to expect in return, but those aren’t affordances, those are conventions, and feedback, and the like. … Don’t confuse affordances with conventions.”

Norman
Metaphors

Suggest an existing mental model

“horseless carriages”, “iron horses”, “wireless”

Desktop metaphor

Not an attempt to simulate a real desktop
Leverages knowledge of files, folders, trash
Explains why some windows seem hidden
Metaphors

Suggest an existing mental model

“horseless carriages”, “iron horses”, “wireless”

Desktop metaphor

Not an attempt to simulate a real desktop

Leverages knowledge of files, folders, trash

Explains why some windows seem hidden
Mail Metaphor
Calendar Metaphor
Health Metaphor

Inform VirusScan how to respond when a virus is detected.

When a virus is found:

- **Clean infected files automatically**

This option instructs VirusScan to clean files automatically.

If the above Action fails:

- **Move infected files to a folder**

This option instructs VirusScan to automatically move all infected files to the quarantine folder. The location of the quarantine folder is configured on the "General" tab under "General Settings"
Shallow or Inappropriate Metaphors

Informs a small range of possibilities, or none at all

It is just a menu and a dialog box?

What does the living room add?
Mixed Metaphors

Two or more different metaphors coexist with some supposed relation

The desktop metaphor
Windows into content

Good?  Bad?
Neither?  Both?

Windows are views into larger content regions
No desktop has windows
Broken Metaphors

Are not consistent, do not operate in every circumstance, or do not uphold things consistent with what the metaphor would suggest.
Mechanical-Age Metaphors

Operate as their mechanical-age counterparts did, not taking advantage of the digital domain to escape the limitations of the original
Dead Metaphors

Lost the original imagery of their meaning

- Milk
- Butter
- Cheese
- Water
- Beer
- Wine
Metaphors versus Idioms

Idioms

- rely on shared experience or custom
- are learned, often early in life
- are supported or revealed by context
- become conventions
- do not rely on metaphors

Idiomatic widgets (e.g., screen splitter, draggable title bar)

Single click to select, double click to open

Hyperlinks
Idioms

Star Trek IV: Scotty Uses a Mouse
Idioms

Star Trek IV: Scotty Uses a Mouse
Metaphors and Affordances

Affordances “jump start” a model for interaction
Metaphors “jump start” a model of a system

But if designed poorly, both can be damaging

  - Lead to an incorrect model, undermine interaction
  - Can limit designer creativity
  - Can reduce the advantages of software
  - Can be “cute” at the expense of functional
Signifiers

“There are trails. There are behaviors. We know how to behave by watching the behavior of others, or if others are not there, by the trails they have left behind.”

“I call any physically perceivable cue a signifier, whether it is incidental or deliberate. A social signifier is one that is either created or interpreted by people or society, signifying social activity or appropriate social behavior.”

“Social signifiers replace affordances, for they are broader and richer, allowing for accidental signifiers as well as deliberate ones, and even for items that signify by their absence, as the lack of crowds on a train platform. The perceivable part of an affordance is a signifier, and if deliberately placed by a designer, it is a social signifier.”

Norman
Visibility

Phones

How do you

put somebody on hold

change volume
Visibility

Display

During a conversation, the call duration is displayed. (Example: 15 minutes, 30 seconds)

- The unit is in the programming mode (p. 9, 16, 20).
- The AUTO button was pressed while dialing or storing phone numbers for the Speed Dialer (p. 16, 19).
- The LOWER button was pressed (p. 21, 23).
- The ringer is set to OFF (p. 10).
- The MUTE button was pressed during a conversation (p. 24).
- The dial lock mode is set. To cancel the mode, see page 27.
- The FLASH button was pressed while storing phone numbers.
- The PAUSE button was pressed while dialing or storing phone numbers.
- You pressed [ ] while dialing or storing phone numbers in the TONE mode.
- You pressed [ ] while dialing or storing phone numbers in the TONE mode.
- While storing a phone number in an UPPER memory location for the One-Touch Dialer, " +/− " will appear when you press a one-touch auto dial button (p. 20).
- While storing a phone number in a LOWER memory location for the One-Touch Dialer, " +/− " will appear when you press a one-touch auto dial button (p. 21).
- The MUTE button was pressed as a secret button while storing phone numbers (p. 18, 22).
- While programming function items, such as the dialing mode, " +/− " will flash as a cursor.
Visibility

Changing Ringer Volume

Press “Program”
Press “6”

Set Volume

  Low - Press “1”
  Medium - Press “2”
  High - Press “3”

Press “Program”
Visibility

Controls available on watch with 3 buttons?

Too many and they are not visible

Compare to controls on simple car radio

Number of controls ≈ Number of functions
Controls are labeled and grouped together
Knowledge in the World
Constraints

Prevent some actions while allowing others

Prevent errors before they can happen

Disruptive error messages are a last resort
Constraints
Constraints
Constraints
Constraints

Baudisch et al., Snap-And-Go
Constraints

Traditional

Snap-And-Go

Baudisch et al., Snap-And-Go
Mapping

Correspondence between an interface and the corresponding action in ‘the world’

Minimize cognitive steps to transform action into effect, or perception into comprehension (i.e., execution and evaluation)
Very Bad Mapping
Slightly Better Mapping
Good Mapping
Not this Stove
Great Mapping
Mapping

Removing the cover plate, then removing and swapping the switches.

Mapping
Mapping
Mapping
Mapping
Consistency

Interfaces should be meaningfully consistent

Ubiquitous use of same keys for cut/copy/paste
Helps in developing / applying a mental model

Types of consistency

Internal (i.e., within itself)
  e.g., same terminology and layout throughout

External (i.e., with other applications)
  e.g., common widget appearance
  e.g., design patterns common across applications
Is Consistent Always Better?

Should “new” & “delete” be in the same place?
Is Consistent Always Better?

Should “new” & “delete” be in the same place?

New is common, delete is not
Is Consistent Always Better?

Original focus on consistency, later design for mobile form.
Is Consistency Always Better?
Is Consistency Always Better?
Is Consistency Always Better?
Modes

Modes force people to divide their model

Mode $A_0$

Mode $A_1$

Mode $B$
Active versus Passive Modes

Active modes require constant action to maintain. When that action has ended, so does the mode. e.g., Shift

Passive modes require action to set, and a separate action to unset, or to set again. e.g., CAPS LOCK

Active modes are generally preferred
Standardization

If all else fails, standardize
Fewer things to memorize
Reduced learning time
Adapt to new situations faster

e.g., keyboard layout not optimal, but standard
Norman’s Seven Principles for Design

Use knowledge in the head and in the world
Simplify the structure of tasks
Making things visible
Get the mappings right
Exploit the power of constraints
Design for error
When all else fails, standardize
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 06: Design of Everyday Things

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 07: Storyboarding and Video Prototyping

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

Looking Forward

2e: Task Review due Tonight
2f: Design Check-In (3x4) Due Monday 10/23
2g: Design Review (1x2) Due Thursday 10/26
“Getting the Right Design” Report Due Monday 10/30
“Getting the Right Design” Report Due Wednesday 11/1

Beware the Pitfall of “Splitting” Design Ideation
It hurts, it hurts so much

Other Assignments

Reading 2 Due this Saturday 10/21
Reading 5 Can Be Done Anytime, Sooner is Better
Denny 303 on Tuesday 10/24
James Away on Tuesday 10/24
Design Research Review in Critique

In addition to current milestone, bring your design research review to next three critiques

   Helpful for “what in your research motivated this”
   Helpful for brainstorming other ideas with staff

Look back at design research in defining tasks

   For example, tensions you saw in research might suggest different design approaches

   A common task might be found in those approaches, with designs exploring different tradeoffs relative to that tension
Today

Finishing Design of Everything Things

Storyboarding and Video Prototyping
Norman’s Execution-Evaluation Cycle

Gulf of Execution

- Goals
- Form Intention
- Develop Action Plan
- Execute Actions
- System Change
- Observe State
- Interpret State
- Evaluate Goals

Gulf of Evaluation
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Very Bad Mapping
Slightly Better Mapping
Good Mapping
Not this Stove
Great Mapping
Mapping

Removing the cover plate, then removing and swapping the switches.

Mapping

- Height adjustment
- Lumbar support adjustment
- Horizontal seat adjustment
- Seat back inclination adjustment
Mapping
Mapping
Consistency

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Ubiquitous use of same keys for cut/copy/paste
Helps in developing / applying a mental model

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- Metaphors
- Visibility
- Knowledge in the World
- Constraints
- Mapping
- Consistency
- Modes
Today

Finishing Design of Everything Things

Storyboarding and Video Prototyping
Objectives

Be able to:

Describe purposes of storyboards, as differentiated from sketches and prototypes

Describe varying purposes of video prototypes (e.g., and why this name is a poor fit)
Tasks in Sketching and Design

Tasks guide your exploration of a design

Creating scenarios for each task illustrates

what a person does
what they see
step-by-step performance of task with a design
Sketching

Movies

Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist: 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, CA 94709
Cost: $8.50 normal, $6.00 senior, $4.00 matinee

Art of War
(10:00)-(1:00): 4:00 - 7:00 - 10:00

Bittersweet Motel
(11:00)-(1:30): 4:00 - 6:30 - 9:00

Godzilla
(10:30)-(2:00): 5:30 - 9:00

The Cell
(11:00)-(1:00): 3:00 - 5:00 - 7:00 - 9:00

Store for the Style-Challenged

As it is...

As it should be...

Outfit #1
Outfit #2
Outfit #3

(pre-selected to match so you don't have to choose)
Sketching

MAP SHOWING PARKING AVAILABILITY BASED ON INPUTTED DATA, INPUTTED ON MAP

- Different colors
- Highlight availability
Sketching and Tasks
Scenario 1: "I want to listen to alternative music"

Diagram showing user interface designs.
Sketching and Tasks
Sketching and Tasks
Sketching and Tasks
Illustrating Time

Storyboards come from film and animation

Give a “script” of important events
leaving out the details
concentrate on the important interactions
Storyboards

Can be used to explore

Much faster and less expensive to produce
Can therefore explore more potential approaches

Notes help fill in missing pieces of the proposal

Relative to film, these function as sketches
Storyboards

Can be used to convey

Effective storyboards can quickly convey information that would be difficult to understand in text

Imagine explaining this in text, for various audiences
Storyboards

Can illustrate key requirements and leave open less important details of design.
Basic Storyboard
Storytelling

Stories have an audience

Other designers, clients, potential end-users, stakeholders, managers, funding agencies

Stories need to match **audience and purpose**
Potential Purpose of a Story

Purpose allows choosing effective details

Stories have a purpose

Share information about people, tasks, goals
Giving insight into people who are not like us, convey details that might be lost in generalities
Put a human face on analytic data
Spark design concepts and encourage innovation
Share ideas and persuade on potential value
Stories Provide Context

Characters
  Who is involved

Setting
  Environment

Sequence
  What task is illustrated
  What leads a person to use a design
  What steps are involved

Satisfaction
  What is the motivation
  What is the end result
  What need is satisfied

Minor interface features and components are not necessarily surfaced, they can often be developed and conveyed more effectively with other methods.

Can help surface details that might otherwise be ignored.

Grocery store application:
- use with one hand while pushing a shopping cart
- privacy of speech input
- split attention
Amal’s Guide to Storyboarding

1. Cities
   - S.F.
   - S.J.
   - Ta-Ha-X

2. No.

3. Don’t use this to illustrate all the UI features & components!
   *this is what paper prototyping is for!

4. Red & Sean were bored after going to the bluegrass festival. I decided to find out what else they could do...
   - Dude, what do we do?!
   - Let me look on my phone.
   - Q - use tour sat!
   - Q - Do we OK?

5. Instead, show why & when features would be used.
Amal’s Guide to Storyboarding

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.
## Storytelling

**Good stories**
- Understand audience
- Provide context of use
- Are well-motivated
- Memorable
- Evokes a reaction
- Evokes empathy
- Illustrate experience
- Convey emotions
- Short and to-the-point

**Bad stories**
- Do not account for audience
- Boring or un-engaging
- Fantastical or unrealistic
- Wrong story for purpose
- Too long to hold attention
- tl;dr
Elements of a Storyboard

Visual storytelling

5 visual elements

- Level of detail
- Inclusion of text
- Inclusion of people and emotions
- Number of frames
- Portrayal of time

To better characterize design intuitions: gather and analyze artifacts from semi-structured interviews and a survey focused on identified elements.

Truong et al, 2006
1. How Much Detail?

Guideline: too much detail can lose universality

Scott McCloud
1. How Much Detail?

Sketching People

Star people by Bill Verplank

(c) 2009 SACHA CHUA

Keith Haring
1. How Much Detail?
1. How Much Detail?

Unnecessary details distract from the story.
2. Use of Text

Guideline: It is often necessary, but keep it short
2. Use of Text

Guideline: It is often necessary, but keep it short

1. At home, Mary checks her blood pressure.
2. After a few simple key presses, her blood pressure readings get sent to a clinic.
3. The information is made available to her doctor.

Short text is more effective, less likely to over-explain

Watch for cases where text induces weird biases
3. Include People and Emotions

Guideline: Include people experiencing the design and their reactions to it (good or bad)

Remember, the point of storyboards is to convey the experience of using the system
4. How Many Frames?

Guideline: 4-6 frames is ideal for end-users

- Less work to illustrate
- Must be able to succinctly tell story
- Potentially longer for design clients

More is not always better

- May lose focus of story
- May lose attention
4. How many frames?
4. How many frames?

People found the extra panels were not needed
5. Passage of Time

Guideline: Only use if necessary to understand

[Diagram of a museum entrance, a painting labeled "This painting was created in the early 1900's. Proceed to the Blue Room for the next stop on our tour.", and a blue room with a sign "BLUE ROOM. You are now exiting the green room. The next stop on our tour is..."

On this side of the room you'll find..."

[Two stick figures looking at a painting and two stick figures entering a room labeled "BLUE ROOM." ]
5. Passage of Time

Guideline: Only use if necessary to understand

Inclusion of the clock distracts
Storyboards for Comparing Ideas

**Authoritative**

Cell phone is used to keep track of one's fitness goal.

**Supportive**

Cell phone is used to keep track of one's fitness goal.
Storyboards for Comparing Ideas

Cooperative

Let's use our cell phones to keep a record of the number of days that we exercise.

1st Week

Okay! Let's work together to meet a goal of exercising for least 2 weeks.

2nd Week

Yeah! We are almost there. Good job!

Competitive

Let's compete to see who exercises more.

1st Week

Okay! Let's do it!

2nd Week

Yeah! I win this week! Let's see who wins next week.
Storyboards for Comparing Ideas

**Negative Reinforcement**

Week 1

I'm going to use my phone to keep track of my fitness goals.

Week 2

Oh no! My virtual garden on my phone is ugly. I need to exercise to keep the flowers alive!

Now I have lots of flowers in my garden!

**Positive Reinforcement**

Week 1

I'm going to use my phone to keep track of my fitness goals.

Week 2

Each time I exercise, I will get another plant added to my garden.

Now I have a full garden!
Examples and Tricks in Storyboarding

This is also the focus of Reading 2

Due Saturday night
(not needed for Friday section)

Will go over these quickly, especially the videos

You then view them outside of class
Drawing is Hard

It is so dark Jane can hardly read her book.

She gestures in front of her special pendant to turn on the lights.

The lights turn on!

Finally, she can read happily.

Will a picture work instead?
Existing Images from Other Sources

http://designcomics.org/

http://www.pdclipart.org/
Blur Out Distracting Details

Using image editing software to simplify photos into sketches
Tracing Photos

Baudisch and Chu, 2009
Comic Presentation

Thought bubbles argue for the design

Gukeisen et al, 2007
Selective Use of Color
Route Maps

You... Central Park
2 hours until dinner
with Simon
What to do?

You enable geocaching mode
on your phone and spend
the next two hours exploring

Dinner!
Route Maps

Day 1:
- 8th: Dinner, Groceries
- Elliot Bay Book Co.
- Downtown meeting

Day 2:
- 16th: Home
- Elliot Bay Book Co.
- Coffee

Notes:
- Looks interesting but you're late.
- Save location!
- No time to stop on the way back.
- You are two blocks from a saved location. Would you like to visit?
Route Maps

The movie is over and you are hungry, but you don't know the area...

you check your phone for a list of places people often go from here...

...eventually settling on a diner and getting directions through your phone.

and discuss the food options with your friends...
Mapping the Space of Interaction
Value of Animation or Video

Can illustrate critical timing

Can be more engaging than written or storyboard

Can help convey emotion (e.g., voice, music)

Can show interactive elements more clearly

Can be self-explanatory

If done well, can be an effective pitch

But you need to keep it quick and effective
Most Important Trick: Stop Motion

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mackay-StopAction.mp4
Most Important Trick: Stop Motion

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mackay-StopActionResult.mp4
Video Prototypes

May build upon paper prototypes, existing software, and images of real settings

Narration optional

  Narrator explains,
  actors move or illustrate interaction

  Actors perform movements and viewer expected to understand without voice-over
Steps to Create a Video Prototype

Review field data

Review ideas from brainstorm

Create text for usage scenarios

Develop storyboard, with each scene on a card, illustrating each action/event with annotations explaining what is happening
Steps to Create a Video Prototype
Steps to Create a Video Prototype

Shoot a video clip for each storyboard card
   Avoid editing in the camera, just shoot scenes

Use titles to separate clips
   Like a silent movie

Digital changes these tradeoffs, but respect the spirit of doing this quickly to get point across
   If you make an error, just reshoot it
Prototyping Microsoft Surface

Prototyping Microsoft Surface

[Image: A book page with a screenshot of a computer interface]

Lessons from Prior Video Prototypes

Narration, Pace, and Flair

Three versions of “Don’t Forget”

Using Projectors and Simple Props

“Buddy Map”

Watch for Pace and Scene Relevance

“Consumestern”
Narration, Pace, and Flair

Don’t Forget
by Carolyn Holmes and Fred Potter

http://courses.cs.washington.edu/courses/cse440/videos/vidprotyping/Don’t-Forget-1.mp4
Narration, Pace, and Flair

Don't Forget!
Video Prototype
1 February 2007

http://courses.cs.washington.edu/courses/cse440/videos/videtoprototyping/Don't-Forget-2.mp4
Narration, Pace, and Flair

"Don't Forget" Video Prototype
Chris Govella - Peter Woodman

http://courses.cs.washington.edu/courses/cse440/videos/vidgroundtyping/Don't-Forget-3.mp4
Using Projectors and Simple Props

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Buddy-Map-Backcountry.mp4
Watch for Pace and Scene Relevance

Consumester

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Consumester.mp4
Lessons from Prior Video Prototypes

Split Presentation, Simple Effects
  “PickUp”

Still-Frame, More Effects
  “Graffiti Karma”
Split Presentation, Simple Effects

Daniel Swisher
Ian Crofoot

Mitchell Ishimitsu
Sunil Garg

PickUp
It's more than a game it's a community

CSE 440 Video Prototype

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Pickup.mp4
Still-Frame, More Effects

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Graffiti.mp4
Lessons from Prior Video Prototypes

Scenario with a Contrast

“ParkSmart” (note that screens are static images)

Playful while Keeping Pace

“Plantr”
Scenario with a Contrast

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Parksmart.mp4

But watch for pace and scene relevance
Playful while Keeping Pace

http://courses.cs.washington.edu/courses/cse440/videos/vidoprotoyping/Plantr.mp4
Reminder on Fidelity

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mug-Sketch.mp4
http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Mug-HiFi.mp4
Fidelity Takes Time: Stay Low Fidelity

If you need a video, do you really need footage?

If you need an animation, do you really need Flash?

If you need a photo, do you really need to shoot?

Completely made-up bar length

But it is probably at least this bad
Range of Purposes

Illustrating Low-Level Techniques
Microsoft Surface examples convey timing

Illustrate Designs in Context, Convey Satisfaction
Focus in this course

High-Level Visions
StarFire
Knowledge Navigator
A Day Made of Glass
Sun’s “Starfire” (1994)

http://courses.cs.washington.edu/courses/cse440/videos/videoprototyping/Vision-Sun-Starfire.mp4
Apple’s “Knowledge Navigator” (1987)

Corning’s “A Day Made of Glass” (2011)

Summary

Think about your audience
Think about your time constraints
Think about the purpose of your story

Think about options for effective presentation
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 07: Storyboarding and Video Prototyping

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 08:
Presentations,
Paper Prototyping,
Tasks in Testing
Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

Looking Forward

2g: Design Review (1x2) Due Tonight

“Getting the Right Design”
Report Due Monday 10/30
Presentation Due Wednesday 11/1

Other Assignments

Reading 3 Due Saturday 11/4
Reading 4 Due Saturday 11/11, Sooner is Better
Reading 5 Can Be Done Anytime, Sooner is Better
Presentations

Presentations Next Thursday / Friday

6 groups will present on Thursday
  entire 9:30 and 10:30 sections
  (no 9:30 or 10:30 sections on Friday)
Everybody attends Thursday
  welcome in 12:30 and 1:30 sections on Friday
Have thoughtful questions for other groups

Be sure you prepare and rehearse
  Team responsibility for the presentations
  PPT(X) or PDF, embed fonts, happy to “check”
Today

Tips for Effective Presentations

Paper Prototyping
Testing
Ethics in Testing
Tasks in Testing
DisTrack

Refocus yourself

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

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

Jen Kang • Vivian Yu • Si Liu • Brendan Lee
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

• 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

- 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
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
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

- 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

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor
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"
Overall Problem: Joint Pain & Activity

- Target Audience: Athletes
  - Health conscious
  - Disciplined

- Problem: Overexertion and aggravation of injury among athletes
Contextual Inquiry

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

4 Locations
- Odegaard Library
- CSE Undergraduate Labs
- Mercer Court
- Yunnie Bubble Tea (Ave)

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

Pictures are Good

NounProject

Professional (20-40s)

Family

Undergrad Student
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
Focus on the Right Thing

Contextual Inquiries

Suzzallo Library

Husky Union Building

Paccar Hall

One person still uses food journaling consistently and has a positive experience.
One person stopped food journaling because she reached her goal and had a nutritionist.
The third person loves taking pictures of her food and just seeing what she’s been eating.
Had them take us through their process during mealtime, motivations, difficult, benefits
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.
Tasks

Facebook, please! I am trying to study!

Check me!
Check meeeeee!

break

Our relationship entered its decline at this point.

That's when you started graphing everything.

Coincidence!
Speaking of Distractions

Whether correct or not, many things distract

- Plural possessive
- *a posteriori*

Anything else that might be distracting

- Too hilarious
- Too close to being inappropriate
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.
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**.
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**.
Task: Reflect on recorded data relative to time and location.
Task: Find and implement methods/strategies to reduce distractions and increase focus.
Design 1

Pre-shopping

EA Groupshop
Hi there!
Honey Nut Cheerio is on sale! Get it now?
sale ends Oct 31st
Add to shopping list
Dismiss

SELECT LIST:
PETER's list
Household's list

Household

P. Honey nut cheerio $4.99 [Private]
added in Oct 30th

G. Chocolate $2.99
milk
added in Oct 25th

A. Orange Juice $5.99 [Public]

[+] Add an item
Done
Design 1
Sensor Ball with Mobile App

Naming Designs

Tracking Liquid Intake

Education on Hydration

Convenient Reminders

Smart Beverage Suggestions
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
Updated Sketch

Two Tasks
- Recurring subscription management
- Insight and informed decisions
Tasks

Categorize Time Spent
What qualifies as work or play?

Set Goals For Each Category
How much time should you spend on each activity?

Share Schedule and Free Time
Who should be notified? Who is free right now?

Decide What To Do While Waiting
What can get accomplished within that time?

Adapt Correctly To Schedule Changes
What can be pushed back and what has a solid deadline?

Get Reminders for Flexible Tasks
When is the best time for lunch?
Storyboards

Star People!
Hard to Follow on a Single Slide
Selected Design

- Simplest overall design of the three
- Most aesthetically pleasing due to effective organization and spacing
- Easy way to set goals without any outside pressure on what you choose
- Firmly addresses the most important user need of tracking overall usage
Storyboard 2:

1. David likes the new song released recently, so he shares it on the SR app.

2. When he posts it, he adds tags and defines the group of people he wants it to be seen.

3. Daniel then gets a message showing that David likes the music.

4. Daniel then messages David about his idea of the song.
Initial Paper Prototype
Initial Paper Prototype
Task 1: Finding a SmartMatch

Criteria
- Level
- Avg Dist
- Avg Time
- Route Pref

Finding Match
Match!

Criteria
- Level
- Avg Dist
- Avg Time
- Route Pref

Finding Match
Match!

Frank
About: Happy guy who runs casually
Level: Novice
Rating: ★★★

Jenn
No more matches found!!
Rating: ★★★
Testing - Results

- **Heuristic Evaluation**
  - High Severity Issues
  - Example: “Go Shopping” mode was useless

- **User Testing**
  - High and Medium Severity Issues
  - Example: Takes too long to get to “Add Item”

- **Design Mockup Critique**
  - Low Severity and Aesthetic Issues
  - Example: Home screen too cluttered
GOOD MORNING, JASON.

aw

8:10 AM 67° 11.5.2014 96 BPM

MOOD CHART
ADD ACTIVITY
SEND DATA

PAPER PROTOTYPE [EARLY VERSIONS] | AWEARNESS

Background
Many Screens on One Slide

Final Paper Prototype
IEP-Connect Classroom
Final Paper Prototype

Task2 - Record Water Intake

Many Screens on One Slide
Fewer Screens, Show Connections
Fewer Screens, Show Connections
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall

Sessions

Distracted  Productive

Session 1  Session 2

80% 40%

Session 1 (9 am - 1:20 pm) - 4h 20m

2h 10m Facebook

20m Conversations

1h 50m MatLab

Click on activity for more actions.
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall: Distracted, Productive

Session 1: 2h 10m - Facebook
Session 2: 20m - Conversations

1h 50m - MatLab

Click on activity for more actions.
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall

Sessions

Distracted

Productive

Session 1: 80% 40%

Session 2: 60%

Session 1 (9 am - 1:20 pm) - 4 h 20 m

1 h 10 m

Facebook

2 h 10 m

Conversations

2 h 10 m

MatLab

1 h 50 m

Click on activity for more actions.
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall

Sessions

Distracted  Productive

Session 1  Session 2

80%  40%

2h 10m  4h 20m

Facebook  Conversations

20m

1h 50m  MatLab

Click on activity for more actions.
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall

Sessions

Distracted  Productive

Session 1: 80% 40%
Session 2: 50%

Session 1 (9 am - 1:20 pm) = 4 h 20 m

2h 10m
facebook

20m
conversations

1 h 50 m
MatLab

Click on activity for more actions.
IMPROVED DESIGN

Sunday, November 2nd, 2014

Overall Sessions

- Distracted
- Productive

Session 1 (9am - 1:20 pm) - 4h 20m

Session 1: 40% productive

Session 2: 60% productive

2h 10m
facebook

20 m
conversations

1h 50 m
MatLab

Click on activity for more actions.
Initial Paper Prototype

Task 1: Is Netflix worth it?

1. View the Koala homepage
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. Go to Settings
5. Click “Unsubscribe”
6. Return to homepage
Initial Paper Prototype

Task 1: Is Netflix worth it?

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2. **Navigate to Netflix Detailed View**
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Initial Paper Prototype

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Initial Paper Prototype

Task 1: Is Netflix worth it?

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Initial Paper Prototype

Task 1: Is Netflix worth it?

1. View the Koala homepage.
2. Navigate to Netflix Detailed View
3. View your Usage Score for Netflix
4. Go to Settings
5. Click “Unsubscribe”
6. Return to homepage
PROBLEM

LUNCH  $5.49
COFFEE -$3.49
MOVIES -$11.20
COFFEE  $3.89
ICE CREAM $4.42
DINNER -$7.79
COFFEE  $4.89
BOWLING -$10.20
KIT KAT  $0.99
BRUNCH $11.42
BEER  -$4.00
Problem

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

“An 8 minute time limit will be strictly enforced”

<table>
<thead>
<tr>
<th>Time</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:40</td>
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<tr>
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<td>10ish</td>
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<td>11:45</td>
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<tr>
<td>9:45</td>
<td>13:00</td>
</tr>
</tbody>
</table>

You have 7 minutes
We do not have this overflow
Today

Tips for Effective Presentations

Paper Prototyping
Testing
Ethics in Testing
Tasks in Testing
Objectives

Be able to:

In the language of sketching and prototyping, describe the purpose paper prototyping and the broader goal of low-fidelity prototyping

Describe stages of a usability test, discuss strategies and potential pitfalls in each stage
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 $\rightarrow$ Prototype $\rightarrow$ Evaluate $\rightarrow$ Iterate

Instead simulate the prototype

Sketches $\rightarrow$ Evaluate $\rightarrow$ 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
Welcome to ESP.
Your Telebeats session
is Tues. Sept. 21 @ 10am
Your current schedule
is empty. Please click
on Add a course to
continue.

“Screen” faked with
pre-constructed pieces
Paper Prototype

New pieces added in response to interaction
Transparencies allow flexible use of text
Paper Prototype as Communication

Account Type: 
Username: 
Password: 
Caption Password: 
Account Currency: 
Comm. Presence: 

Accoun Type

Basic Account

Advanced Account
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
Constructing the Prototype

Remember your target platform constraints
Today

Tips for Effective Presentations

Paper Prototyping
Testing
Ethics in Testing
Tasks in Testing
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 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 555-555-5555

Tasks can be chained to naturally lead to next
Stages of a Usability Test

Preparation
Introducing the Test
Conducting the Test
Debriefing
Analyzing the Data
Creating the Report
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 report of testing results
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
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

Rettig, 1994
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
Careful Certain Temptations

- Take a photo of your wireframe sketch
- Add clickable areas and transitions between screens
- “Use” the prototype on your own device
Today

Tips for Effective Presentations

Paper Prototyping
Testing
Ethics in Testing
Tasks in Testing
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
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
Today

Tips for Effective Presentations

Paper Prototyping
Testing
Ethics in Testing
Tasks in Testing
In-Class Design, Prototype, Test

Design and prototype a 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 design 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 the alarm via 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

Without 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 it's 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

Have others help you “debug” them before testing
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 08:
Presentations, Paper Prototyping, Tasks in Testing
Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 09:
Tasks in Testing, Patterns

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

Looking Forward

“Getting the Right Design”
Presentation Due Wednesday 11/1
3a: Paper Prototype (1x2) Due Monday 11/6

Other Assignments

Reading 3 Due Saturday 11/4
Reading 4 Due Saturday 11/11, Sooner is Better
Reading 5 Can Be Done Anytime, Sooner is Better
Denny 303 on Tuesday 11/7
Presentations

Presentations Thursday / Friday

6 groups will present on Thursday
entire 9:30 and 10:30 sections
(no 9:30 or 10:30 sections on Friday)
Everybody attends Thursday
welcome in 12:30 and 1:30 sections on Friday
Have thoughtful questions for other groups

Be sure you prepare and rehearse

Limit 7 minutes
Team responsibility for the presentations
PPT(X) or PDF, embed fonts, happy to “check”
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Testing
Patterns
Objectives

Be able to:

Describe why task design is important for usability testing, how poor tasks can mask problems

Describe the principle of Wizard of Oz testing, give examples of how technology can support it

Describe two high-level strategies for remote testing, limitations of hill-climbing in testing

Describe the benefit of design patterns, contrast them with guidelines or templates
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
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
Labourers        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 .........
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
In-Class Design, Prototype, Test

Design and prototype a 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 design 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 the alarm via 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

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Have others help you “debug” them before testing
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
SILK (1996)

Informal Interaction
Migrate to Prototype, Storyboard-Based Programming
DENIM (2000)

Early Stage, Multiple Levels of Details, Sketching, Pen Interaction
SUEDE (2000)

Low-Fidelity Is Not Just About Ink
Topiary (2004)

Location Awareness, Wizard of Oz
FrameWire (2010)
Sketch Wizard (2007)

SketchWizard: Wizard of Oz
Prototyping of Pen-based
User Interfaces

Richard C. Davis
U.C. Berkeley

T. Scott Saponas
U. of Washington

Michael Shilman
ChatterPop, Inc.

James A Landay
U. of Washington
Intel Research Seattle

More Recognition
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
Remote Usability Testing

Conferencing-based testing

Use tools like video conferencing, instant messaging, and screencasting to test with a remote participant

Semi-automated remote testing

Automatic logging and some analysis of usage

Controlled online A/B experiments

Carefully measure results of showing different versions to different sets of live customers
Semi-Automated Remote Usability

Now available through a variety of services

Loop11  UserZoom
TryMyUI  Validately
Userlytics  WhatUsersDo
UserTesting.com  YouEye

Unlikely you need to bake your own

Some include mobile testing
Crowds for automated testing in build processes

http://www.nngroup.com/articles/unmoderated-user-testing-tools/
Semi-Automated Remote Usability

Move usability testing online

- participants access the “lab” via web
- answer questions & complete tasks in “survey”
- records actions or screens for playback
- can test many people completing many tasks

Analyze data individually or in aggregate

- playback individual sessions
- find general problem areas
- if needed, look closely with traditional methods
Semi-Automated Remote Usability
1. Find a flat panel monitor that costs less than $1200. *Please try to accomplish this task without using the search function.*

<table>
<thead>
<tr>
<th>Task</th>
<th>Response(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was able to complete the task</td>
<td>90%</td>
</tr>
<tr>
<td>I was not able to complete the task</td>
<td>10%</td>
</tr>
<tr>
<td>I think that I was able to complete the task, but I'm not sure</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Response Times**
- Fastest: 00:00:28
- Median: 00:00:41
- Average: 00:00:48.4
- Slowest: 00:01:14

2. What is the price of the monitor you just found?

**Short Freeform**

$1129
Semi-Automated Remote Usability
WebQuilt: Visual Analysis

Goals

- link page elements to actions
- identify behavior/navigation patterns
- highlight potential problems areas

Interactive graph based on web content

- designers can indicate expected paths
- color code common usability interests
- filtering to show only target participants
- use zooming for analyzing at varying granularity
WebQuilt: Visual Analysis
WebQuilt: Visual Analysis
WebQuilt: Visual Analysis
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
Controlled A/B Experiments

Many names for it

A/B tests or Control/Treatment

Randomized Experimental Design

Controlled experiments

Split testing

Parallel flights

(this section mostly due Ronny Kohavi)
Controlled A/B Experiments

Example: Amazon Shopping Cart Recommendations

Add an item to your shopping cart
Most sites show the cart

At Amazon, Greg Linden had idea to show recommendations based on cart items

Controlled A/B Experiments

Evaluation

Pro: cross-sell more items
Con: distract people from checking out

Highest Paid Person’s Opinion:
Stop the project

Simple experiment run:
Wildly successful

Marketplace: Solitaire vs Poker

Experiment run in Windows Marketplace / Game Downloads

Which image has the higher clickthrough? By how much?

A: Solitaire game

B: Poker game
Marketplace: Solitaire vs Poker

Experiment run in Windows Marketplace / Game Downloads

Which image has the higher clickthrough? By how much?

A: Solitaire game

A is 61% better

B: Poker game
Never Underestimate Solitaire

*Six Chix*

**By Rina Piccolo**

OUR COMPUTERS ARE DOWN, SO WE HAVE TO DO EVERYTHING MANUALLY...
Never Underestimate Solitaire

Activision Acquires Candy Crush Maker King Digital For $5.9 Billion

by Motline logan | November 3, 2015, 12:04 AM EST

Activision’s purchase price for the game maker is a premium to its current price but a discount to its recent IPO price.

King Digital Entertainment, the company behind popular Facebook games such as Candy Crush, seems to have decided that being a publicly-traded entity isn’t all it’s cracked up to be. King announced late Monday that it is being acquired by Activision Blizzard, the maker of popular console and PC games such as Call of Duty, for $5.9 billion.

The purchase price of $18 a share amounts to a premium of about 16% over the recent closing price for King’s stock ($15.85 – 18.32%) — but it’s about 20% lower than the price at which the company went public less than a year ago. At that
Conversion rate is percentage of visits that include purchase.

Which version has a higher conversion rate?

Example from Bryan Eisenberg’s article on clickz.com.
Checkout Page

Conversion rate is percentage of visits that include purchase

Which version has a higher conversion rate?

Example from Bryan Eisenberg’s article on clickz.com
Checkout Page

Conversion rate is percentage of visits that include purchase

Coupon Code decreases by factor of 10
Feedback A puts everything together, whereas feedback B is two-stage: question follows rating.

Feedback A just has 5 stars, whereas B annotates the stars with “Not helpful” to “Very helpful” and makes them brighter.

Which one has a higher response rate? By how much?
Feedback A puts everything together, whereas feedback B is two-stage: question follows rating.

Feedback A just has 5 stars, whereas B annotates the stars with “Not helpful” to “Very helpful” and makes them brighter.

Which one has a higher response rate? By how much? B gets more than double response rate.
Another Feedback Variant

Call this variant C. Like B, also two-stage. Which one has a higher response rate, B or C?
Another Feedback Variant

Call this variant C. Like B, also two-stage. Which one has a higher response rate, B or C?

C outperforms B by a factor of 3.5
Office Online

Clicks on revenue generating links (red links)
Office Online

Clicks on revenue generating links (red links)

A gets many more clicks
Office Online

Clicks on revenue generating links (red links)

B gets more revenue
Examples Where Data Is Wrong

If something is “amazing,” find the flaw!

If you have a mandatory birth date field, and people think it’s unnecessary, you will find lots of 11/11/11 or 01/01/01

If you have an optional drop down, do not default to the first alphabetical entry, or you will have lots of: jobs = Astronaut

Traffic to doubled between 1-2am Nov 6, 2011 for many web sites, relative to same hour week prior
MSN US Home Page

Proposal: New Offers module below Shopping

Control

Treatment
Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors
Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough:

Page views per person-day:
Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%
Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%

Value of click from home page: X cents

Net = Expected Revenue –
   Value Per Click * Direct lost clicks –
   Value Per Click * Lost Due to Decreased Views
Experiment Results

Ran A/B test for 12 days on 5% of MSN US visitors

Clickthrough: decreased 0.49%

Page views per person-day: decreased 0.35%

Value of click from home page: X cents

Net = Expected Revenue –
Value Per Click * Direct lost clicks –
Value Per Click * Lost Due to Decreased Views

Net was negative (in millions of dollars), offers module did not launch
ONLINE PLATFORMS
AS THE FUTURE OF RESEARCH

JEFFREY “LYTE” LIN
jlin@riotgames.com | @RiotLyte
Sunglasses are an important accessory for reducing damage from the Sun.
OPTIMUS PRIME

CATEGORY 1:
FUN FACTS

“Nautilus’ /joke makes him swim through air. He’s weird like that.”
OPTIMUS PRIME

CATEGORY 2: POSITIVE BEHAVIOR

“Players perform better if you give them constructive feedback after a mistake.”
CATEGORY 3: NEGATIVE BEHAVIOR

“Players who verbally abuse their teammates lose 16% more games.”
OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1   C2   C3
C4

CATEGORY 4: SELF-REFLECTION

“Who will be the most sportsmanlike player in this game?”
OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1  C2  C3
C4  C5

CATEGORY 5: GAMEPLAY TIPS

“Hold down the ALT key while casting an ability to cast it on yourself.”
OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1  C2  C3
C4  C5

FONT COLORS

Font Color 1 | Red
Font Color 2 | Blue
Font Color 3 | White (Control)
OPTIMUS PRIME

EXPERIMENTAL DESIGN

LOCATIONS

LOCATION 1: Loading Screen
LOCATION 2: In-Game
LOCATION 3: Both
LOCATION 4: None (Control)
OPTIMUS PRIME

EXPERIMENTAL DESIGN

C1  C2  C3
C4  C5
F1  F2  F3
L1  L2  L3  L4

COMPLETE EXPERIMENTAL DESIGN:

24 TIPS ACROSS 5 CATEGORIES
×
3 FONT COLORS
×
3 LOCATIONS + 1 OVERALL CONTROL
=
217 UNIQUE CONDITIONS
EVERY GAME OF LEAGUE OF LEGENDS GOT A RANDOM TIP, LOCATION & FONT COLOR
(10% OF GAMES GOT NOTHING TO ACT AS CONTROLS)
OPTIMUS PRIME RESULTS

TIP: “X% of players punished by the Tribunal improve their behavior and are never punished again”

FONT: White
LOCATION: Loading Screen

INCREASE

COMPARED TO CONTROL GAMES

DECREASE

Verbal Abuse: 6.35%
Offensive Language: 5.89%
Reports/Game: 4.11%

*Optimus data from 11/2012
HOW DO **FONT COLORS** INTERACT WITH TIP CATEGORIES?
**OPTIMUS PRIME RESULTS**

**TIP:** “Teammates perform worse if you harass them after a mistake.”

**FONT:** Red

**LOCATION:** Loading Screen

---

**INCREASE**

**COMPARED TO CONTROL GAMES**

- **Negative Attitude:** 8.34%
- **Verbal Abuse:** 6.22%
- **Offensive Language:** 11.00%

*Optimus data from 11/2012*
OPTIMUS PRIME RESULTS

TIP: “Teammates perform worse if you harass them after a mistake.”
FONT: White
LOCATION: Loading Screen

Comparing to control games, we observe the following increases:
- Negative Attitude: 8.34% increase
- Verbal Abuse: 6.22% increase
- Offensive Language: 11.00% increase

Comparing to previous data from 11/2012:
- Negative Attitude: 0.55% increase
- Verbal Abuse: 2.48% increase
- Offensive Language: 1.28% increase

*Optimus data from 11/2012
OPTIMUS PRIME RESULTS

TIP: “Players who cooperate with their teammates win X% more games.”

FONT: Blue
LOCATION: Loading Screen

INCREASE

NEGATIVE ATTITUDE: 5.13%
VERBAL ABUSE: 3.64%
OFFENSIVE LANGUAGE: 6.22%

DECREASE

*Optimus data from 11/2012
OPTIMUS PRIME RESULTS

TIP: “Players who cooperate with their teammates win X% more games.”

FONT: Red

LOCATION: Loading Screen

*Optimus data from 11/2012
ONLINE PLATFORMS
AS THE FUTURE OF RESEARCH

JEFFREY “LYTE” LIN
jlin@riotgames.com | @RiotLyte
Data Driven Methods Not Just Online

1999
Made from cardboard, the first Netflix mailer weighs more than an ounce. But with only 100,000 customers, reducing material and shipping costs is not yet a priority for the company.

2000
Thick paper replaces cardboard. DVDs are inserted and removed from the top rather than the side.

2000
Full-color printing is introduced. Top-loading is abandoned in favor of side-loading, which is judged more convenient.
Data Driven Methods Not Just Online

2000
Customers are asked to peel off a sticker to reveal Netflix's return address. The design is eventually deemed too complex.

2000
Made from plastic instead of paper, this mailer is cheaper, but it sometimes inflates when transported on airplanes.

2001
An airhole (the black dot on the left side of the mailer) is added to prevent the package from inflating.

2001
Netflix returns to paper because it's easier to recycle. Foam padding is added to reduce breakage.
Data Driven Methods Not Just Online

2001
Foam padding is dropped because the benefits don’t justify the cost. The company gives top-loading another try.

2001
Marking a return to side-loading, this mailer is a direct ancestor of the one the company uses today.

2003
Instead of sealing the entire top and bottom, Netflix introduces a circular sticker, affixed only on the top.

2004
A window shows the disc bar code. Speculation is that this enables storing discs in mailers prior to shipping.
Limitations of Data Driven Testing

Drives hill-climbing, but not overall design

A design may be better, but is it good?

Impossible for new designs to compete

Can be difficult to scale to many features

Now we step through a larger example
NEW: Counting Crows: Hard Candy $11.88 Save 37%!

The Smartest Place to Buy and Sell Books, Music, Computers, Electronics, DVDs & more...

New CD Releases!
only $11.88

More Hot New Releases!

Welcome
Learn about Buying
Learn about Selling
Register Now!
Announcement Board
Updated Jun 13, 2002

Advance Orders
The Simpsons: Complete 2nd Season (DVD) $34.97
Save 30%!
The Sopranos: Complete 3rd Season (DVD) $67.99 Save 32%!
Tom Clancy: Red Rabbit (Hardcover) $19.40 Save 33%!

In Computers
Gateway Desktop Under $400!
$399.00
Includes an 800MHz Intel Celeron processor, 256MB RAM, 20GB hard drive, DVD-ROM drive, and more!

Save Over $100 on Dell Latitude CPx!
$639.00
Get the best quality at the best price with the Dell Latitude CPx featuring an Intel Pentium III@ 500 MHz processor, 256 MB RAM and 12 GB hard drive.

Gateway Desktop Under $500
$499.00
Includes a 1GHz Intel Pentium III processor, 256MB RAM, 20GB hard drive, CD-RW drive, 250MB ZIP Drive, and more!

Red Hot Price for the Chili Peppers' New CD: $11.88!
Evolving after the popularity of Californication, the Chili Peppers release a new album featuring the hit song "By the Way".

In-Stock Now!

Weezer, Weezer

Our Price List Price
$6.99 $18.97

Backstreet Boys, Doo Doo Dolls
Our Price List Price
$9.00 $18.98

The Slim Shady LP, Eminem
Our Price List Price
$2.98 $18.97

Echoes, Pink Floyd
Our Price List Price
$11.54 $24.97

18, Moby
Our Price List Price
$10.99 $18.98

Just Released: The Royal Tenenbaums for $10.45
Wes Anderson (Rushmore) directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!

Monster's Ball (DVD)
Our Price List Price
$11.25 $24.99
### Weezer (2001)

**Weezer**

**Our best price:** $6.99  
List Price: $18.97 (Save: $11.98)

#### Find out more...  
- Full product info, Product Reviews

#### Not ready to buy?  
- Add to your Wish List, Preorder this item, May we also suggest...

#### Like New  
Sorted by **Price**  
- **Price**  
  - **Total Price**  
  - **Seller (Rating)**  
  - **Seller Comments**

<table>
<thead>
<tr>
<th>Price</th>
<th>Total Price</th>
<th>Seller (Rating)</th>
<th>Seller Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7.75</td>
<td>$10.20</td>
<td>custodian46 (142)</td>
<td>best buy</td>
</tr>
<tr>
<td>$8.00</td>
<td>$10.45</td>
<td>stargaze13 (3)</td>
<td>Disk, case, and liner all in excellent condition... more...</td>
</tr>
<tr>
<td>$8.25</td>
<td>$10.70</td>
<td>dazzyliz (1205)</td>
<td>SEALED NEW BMG</td>
</tr>
<tr>
<td>$8.38</td>
<td>$10.75</td>
<td><a href="mailto:naojia@hotmail.com">naojia@hotmail.com</a> (35)</td>
<td>Perfect condition</td>
</tr>
</tbody>
</table>

#### Very Good  
Sorted by **Price**  
- **Price**  
  - **Total Price**  
  - **Seller (Rating)**  
  - **Seller Comments**

<table>
<thead>
<tr>
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<tr>
<td>$8.00</td>
<td>$10.45</td>
<td>lucidksy (14)</td>
<td>perfect</td>
</tr>
<tr>
<td>$8.84</td>
<td>$11.29</td>
<td>steveqg1 (82)</td>
<td></td>
</tr>
<tr>
<td>$9.00</td>
<td>$11.45</td>
<td>saint.timothy (18)</td>
<td>Great shape...first class ship</td>
</tr>
</tbody>
</table>

Standard shipping (USPS Media Mail) for this item is $2.30.

### About this album:  
- **Song List**  
- **Album Credits**  
- **Album Notes**  
- **Editorial**  
- **Customer Reviews**

### About the Artist:  
- **Other Works**

### Spread the Word:  
- **Write a Review**  
- **Email a Friend**
People with similar tastes also enjoyed...

Redeeming a Gift Certificate or Coupon?

Shopping Cart

**Weezer (2001)** Weezer, Weezer (Music)
CD, Release Year: 2001
Seller: naolia@hotmail.com (35)
Condition: Like New • Notes: Perfect condition

- Item: $8.30
- Media Mail: $2.45
(Change Shipping Method)

Move to WishList • Remove from Cart • Find another one

TOTAL: $10.75

Gift Certificates and Coupons

Redeeming your Half.com Gift Certificate or Coupon is easy. Just enter your Claim Code in the box to the right and click "Redeem".
Checkout

Enter your User ID and Password.

Are you a half.com user having trouble signing in? Get help now.

eBay User ID

You can also use your registered email.

eBay Password

Forgot your password?
Learn how to protect your account

Secure Sign In or Register Now

Keep me signed in on this computer unless I sign out. Learn more.

Having problems signing in? Get help now.

For more information about sign in, visit sign in help.
Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong
387 Soda Hall Computer Science UC Berkeley
Berkeley, CA 94720

Use This Address

OR

Enter a new shipping address:

Name
Street address
City
State
ZIP code
Country USA

Save Changes
Place my order!
Testing in a Larger Design

OK, so the strategy behind this redesign is—

wait, did you increase the border size??

Holy crap! We better isolate and re-test!

But... that change is just part of a larger design...

Calm down, pixel-boy. We've got scientific ways to handle this.

3 months later...

See? That border would have cost us 0.012%. Thank goodness I stopped your sloppy "redesign."

Absolutely. Once again our business is safe.
Goodbye, Google

Part 1 of 2 (here’s Part 2)

Today is my last day at Google.

I started working in-house at Google almost three years ago. I built a team from scratch. I was fortunate to hire a team of very talented designers. We introduced Visual Design as a discipline to Google. And we produced amazing work together. I’m very proud of my team, and I wish them well. They have a lot of challenging work ahead. But for me, it’s time to move on.

Do I have something else lined up? Yes. That will be covered in Part 2. So I’m not leaving just to leave. But I’m not going to sugarcoat the reasons for my departure either. The scale at which Google operates was an early attractor for me. Potential to impact millions of people? Where do I sign? Unfortunately for me, there was one small problem I didn’t see back then.

When I joined Google as its first visual designer, the company was already seven years old. Seven years is a long time to run a company without a classically trained designer. Google had plenty of designers on staff then, but most of them had backgrounds in CS or HCI. And none of them were in high-up, respected leadership positions. Without a person at (or near) the helm who thoroughly understands the principles and elements of Design, a company eventually runs out of reasons for design decisions. With every new design decision, critics cry foul. Without conviction, doubt creeps in. Instincts fail. “Is this the right move?” When a company is filled with engineers, it turns to engineering to solve problems. Reduce each decision to a simple logic problem. Remove all subjectivity and just look at the data. Data in your favor? Ok, launch it. Data shows negative effects? Back to the drawing board. And that data eventually becomes a crutch for every decision, paralyzing the company and preventing it from making any daring design decisions.

Yes, it’s true that a team at Google couldn’t decide between two blues, so they’re testing 41 shades between each blue to see which one performs better. I had a recent debate over whether a border should be 3, 4 or 5 pixels wide, and was asked to prove my case. I can’t operate in an environment like that. I’ve grown tired of debating such minuscule design decisions. There are more exciting design problems in this world to tackle.
Today

Ethics in Testing
Tasks in Testing
Wizard of Oz Methods in Testing
Remote Usability Testing
Patterns
Design Equals Solutions

Design is about finding solutions

Designers often reinvent

- Hard to know how things were done before
- Why things were done a certain way
- How to reuse solutions

One option is patterns

- But this is also why we point you at research
Design Patterns

Design patterns communicate common design problems and solutions

First used in architecture [Alexander]

How to create a beer hall where people socialize?

Somewhere in the community at least one big place where a few hundred people can gather, with beer and wine, music, and perhaps a half-dozen activities, so that people are continuously criss-crossing from one to another.
Somewhere in the community at least one big place where a few hundred people can gather, with beer and wine, music, and perhaps a half-dozen activities, so that people are continuously criss-crossing from one to another.
Using Design Patterns

Not too general and not too specific

use a solution “a million times over, without ever doing it the same way twice”

Design patterns are a shared language

for “building and planning towns, neighborhoods, houses, gardens, and rooms”

Beer hall is part of a center for public life

Beer hall needs spaces for groups to be alone

ALCOVES
A Web of Design Patterns

(8) Mosaic of Subcultures

(31) Promenade

(90) Beer Hall

(33) Night Life

(95) Building Complex

(179) Alcoves

(181) The Fire
Red Hot Price for the Chili Peppers' New CD: $11.88!

Evolving after the popularity of "Californication," the Chili Peppers release a new album featuring the hit song "By the Way."

In-Stock Now!

<table>
<thead>
<tr>
<th>Band</th>
<th>Our Price</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weezer</td>
<td>$6.99</td>
<td>$18.97</td>
</tr>
<tr>
<td>Gutterflower</td>
<td>$9.00</td>
<td>$18.98</td>
</tr>
<tr>
<td>The Slim Shady LP</td>
<td>$2.98</td>
<td>$18.97</td>
</tr>
<tr>
<td>Echoes</td>
<td>$11.54</td>
<td>$24.97</td>
</tr>
<tr>
<td>18</td>
<td>$10.99</td>
<td>$18.98</td>
</tr>
</tbody>
</table>

Just Released: The Royal Tenenbaums for $18.45

Wes Anderson ("Rushmore") directs a motley crew of talented actors in this hysterical comedy about the rise and fall of an eccentric family.

In-Stock Now!

<table>
<thead>
<tr>
<th>DVD</th>
<th>Our Price</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monster's Ball</td>
<td>$11.25</td>
<td>$24.99</td>
</tr>
</tbody>
</table>
• **What site is this?**
  - Logo in top-left corner denotes the site
  - Another logo at top-right to reinforce
  - examples of SITE BRANDING
What kind of site is this?
- Shopping cart icon
- Tab row content & categories on left
- Prices in content area
- UP-FRONT VALUE PROPOSITION
- example of PERSONAL E-COMMERCE
What can I do here?

- **Welcome** for new visitors
- Tab row / Search on top
- “Categories”
- Prices
- Examples of OBVIOUS LINKS
• Most important info visible without scrolling
• ABOVE THE FOLD
Weezer (2001)
Weezer

Our best price: $6.99
List Price: $18.97 (Save: $11.98)

Find out more...
Full product info, Product Reviews

Not ready to buy?
Add to your Wish List, Preorder this item, May we also suggest...

Like New Sorted by Price

<table>
<thead>
<tr>
<th>Price</th>
<th>Total Price</th>
<th>Seller</th>
<th>Seller Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7.75</td>
<td>$10.20</td>
<td>custodian46  (149)</td>
<td>best buy</td>
</tr>
<tr>
<td>$8.00</td>
<td>$10.45</td>
<td>stargaze13   (3)</td>
<td>Disk, case, and liner all in excellent condition</td>
</tr>
<tr>
<td>$8.25</td>
<td>$10.70</td>
<td>dazzyliz     (1205)</td>
<td>SEALED NEW BMG</td>
</tr>
<tr>
<td>$8.30</td>
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<td><a href="mailto:najoja@hotmail.com">najoja@hotmail.com</a> (35)</td>
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Standard shipping (USPS Media Mail) for this item is $2.30.

About this album:
Song List
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Editorial
Customer Reviews

About the Artist:
Other Works

Spread the Word:
Write a Review
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<td>perfect</td>
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<td></td>
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<td>$9.00</td>
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<td>saintTimothy (18)</td>
<td>Great shape...first class ship</td>
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Compare our Prices!

<table>
<thead>
<tr>
<th></th>
<th>Half.com</th>
<th>CDNow</th>
<th>AlphaCraze</th>
<th>CDUniverse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$6.99</td>
<td>--</td>
<td>$15.66</td>
<td>$15.69</td>
</tr>
</tbody>
</table>

View all Like New Items

74 items in stock

17 items in stock
• What site am I at?
  – Logo in upper-left reinforces brand, can click to go to home
  – Same font, layout, color scheme also reinforces
  – examples of SITE BRANDING (E1)
• Where am I in the site?
  – “Home > Music” are LOCATION BREAD CRUMBS
  – TAB ROW says “Music”
  – Album cover, “Product Highlights”, and CD cover
• Can I trust these sellers?
  – Who am I buying from?
  – Are they reputable?
  – What about shipping?
Weezer (2001)

Weezer

Our best price: $6.99
List Price: $18.97 (Save: $11.98)

Find out more...
Full product info, Product Reviews

Not ready to buy?
Add to your Wish List, Preorder this item, May we also suggest...

Like New Sorted by Price

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<td>$8.68</td>
<td>$10.18</td>
<td>photobooth (35)</td>
<td>Perfect condition</td>
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</table>

Very Good Sorted by Price

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</tbody>
</table>

• The Fold
  – Hmm, what’s below here?
• Impulse buy
• PERSONALIZED RECOMMENDATIONS
• About this album
• Lots of unused space
• Still more info below…
CSE 440 - Autumn 2007
User Interface Design, Prototyping, and Evaluation

Product Reviews

Editorial Reviews
Spin (01/01/2002)
Ranked #9 in Spin's Albums of the Year 2001
Ranked #13 in AP's 25 Best Albums of 2001
"Rivers Cuomo has created a sonic masterpiece...Rivers Cuomo's brainchild WEEZER burst on the scene in 1994, dazzling the world with their energetic, punk-inspired sound. With their latest effort, WEEZER 2001, they continue to deliver the goods in spades. The album kicks off with the powerful "Hash Pipe," which immediately grabs your attention with its catchy guitar riff and Rivers Cuomo's distinctive vocals. Throughout the album, the band's trademark sound is evident, with pop-punk melodies and infectious hooks. WEEZER 2001 is a must-listen for fans of the band and anyone looking for a solid addition to their music collection."

Customer Reviews
Rated 4.3 out of 5.0 by 29 raters.
» Read Customer Reviews
» Rate this item

RECOMMENDATION COMMUNITY

• Is this product any good?
  – Editorial reviews
  – Customer reviews
  – RECOMMENDATION COMMUNITY
People with similar tastes also enjoyed...

**Weezer (1994)**  
CD, 1994  
**Weezer**  
$5.00  
(Save $6.97)

**Pinkerton**  
CD, 1996  
**Weezer**  
$6.00  
(Save $10.95)

**All Killer No Filler**  
[EDC]  
CD, 2001  
Sum 41, Sum 41  
$4.29  
(Save $8.68)

---

**Redeeming a Gift Certificate or Coupon?**

**Shopping Cart**

**Weezer (2001)** Weezer, Weezer (Music)  
CD, Release Year: 2001  
Seller: naolia@hotmail.com (35)  
Condition: Like New  
Notes: Perfect condition

**Item:** $8.30  
**Media Mail:** $2.45  
*(Change Shipping Method)*

**Move to WishList**  
**Remove from Cart**  
**Find another one**

**TOTAL:** $10.75

---

**Gift Certificates and Coupons**

Redeeming your Half.com Gift Certificate or Coupon is easy. Just enter your Claim Code in the box to the right and click "Redeem".
• What site am I at?
  – Logo in upper-left
  – Colors, layout, font
  – examples of SITE BRANDING
• Where am I in the site?
  – Last link clicked was “Buy!”
  – “Shopping Cart” and “Proceed to Checkout” reinforce that this is “the right page”
  – SHOPPING CART
- Cross-selling
  - Possibly a pleasant surprise
  - Impulse buy
  - CROSS-SELLING & UP-SELLING
• What am I going to buy?
  – Easy to remove
  – Easy to move to wishlist

• How much will it cost?
  – Shipping costs there, no nasty surprises

• SHOPPING CART
• What can I do?
  – “Proceed to Checkout”
    HIGH VISIBILITY ACTION BUTTON
    – Visually distinct
    – 3D, looks clickable
    – Repeated above and below fold
Checkout

Enter your User ID and Password.

Are you a half.com user having trouble signing in? Get help now.

eBay User ID
You can also use your registered email.

eBay Password
Forgot your password?
Learn how to protect your account

Secure Sign In or Register Now

Keep me signed in on this computer unless I sign out. Learn more.

Having problems signing in? Get help now.

For more information about sign in, visit sign in help.
- What if I don’t have a User ID?
- What if I forgot my password?
- SIGN-IN/NEW ACCOUNT options
Step 1 - Choose Shipping Address

Ship my order to:

Jason Hong  
387 Soda Hall Computer Science UC Berkeley  
Berkeley, CA 94720  
Use This Address

OR

Enter a new shipping address:

Name  
Street address  
City  
State: Select State
ZIP code  
Country: USA

Save Changes
- **What site?**
  - Logo, layout, color, fonts

- **Where in site?**
  - Checkout, step 1 of 3
  - “Choose shipping address”
  - QUICK-FLOW CHECKOUT
• Note what’s different
  – No tab rows
  – No impulse buys
  – Only navigation on page takes you to next step

• This is a PROCESS FUNNEL
  – Extraneous info and links removed to focus customers
• Last step of process
  – Step 3, “Place Order”
  – “Place my order” button

• **Two HIGH-VISIBILITY ACTION BUTTONS** for fold
• No nasty surprises
  – Can see order
  – Total price is same as shopping cart
  – ORDER SUMMARY
- Easy to change shipping and billing
- Easy to save this info
  - Easier to setup info in context of specific task
Web Design Patterns

Communicate design problems & solutions

- how to create navigation bars for finding relevant content
- how to create a shopping cart that supports check out
- how to make e-commerce sites where people return & buy
NAVIGATION BAR (K2)

Problem: Customers need a structured, organized way of finding the most important parts of your Web site
NAVIGATION BAR (K2)

Solution diagram

Captures essence on how to solve problem

Link to home

First-level navigation

Second-level navigation
Patterns organized by group

- Site genres
- Navigational framework
- Home page
- Content management
- Trust and credibility
- Basic ecommerce
- Advanced ecommerce
- Completing tasks
- Page layouts
- Search
- Page-level navigation
- Speed
- The mobile web
PROCESS FUNNEL (H1)

Problem:

Need a way to help people complete highly specific stepwise tasks

Ex. Create a new account
Ex. Fill out survey forms
Ex. Check out
• What’s different?
  – No tab rows
  – No impulse buys
  – Only navigation on page takes you to next step

• What’s the same?
  – Logo, layout, color, fonts
PROCESS FUNNEL (H1)

Problem:

What if users need extra help?
PROCESS FUNNEL (H1)
CONTEXT-SENSITIVE HELP (H8)
FLOATING WINDOWS (H6)
PROCESS FUNNEL (H1)

Solution Diagram
Related Patterns

(A1) E-Commerce

(A10) Web Apps

(A11) Intranets

(K1) Navigation Bars

(K2) Tab Rows

(K3) Action Buttons

(H1) Process Funnel

(H2) Context-Sensitive Help

(I1) Above the Fold

(K4) High-Viz Action Buttons

(K5) Preventing Errors

(K6) Meaningful Error Messages
Patterns Support Creativity

Patterns come from successful examples
  sites that are so successful that lots of people
  are familiar with their paradigms
  interaction techniques/metaphors that work well
  across many sites (e.g., shopping carts)

Not too general and not too specific
  you need to specialize to your needs

Patterns let you focus on the hard,
unique problems of your design situation
Principles, Guidelines, Templates

Patterns help design without over-constraining

unlike principles, patterns are not too general

unlike guidelines, patterns discuss tradeoffs, show good examples, and tie to other patterns

unlike style guides, patterns not too specific, can be specialized to a design

unlike templates, patterns illustrate flows and relationships among different pages
Web Design Patterns

**Pattern Name and Number**

**Exemplar**

**Forces & Solution**

**Background**

**Problem Statement**

**Background**

All Web applications that lead visitors through stepped tasks—PERSONAL E-COMMERCE (A1), SELF-SERVICE GOVERNMENT (A4), WEB APPS THAT WORK (A10), and ENABLING INTRANETS (A11)—need ways to help people succeed at completing the tasks.

**Problem**

Customers often need to complete highly specific tasks on Web sites, but pages with tangential links and many questions can prevent them from carrying out these tasks successfully.

People enjoy completing the tasks they start. Yet all kinds of distractions—including links that lead off the critical path, extra steps, and extra
Web Design Patterns

Use Pop-Up Windows to Provide Extra Information, without Leading Visitors Out of the Process Funnel • Sometimes customers need additional information that you have not provided on a page, such as extra help or product details. Provide a link to a pop-up window (H16) containing: clean product details (F2) (see Figure H1.1), context-sensitive help (H8), or information from the frequently asked questions (H17) page, to make the extra information less intrusive. Your challenge is to implement this extra content without detracting from the main purpose.

Make Sure the Back Button Always Works • Customers often use the Back button on browsers to modify answers they have typed in on previous pages. However, if the Web site is not implemented correctly, the information they have already entered may be lost when they hit the Back button, forcing them to type everything again. In the worst case, people get a cryptic error message saying that the posted information was lost. You can address this annoying problem by temporarily storing the information they type in on each page, redisplaying this information if customers hit the Back button, and then overriding the temporarily stored information on the page if it is changed.

Always Make It Clear How to Proceed to the Next Step • Some Web pages are longer than can be displayed on a customer's Web browser. The problem is that people sometimes get lost if the critical action button (K4), the one that takes them to the next step, is hidden below the fold. Place non-visibility action buttons (K5) both high and low on the page, ensuring that at least one of the critical action buttons is visible.

Prevent Errors Where Possible, and Provide Clear Guidance on How to Recovery From One That Do Occur • People will always make mistakes in Web designs. You can provide good customer service by helping users avoid mistakes by providing clear error messages (K13).

Solution

SOLUTION

Minimize the number of steps required to complete a task, keeping them between two and eight. Remove unnecessary and potentially confusing links and content from each page, while reinforcing the brand to maintain a sense of place. Use pop-up windows to provide extra information, without leading people out of the process funnel. Make sure the Back button always works so that customers can correct errors. Make it clear how to proceed to the next step.
Pre-Patterns

Patterns require broad adoption and examples
   Many version of the same basic idea
   Shown successful in many contexts
   That is what makes them patterns

This is challenging in novel domains

Pre-patterns are based in weaker evidence
   Can help speed diffusion of techniques and results
   Can help see relationships among ideas
UbiComp Pre-Patterns

Literature review

Button-up card sorting of lessons from literature
Cut down based on critique by other researchers
Displaying people’s location • There are several different ways of displaying a person’s location. A straightforward approach is to simply show the location in text, for example “near corner of Euclid Ave and Hearst Ave” or “in Soda Hall”. Another approach is to show the data on a map, or possibly even an ACTIVE MAP (B1) that is constantly updated.

Figure 1. AT&T Wireless’ mMode service allows customers to add friends to a friend list, find out who is nearby, and call or send messages to them. Users can make themselves invisible whenever they want.

Figure 2. UC San Diego’s ActiveCampus project shows your friends’ location in real time. While useful, this visualization raises many privacy concerns.

Managing privacy concerns • There are many privacy concerns about find-a-friend applications due to the potential for abuse. This is not just the fear of “Big Brother,” but also so-called “Little Brother,” in which others...
## UbiComp Pre-Patterns

<table>
<thead>
<tr>
<th>A – Ubiquitous Computing Genres</th>
<th>B – Physical-Virtual Spaces</th>
<th>C – Developing Successful Privacy</th>
<th>D – Designing Fluid Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describes broad classes of emerging applications, providing many examples and ideas</td>
<td>Associating physical objects and spaces with information and meaning; location-based services; helping users navigate such spaces</td>
<td>Policy, systems, and interaction issues in designing privacy-sensitive systems</td>
<td>How to design for interactions involving dozens or even hundreds of sensors and devices while making users feel like they are in control</td>
</tr>
<tr>
<td>Upfront Value Proposition (A1)</td>
<td>Active Map (B1)</td>
<td>Fair Information Practices (C1)</td>
<td>Scale of Interaction (D1)</td>
</tr>
<tr>
<td>Personal Ubiquitous Computing (A2)</td>
<td>Topical Information (B2)</td>
<td>Respecting Social Organizations (C2)</td>
<td>Sensemaking of Services and Devices (D2)</td>
</tr>
<tr>
<td>Ubiquitous Computing for Groups (A3)</td>
<td>Successful Experience Capture (B3)</td>
<td>Building Trust and Credibility (C3)</td>
<td>Streamlining Repetitive Tasks (D3)</td>
</tr>
<tr>
<td>Ubiquitous Computing for Places (A4)</td>
<td>User-Created Content (B4)</td>
<td>Reasonable Level of Control (C4)</td>
<td>Keeping Users in Control (D4)</td>
</tr>
<tr>
<td>Guides for Exploration and Navigation (A5)</td>
<td>Find a Place (B5)</td>
<td>Appropriate Privacy Feedback (C5)</td>
<td>Serendipity in Exploration (D5)</td>
</tr>
<tr>
<td>Enhanced Emergency Response (A6)</td>
<td>Find a Friend (B6)</td>
<td>Privacy-Sensitive Architectures (C6)</td>
<td>Context-Sensitive I/O (D5)</td>
</tr>
<tr>
<td>Personal Memory Aids (A7)</td>
<td>Notifier (B7)</td>
<td>Partial Identification (C7)</td>
<td>Active Teaching (D7)</td>
</tr>
<tr>
<td>Smart Homes (A8)</td>
<td></td>
<td>Physical Privacy Zones (C8)</td>
<td>Resolving Ambiguity (D8)</td>
</tr>
<tr>
<td>Enhanced Educational Experiences (A9)</td>
<td></td>
<td>Blurred Personal Data (C9)</td>
<td>Ambient Displays (D9)</td>
</tr>
<tr>
<td>Augmented Reality Games (A10)</td>
<td></td>
<td>Limited Access to Personal Data (C10)</td>
<td>Follow-me Displays (D10)</td>
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<td>Invisible Mode (C11)</td>
<td>Pick and Drop (D11)</td>
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<tr>
<td>Enabling Mobile Commerce (A12)</td>
<td></td>
<td>Limited Data Retention (C12)</td>
<td></td>
</tr>
</tbody>
</table>
Patterns

When you see advice, consider its depth

- Result of an individual study / rant
- Pre-pattern based on some meta-analysis
- Established pattern

Be aware of misapplying patterns

- And be aware of anti-patterns
Touch and Microsoft Windows

2004

2012
Consistency vs. Specialization

Beware of simply copying a design language

Consistency is your friend
until is it not your friend

Not limited to platform-level decisions

One “look” for your app
Or targeted at each device
Dark Patterns

A Dark Pattern is an interface that has been carefully crafted to trick people into doing things, such as buying insurance with their purchase or signing up for recurring bills.

Disguised Ads

Ads that are disguised as other kinds of content or navigation, in order to get users to click on them
Dark Patterns

A Dark Pattern is an interface that has been carefully crafted to trick people into doing things, such as buying insurance with their purchase or signing up for recurring bills.

Friend Spam

A site or game asks for your credentials, then goes on to publish content or send out bulk messages
After Lawsuit Settlement, LinkedIn’s Dishonest Design Is Now A $13 Million Problem

HOPPELLY, THIS WILL BE A LESSON TO OTHER COMPANIES WHO USE DARK UX PATTERNS TO TRICK THEIR USERS.

Anyone who has ever signed up, or even known anyone who has signed up, for LinkedIn has probably found themselves on the receiving end of dozens of follow-up emails, inviting you to “expand your professional network.” Even worse, they’re virtually impossible to opt-out of. It’s a scummy use of dark UX patterns by a company that should know better. Now, LinkedIn is going to be paying for it as part of a class-action lawsuit, to the tune of $13 million.

Presented in San Jose’s U.S. District Court, the key issue in Perkins v. LinkedIn is spam. Namely, during the user sign-up process, LinkedIn claims that it “will not store your password or email anyone without your permission.” Despite this, LinkedIn sends automated follow-up email reminders on a new user’s behalf to any contacts harvested from their webmail accounts, which are presented in such a way as to appear as if they came directly from the user.

Under California law, the sitting judge says has deemed this illegal. Consequently, if you were a member of LinkedIn’s “add connection” program between September 2011 and October 2014, you can submit a claim to be reimbursed.
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 08: Presentations, Paper Prototyping, Tasks in Testing
Tuesday / Thursday 12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 11: Inspection

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

Looking Forward

Team Peer Feedback was Due Saturday 11/4
3b: Heuristic Evaluation Due Wednesday 11/8
3c: Usability Testing Check-In Due Friday 11/10
3d: Usability Testing Review Due Monday 11/13
3e: Digital Mockup Due Thursday 11/16

Other Assignments

Reading 4 Due Saturday 11/11, Sooner is Better
Reading 5 Can Be Done Anytime, Sooner is Better
Objectives

Be able to:

Describe why we use inspection-based methods

Given Nielsen's heuristics, be able to:
explain what each of them means
apply them to identify usability failures in an interface

Describe an effective heuristic evaluation process

Explain why the typical recommendation for heuristic evaluation is 3 to 5 independent evaluators
Inspection-Based Methods

We have cut prototyping to its minimum

- Sketches, storyboards, paper prototypes
- Rapid exploration of potential ideas

But we need evaluation to guide improvement

- Can become relatively slow and expensive
- Study participants can be scarce
- Can waste participants on obvious problems
Inspection-Based Methods

Simulate study participants

Instead of actual participants, use inspection to quickly and cheaply identify likely problems

Inspection methods are rational, not empirical

Today we cover two complementary methods

Heuristic Evaluation

Cognitive Walkthrough
Heuristic Evaluation

Developed by Jakob Nielsen

Helps find usability problems in a design
Not a method for “coming up with” a design

Small set of evaluators examine interface

Three to five evaluators
Independently check compliance with principles
Different evaluators will find different problems
Evaluators only communicate afterwards

Can perform on working interfaces or sketches
Nielsen’s 10 Heuristics

Too few unhelpful, too many overwhelming

“Be Good” versus thousands of detailed rules

Nielsen seeks to create a small set

Collects 249 usability problems
Collects 101 usability heuristics
Rates how well heuristics explain problems
Factor analysis to identify key heuristics

Nielsen, 1994
Nielsen’s 10 Heuristics

Visibility of system status
Match between system and the real world
User control and freedom
Consistency and standards
Error prevention
Recognition rather than recall
Flexibility and efficiency of use
Aesthetic and minimalist design
Help recognize, diagnose, and recover from errors
Help and documentation

Nielsen, 1994
1. Visibility

Visibility of system status

The system should always keep people informed about what is going on, through appropriate feedback within reasonable time.
1. Visibility

Visibility of system status

The system should always keep people informed about what is going on, through appropriate feedback within reasonable time.

Refers to both visibility of system status and providing appropriate feedback

Anytime a person is wondering what state the system is in, or the result of some action, this is a visibility violation.
2. Real World Match

Match between system and the real world

The system should speak a person’s language, with words, phrases and concepts familiar to the person, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
2. Real World Match

Match between system and the real world

The system should *speak a person’s language*, with words, phrases and concepts familiar to the person, rather than *system-oriented terms*

Follow real-world conventions, making information appear in a *natural and logical order*

Refers to word and language choice, mental model, metaphor, mapping, and sequencing
3. Control and Freedom

User control and freedom

People often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue.

Support undo and redo.
3. User in Control

User control and freedom

People often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue.

Support undo and redo.

Not just for navigation exits, but for getting out of any situation or state.
4. Consistency

Consistency and standards

People should not have to wonder whether different words, situations, or actions mean the same thing.
Follow platform conventions.
4. Consistency

Consistency and standards

People should not have to wonder whether different words, situations, or actions mean the same thing.

Follow platform conventions.

Internal consistency is consistency throughout the same product. External consistency is consistency with other products in its class.
Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present people with a confirmation option before they commit to the action.
5. Error Prevention

Error prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present people with a confirmation option before they commit to the action.

Try to commit errors and see how they are handled. Could they have been prevented?
6. Recognition not Recall

Recognition rather than recall

Minimize a person’s memory load by making objects, actions, and options visible. A person should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
6. Recognition not Recall

Recognition rather than recall

Minimize a person’s memory load by making objects, actions, and options visible. A person should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

People should never carry a memory load
6. Recognition not Recall

Addresses visibility of features and information
where to find things

Visibility addresses system status and feedback
what is going on

Problems with affordances may go here
hidden affordance: remember where to act
false affordance: remember it is a fake
7. Flexibility and Efficiency

Flexibility and efficiency of use

Accelerators, while unseen by novices, may often speed up the interaction for experts such that the system can cater to both inexperienced and experienced use. Allow people to tailor frequent actions.
7. Flexibility and Efficiency

Flexibility and efficiency of use

Accelerators, while unseen by novices, may often speed up the interaction for experts such that the system can cater to both inexperienced and experienced use.

Allow people to tailor frequent actions.

Concerns anywhere users have repetitive actions that must be done manually. Also concerns allowing multiple ways to do things.
8. Aesthetic Design

Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
8. Aesthetic Design

Aesthetic and minimalist design

Dialogues should not contain information which is irrelevant or rarely needed.
Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Not just about “ugliness”.
About clutter, overload of visual field, visual noise, distracting animations.
9. Error Recovery

Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
9. Error Recovery

Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Error prevention is about preventing errors before they occur. This is about after they occur.
10. Help

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on a person’s task, list concrete steps to be carried out, and not be too large.
10. Help

Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on a person’s task, list concrete steps to be carried out, and not be too large.

This does not mean that a person must be able to ask for help on every single item.
Heuristic Evaluation Process

Evaluators go through interface several times
  Inspect various dialogue elements
  Compare with list of usability principles

Usability principles
  Nielsen’s heuristics
  Supplementary list of category-specific heuristics
    (competitive analysis or testing existing products)

Use violations to redesign/fix problems
Examples

Can’t copy info from one window to another
   violates “Minimize memory load” (H6)
   fix: allow copying

Typography uses different fonts in 3 dialog boxes
   violates “Consistency and standards” (H4)
   slows users down
   probably wouldn’t be found by usability testing
   fix: pick a single format for entire interface
Heuristics
Heuristics
Heuristics

Time Left: 00:00:19
Searching database for matches

46%
Heuristics

Visibility of system status

pay attention to response time

0.1 sec: no special indicators needed (why?)
1.0 sec: person tends to lose track of data
10 sec: maximum duration if person to stay focused
longer delays require progress bars
Heuristics
Heuristics

“Mailto”, “protocol”?

Match system to real world
Speak the person’s language
Heuristics
Heuristics

Flexibility and Efficiency of Use
accelerators for experts (e.g., keyboard shortcuts) allow tailoring of frequent actions (e.g., macros)
Heuristics

Error

You have not specified a Web Browser, or Web Browser specified is incorrect!

Yes
Heuristics

Help recognize, diagnose, & recover from errors
error messages in plain language
precisely indicate the problem
constructively suggest a solution
You are saving this document in Adobe Illustrator 9.0 format. Saving this document in an older format may disable some editing features when the document is read back in.

[Buttons: Yes, No]
Heuristics

User Control and Freedom
Prevent Errors
Heuristics

<table>
<thead>
<tr>
<th>The Radiation Dosimetry Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please Enter Desired Dose (in Rems)</td>
</tr>
<tr>
<td>Enter Substance</td>
</tr>
<tr>
<td>Isotope Number</td>
</tr>
</tbody>
</table>
# Heuristics

**The Radiation Dosimetry Program**

<table>
<thead>
<tr>
<th>Please Enter Desired Dose (in Rems)</th>
<th>0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Substance</td>
<td>Polonium</td>
</tr>
<tr>
<td>Isotope Number</td>
<td>211</td>
</tr>
</tbody>
</table>
Heuristics
Heuristics

User control & freedom
  provide “exits” for mistaken choices, undo, redo
  don’t force down fixed paths

Wizards
  must respond to question before going to next
  good for beginners, infrequent tasks
  not for common tasks
  consider having 2 versions (WinZip)
Heuristics
Heuristics

Consistency & Standards
Heuristics

Select an award style using the scroll bar. When you've found a style that suits you, press OKAY to create that award and open the editor.
Heuristics
Heuristics
How to Perform Heuristic Evaluation

At least two passes for each evaluator
  first to get feel for flow and scope of system
  second to focus on specific elements
If system is walk-up-and-use or evaluators are domain experts, no assistance needed
  otherwise might supply evaluators with scenarios
Each evaluator produces list of problems
  explain why with reference to heuristic
  be specific & list each problem separately
Example Heuristic Violation

1. [H4 Consistency]

The interface used the string "Save" on the first screen for saving the person’s file, but used the string "Write file" on the second screen. People may be confused by this different terminology for the same function.
How to Perform Heuristic Evaluation

Why separate listings for each violation?

- risk of a ‘fix’ repeating some problematic aspect
- may not be possible to fix all problems

Where problems may be found

- single location in interface
- two or more locations that need to be compared
- problem with overall structure of interface
- something that is missing

- common problem with paper prototypes, but sometimes features are implied and just not yet “implemented”
Phases of Heuristic Evaluation

1) Pre-evaluation training
give expert evaluators needed
domain knowledge & information on the scenario

2) Evaluation
individuals evaluate interface
and make lists of problems

3) Severity rating
determine how severe each problem is

4) Aggregation
group meets and aggregates problems (w/ ratings)

5) Debriefing
discuss the outcome with design team
Severity Rating

Used to allocate resources to fix problems
Estimates of need for more usability efforts
Combination of
  frequency
  impact
  persistence (one time or repeating)

Should be calculated after all evaluations are in
Should be done independently by all judges
Severity Rating

0 - Do not agree this is a problem.

1 - Usability blemish.
   Mild annoyance or cosmetic problem. Easily avoidable.

2 - Minor usability problem.
   Annoying, misleading, unclear, confusing.
   Can be avoided or easily learned. May occur only once.

3 - Major usability problem.
   Prevents people from completing tasks. Highly confusing or unclear.
   Difficult to avoid. Likely to occur more than once.

4 - Critical usability problem.
   People will not be able to accomplish their goals.
   People may quit using system all together.
Example Heuristic Violation

1. [H4 Consistency] [Severity 3]

The interface used the string "Save" on the first screen for saving the person’s file, but used the string "Write file" on the second screen. People may be confused by this different terminology for the same function.
Why Multiple Evaluators?

Every evaluator does not find every problem.

Good evaluators find both easy & hard ones.
Debriefing

Conduct with evaluators, observers, and development team members
Discuss general characteristics of interface
Suggest potential improvements to address major usability problems
Development team rates how hard to fix
Make it a brainstorming session
Fixability Scores

1 - Nearly impossible to fix. Requires massive re-engineering or use of new technology. Solution not known or understood at all.

2 - Difficult to fix. Redesign and re-engineering required. Significant code changes. Solution identifiable but details not fully understood.

3 - Easy to fix. Minimal redesign and straightforward code changes. Solution known and understood.

4 - Trivial to fix. Textual changes and cosmetic changes. Minor code tweaking.
Example Heuristic Violation

1. [H4 Consistency] [Severity 3] [Fix 4]

The interface used the string "Save" on the first screen for saving the person’s file, but used the string "Write file" on the second screen. People may be confused by this different terminology for the same function.

Fix: Change second screen to "Save".
Results of Using HE

Discount: benefit-cost ratio of 48

- cost was $10,500 for benefit of $500,000
- how might we calculate this value?

in-house → productivity; open market → sales

Single evaluator achieves poor results

- only finds 35% of usability problems
- 5 evaluators find ~ 75% of usability problems
- why not more evaluators?

Nielsen, 1994
Decreasing Returns

problems found

benefits / cost

Nielsen, 1994
Alternative Inspection-Based Methods

Cognitive Walkthrough
- Surfaces different types of usability problems
- Consider as a complement to heuristic evaluation

Action Analysis
- Low-level modeling of expert performance
- Be aware of GOMS, but may never encounter it
Cognitive Walkthrough

Evaluation method based on:

- A person works through an interface in an exploratory manner
- A person has goals
- The person is applying means-ends reasoning to work out how to accomplish these goals

Evaluation by an expert, who goes through a task while simulating this cognitive process
Preparation: Need Four Things

1) Person description, including level of experience and any assumptions made by the designer
2) System description (e.g., paper prototype)
3) Task description, specifying the task the expert has to carry out, from a person’s point of view
4) Action sequence describing the system display and the actions needed to complete the task. One system display and one action together are one step.
Cognitive Walkthrough Process

Designer/Developer prepares the required documents described on previous slide

Gives these documents to the usability expert

Expert reads the descriptions, carries out the task by following the action list

At each step in action list, asks four questions

Record problems similar to heuristic evaluation
Believability

1) Will the person be trying to produce whatever effect the action has?
2) Will the person be able to notice that the correct action is available?
3) Once the person finds the correct action at the interface, will they know that it is the right one for the effect they are trying to produce?
4) After the action is taken, will the person understand the feedback given?
Action Analysis / Cognitive Modeling

GOMS: Goals, Operators, Methods, Selection

Developed by Card, Moran and Newell

Walk through sequence of steps
Assign each an approximate time duration
Sum to estimate overall performance time

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Operator</th>
<th>Time (secs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Select sentence</td>
<td>H</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Reach for mouse</td>
<td>P</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>Point to first word</td>
<td>K</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Click button down</td>
<td>P</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>Drag to last word</td>
<td>K</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Release</td>
<td></td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.90 secs</td>
</tr>
</tbody>
</table>
Inspection vs. Usability Testing

Inspection
- Is much faster
- Does not require interpreting participant actions
- May miss problems or find false positives

Usability testing
- More accurate, by definition
- Account for actual people and tasks

One approach is to alternate between them
- Find different problems, conserve participants
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 11:
Inspection

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Phases of Heuristic Evaluation

1) Pre-evaluation training
give expert evaluators needed
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individuals evaluate interface
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4) Aggregation
group meets and aggregates problems (w/ ratings)

5) Debriefing
discuss the outcome with design team
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 12:
Human Performance

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

It just keeps going forward

Looking Forward

3c: Usability Testing Check-In Due Friday 11/10
3d: Usability Testing Review Due Monday 11/13
3e: Digital Mockup Due Thursday 11/16

Other Assignments

Reading 4 Due Saturday 11/11, Sooner is Better
Reading 5 Can Be Done Anytime, Sooner is Better
Objectives

Be able to:

Describe an interaction in terms of a model, such as Norman's Execution-Evaluation Cycle or Buxton's 3-State Model

Describe properties of the human perceptual system that impact interaction

Use the Model Human Processor to describe simple human performance phenomena

Describe what Fitts's Law models, how terms in the model impact interaction, how the model can be used in low-level and higher-level interaction design

Describe the Gestalt perspective on human perception
These are Examples of What?

Popsicle-stick bridge

\[ x = x_0 + v_0 t + \frac{1}{2} a t^2 \]

ACT-R

Goffman’s Negotiated Approach

Norman’s Execution-Evaluation Cycle
Models

We have said models describe phenomena, isolating components and allowing a closer look

Today is a closer look at modeling humans

Capture essential pieces
Model should have what it needs but no more
Thus avoid underfitting or overfitting model

Allow us to measure
Collect data, put in model, compare model terms

Allow us to predict
The better the model, the better the predictions
Models of Interaction

Models of interaction allow a closer look

- Define and describe an interaction
- Isolate areas where problems occur
- Design new interaction

Two examples at different scales

- Norman’s Execution-Evaluation Cycle
- Buxton’s 3-State Model
Models of Interaction

Models of interaction allow a closer look

Define and describe an interaction
Isolate areas where problems occur
Design new interaction

Two examples at different scales

Norman’s Execution-Evaluation Cycle
Buxton’s 3-State Model

“All models are wrong, but some are useful”
George Box
Norman’s Execution-Evaluation Cycle

Gulf of Execution

- Goals
- Form Intention
- Develop Action Plan
- Execute Actions
- System Change
- Observe State
- Interpret State
- Evaluate Goals

Gulf of Evaluation
Buxton’s 3-State Model

Mouse

- State 1
  - Button up
  - Tracking

- State 2
  - Button Down
  - Dragging

Touchpad

- State 0
  - Release
  - Out of Range

- State 1
  - Touch
  - Tracking

Stylus

- State 0
  - Stylus Lift
  - Out of Range

- State 1
  - Tip Switch Open
  - Tracking

- State 2
  - Tip Switch Close
  - Dragging

Touch Screen

- State 0
  - Release Contact
  - Passive Tracking

- State 2
  - Contact
  - Selection
Buxton’s 3-State Model

Mouse

Touchpad

Stylus

Touch Screen

Which can support tooltip previews?
Creating a Model

How would you go about creating a model?
Creating a Model

How would you go about creating a model?

One approach:

Observe, Collect Data, Find Patterns, Draw Analogies, Devise Model, Test Fit to Data, Test Predictions, Revise

Fundamentally an inductive process

From specific observations to broader generalization
Today

Some example models of human performance

Visual System  Biological Model
Model Human Processor  Higher-Level Model
Fitts’s Law  Model by Analogy
Gestalt Principles  Predict Interpretation
Human Visual System

Light passes through lens, focused on retina

Blind Spot?
Blind Spot

Use right eye, look at letters.
Blind Spot

Use left eye, look at cross
Visible Spectrum
Retina

Covered with light-sensitive receptors

Rods (120 million)
- Sensitive to broad spectrum of light
- Sensitive to small amounts of light
- Cannot discriminate between colors
- Sense intensity or shades of gray
- Primarily for night vision & perceiving movement

Cones (6 million)
- Used to sense color
Retina

Center of retina has most of the …
Retina

Center of retina has most of the cones

Allows for high acuity of objects focused at center
Retina

Center of retina has most of the cones
  Allows for high acuity of objects focused at center

Edge of retina is dominated by …
Retina

Center of retina has most of the cones
  Allows for high acuity of objects focused at center

Edge of retina is dominated by rods
  Allows detecting motion of threats in periphery
Retina

Center of retina has most of the cones
  Allows for high acuity of objects focused at center

Edge of retina is dominated by rods
  Allows detecting motion of threats in periphery

What does that mean for you?
Retina

Center of retina has most of the cones
   Allows for high acuity of objects focused at center

Edge of retina is dominated by rods
   Allows detecting motion of threats in periphery

What does that mean for you?
   Peripheral movement is easily distracting
Retina

Center of retina has most of the cones
  Allows for high acuity of objects focused at center

Edge of retina is dominated by rods
  Allows detecting motion of threats in periphery

What does that mean for you?
  Peripheral movement is easily distracting
Color Perception via Cones

Photopigments used to sense color

3 types: blue, green, “red” (actually yellow)

Each sensitive to different band of spectrum

Ratio of neural activity stimulation for the three types of gives us a continuous perception of color
Color Sensitivity

[Dowling, 1987]
Distribution of Photopigments

Not distributed evenly

Mainly reds (64%), Very few blues (4%)

Insensitivity to short wavelengths (i.e., blue)

No blue cones in retina center

Fixation on small blue object yields “disappearance”

Lens yellows with age, absorbs short wavelengths

Sensitivity to blue is reduced even further
Color Sensitivity & Image Detection

Most sensitive to center of spectrum

To be perceived as the same, blues and reds must be brighter than greens and yellows

Brightness determined mainly by red and green

\[ Y = 0.3 \text{ Red} + 0.59 \text{ Green} + 0.11 \text{ Blue} \]

Shapes detected by finding edges

We use brightness and color difference

Implication

Blue edges and shapes are hard
Color Sensitivity & Image Detection

Most sensitive to center of spectrum

To be perceived as the same, blues and reds must be brighter than greens and yellows

Brightness determined mainly by red and green

\[ Y = 0.3 \text{ Red} + 0.59 \text{ Green} + 0.11 \text{ Blue} \]

Shapes detected by finding edges

We use brightness and color difference

Implication

Blue edges and shapes are hard
Focus

Different wavelengths of light focused at different distances behind eye’s lens

Constant refocusing causes fatigue

Saturated colors (i.e., pure colors) require more focusing than desaturated (i.e., pastels)
Focus

Different wavelengths of light focused at different distances behind eye’s lens

Constant refocusing causes fatigue

Saturated colors (i.e., pure colors) require more focusing than desaturated (i.e., pastels)
Color Deficiency

Trouble discriminating colors
  Affects about 9% of population

Two main types
  Different photopigment response most common
    Reduces capability to discern small color differences
  Red-Green deficiency is best known
    Lack of either green or red photopigment, cannot discriminate colors dependent on red and green

Also known as color blindness
Red-Green Deficiency Test
Dual / Redundant Encoding

http://danielsolisblog.blogspot.com/2011_03_01_archive.html
## Dual / Redundant Encoding

### Add/Update Shipping Information

We found an error while verifying your shipping address. We've marked the problem in red for you.

**Required information is marked in GREEN CAPS.**

For questions about shipping, please write a nickname for the person you're shipping to.
You may change or delete this information at any time.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICKNAME:</td>
<td>MYSELF</td>
</tr>
<tr>
<td>FIRST NAME:</td>
<td>DOUGLAS</td>
</tr>
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<tr>
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<td>In the U.S.: Standard UPS (2 business days plus), International: Canada Post (4-10 business days)</td>
</tr>
</tbody>
</table>
Today

Some example models of human performance

<table>
<thead>
<tr>
<th>Visual System</th>
<th>Biological Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Human Processor</td>
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<td>Fitts’s Law</td>
<td>Model by Analogy</td>
</tr>
<tr>
<td>Gestalt Principles</td>
<td>Predict Interpretation</td>
</tr>
</tbody>
</table>
The Model Human Processor

Developed by Card, Moran, & Newell (1983)

Based on empirical data

Summarizing human behavior in a manner easy to consume and act upon

Same book that named human computer interaction
The Model Human Processor

Long-term Memory

Working Memory

Visual Image Store

Auditory Image Store

Sensory Buffers

Eyes

Ears

Perceptual Processor

Motor Processor

Cognitive Processor

Fingers, etc.
Basics of Model Human Processor

Sometimes serial, sometimes parallel

Serial in action and parallel in recognition
Pressing key in response to light
Driving, reading signs, hearing all simultaneously

Parameters
Processors have cycle time, about 100-200ms
Memories have capacity, decay time, and type
A Working Memory Experiment
Memory

Working memory (also known as short-term)

- **Small capacity** \((7 \pm 2 \text{ “chunks”})\)
  - 6174591765 vs. (617) 459-1765
  - IBMCIACSE vs. IBM CIA CSE
- **Rapid access** (~ 70ms) and **decay** (~200 ms)
  - Pass to LTM after a few seconds of continued storage

Long-term memory

- **Huge** (if not “unlimited”)
- **Slower access time** (~100 ms) with little decay
Activation Experiment

Volunteer
Activation Experiment

Volunteer

Start saying colors you see in list of words
  When slide comes up, as fast as you can
  There will be three columns of words

Say “done” when finished
  Everyone else time how long it takes
**Activation Experiment**

<table>
<thead>
<tr>
<th>word</th>
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<tbody>
<tr>
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Activation Experiment

Volunteer
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<td>red</td>
</tr>
<tr>
<td>red</td>
<td>green</td>
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</tr>
</tbody>
</table>
Activation Experiment

Do it again

Say “done” when finished
Activation Experiment

Do it again

Say “done” when finished
<table>
<thead>
<tr>
<th>red</th>
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<td>yellow</td>
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</tbody>
</table>
Model Human Processor Operation

Recognize-Act Cycle of the Cognitive Processor

On each cycle, contents in working memory initiate actions associatively linked in long-term memory.

Actions modify the contents of working memory.

Discrimination Principle

Retrieval is determined by candidates that exist in memory relative to retrieval cues.

Interference created by strongly activated chunks.

See also Freudian slips.
Perceptual Causality

How soon must the red ball move after cue ball collides with it?
Perceptual Causality

Stimuli that occur within one cycle of the perceptual processor fuse into a single concept

Requirement

If you want to create the perception of causality, then you need to be sufficiently responsive

Caution

Two stimuli intended to be distinct can fuse if the first event appears to cause the other
Today

Some example models of human performance

Visual System
Model Human Processor
Fitts’s Law
Gestalt Principles

Biological Model
Higher-Level Model
Model by Analogy
Predict Interpretation
Fitts’s Law (1954)
Models time to acquire targets in aimed movement
  Reaching for a control in a cockpit
  Moving across a dashboard
  Pulling defective items from a conveyor belt
  Clicking on icons using a mouse
Very powerful, widely used
  Holds for many circumstances (e.g., under water)
  Allows for comparison among different experiments
  Used both to measure and to predict
Fitts’s Law (1954)

Models time to acquire targets in aimed movement

- Reaching for a control in a cockpit
- Moving across a dashboard
- Pulling defective items from a conveyor belt
- Clicking on icons using a mouse

Very powerful, widely used

- Holds for many circumstances (e.g., under water)
- Allows for comparison among different experiments
- Used both to measure and to predict

James’s use of ’s is correct, but most people say Fitts’ Law
Fitts’s Law (1954)

Models time to acquire targets in aimed movement

  Reaching for a control in a cockpit
  Moving across a dashboard
  Pulling defective items from a conveyor belt
  Clicking on icons using a mouse

Very powerful, widely used

  Holds for many circumstances (e.g., under water)
  Allows for comparison among different experiments
  Used both to measure and to predict

https://en.wikipedia.org/wiki/Fitts's_law
Reciprocal Point-Select Task

Amplitude

Width
Closed Loop versus Open Loop

What is closed loop motion?

What is open loop motion?
Closed Loop versus Open Loop

What is closed loop motion?
- Rapid aimed movements with feedback correction
- Fitts’s law models this

What is open loop motion?
- Ballistic movements without feedback correction
- Example: Throwing a dart
- See Schmidt’s Law (1979)
Model by Analogy

Analogy to Information Transmission
Shannon and Weaver, 1959
Model by Analogy

Analogy to Information Transmission
Shannon and Weaver, 1959
Fitts’s Law

\[ MT = a + b \log_2(A / W + 1) \]

What kind of equation does this remind you of?
Fitts’s Law

\[ MT = a + b \log_2(A / W + 1) \]

What kind of equation does this remind you of?

\[ y = mx + b \]

\[ MT = a + bx, \text{ where } x = \log_2(A / W + 1) \]

\[ x \text{ is called the Index of Difficulty (ID)} \]

As “A” goes up, ID goes up

As “W” goes up, ID goes down
Index of Difficulty (ID)

\[ \log_2\left(\frac{A}{W} + 1\right) \]

Fitts’s Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W)

Why is it significant that it is a ratio?
Index of Difficulty (ID)

\[ \log_2\left( \frac{A}{W} + 1 \right) \]

Fitts’s Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W)

Why is it significant that it is a ratio?

Units of A and W don’t matter
Allows comparison across experiments
Index of Difficulty (ID)

\[ \log_2 \left( \frac{A}{W} + 1 \right) \]

Fitts’s Law claims that the time to acquire a target increases linearly with the log of the ratio of the movement distance (A) to target width (W).

ID units typically in “bits”

Because of association with information capacity and somewhat arbitrary use of base-2 logarithm.
Index of Performance (IP)

MT = a + b \log_2(A / W + 1)

b is slope

1/b is called Index of Performance (IP)

If MT is in seconds, IP is in bits/second

Also called “throughput” or “bandwidth”

Consistent with analogy of the interaction as an information channel from human to target
A Fitts’s Law Experiment
Experimental Design and Analysis

Factorial Design

Experiment with more than one manipulation

Within vs. Between Participant Design

Statistical power versus potential confounds

Carryover Effects and Counterbalanced Designs

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
<th>D</th>
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</table>

Latin Square Design

https://depts.washington.edu/aimgroup/proj/ps4hci/
“Beating” Fitts’s law

It is the law, right?

\[ MT = a + b \log_2(A / W + 1) \]

So how can we reduce movement time?

- Reduce A
- Increase W
Fitts’s Law Related Techniques

Put targets closer together

Make targets bigger

Make cursor bigger
  - Area cursors
  - Bubble cursor

Use impenetrable edges
Fitts’s Law Examples

Which will be faster on average?

Pop-up Linear Menu

<table>
<thead>
<tr>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
</tr>
<tr>
<td>Monday</td>
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<tr>
<td>Tuesday</td>
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<td>Friday</td>
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<tr>
<td>Saturday</td>
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</tbody>
</table>

Pop-up Pie Menu

- Today
- Sunday
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
Pie Menus in Use

The Sims

Rainbow 6

Maya
Fitts’s Law Examples

Which will be faster on average?

Pop-up Linear Menu

<table>
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<tr>
<td>Friday</td>
</tr>
<tr>
<td>Saturday</td>
</tr>
</tbody>
</table>

Pop-up Pie Menu

What about adaptive menus?
Fitts’s Law in Windowing

Windows 95: Missed by a pixel
Windows XP: Good to the last drop

Macintosh Menu
Fitts’s Law in MS Office 2007

Larger, labeled controls can be clicked more quickly

Mini toolbar is close to the cursor

Magic Corner: Office Button in the upper-left corner
Bubble Cursor

Grossman and Balakrishnan, 2005
Bubble Cursor

Grossman and Balakrishnan, 2005
Bubble Cursor with Prefab

Dixon et al, 2012
Zhai et al. (2002) pose stylus keyboard layout as an optimization of all key pairs, weighted by language frequency.

\[ MT = a + b \log_2 \left( \frac{D_{ij}}{W_j} + 1 \right), \]

\[ t = \sum_{i=1}^{27} \sum_{j=1}^{27} \frac{P_{ij}}{IP} \left[ \log_2 \left( \frac{D_{ij}}{W_j} + 1 \right) \right], \]
Hooke’s Keyboard
Optimizes a system of springs
Metropolis Keyboard

Random walk minimizing scoring function
Considering Multiple Space Keys

FITALY Keyboard
Textware Solutions

OPTI Keyboard
MacKenzie and Zhang 1999
Considering Multiple Space Keys

FITALY Keyboard
Textware Solutions

<table>
<thead>
<tr>
<th>Z</th>
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<td>M</td>
<td>P</td>
<td>X</td>
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</table>

OPTI Keyboard
MacKenzie and Zhang 1999

Correct choice of space key becomes important
Requires planning head to be optimal
ATOMIK Keyboard

Optimized keyboard, adjusted for early letters in upper left and later letters in lower right
Using Motor Ability in Design

Pointing

Dragging

List Selection

Gajos et al 2007
Interface Generation As Optimization

$\text{Estimated task completion time}$
Manufacturer Interface

Font Formatting

Font, Character Spacing, Text Effects

Type, Style and Size

<table>
<thead>
<tr>
<th>Font</th>
<th>Style</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
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<td>8</td>
</tr>
<tr>
<td>Arial Black</td>
<td>Italic</td>
<td>9</td>
</tr>
<tr>
<td>Comic Sans MS</td>
<td>Bold</td>
<td>10</td>
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<tr>
<td>Courier New</td>
<td>Bold Italic</td>
<td>11</td>
</tr>
<tr>
<td>Franklin Gothic Medium</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Underline style: (none)

Effects

- Strikethrough
- Double Strikethrough
- Superscript
- Subscript
- Shadow
- Outline
- Emboss
- Engrave
- Small Caps
- All Caps
- Hidden

Preview

Times New Roman

[Ok] [Cancel]
Person with Cerebral Palsy

<table>
<thead>
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<td>27</td>
</tr>
<tr>
<td>Times New Roman</td>
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</tr>
</tbody>
</table>
Person with Muscular Dystrophy
Interface Generation As Optimization

In a study with 11 participants with diverse motor impairments:

Consistently faster with generated interfaces (26%)

Fewer errors with generated interfaces (73% fewer)

Strongly preferred generated interfaces
Fitts’s Law Related Techniques

Gravity Fields
   Pointer gets close, gets “sucked in” to target

Sticky Icons
   When within target, pointer “sticks”

Constrained Motion
   Snapping,
   holding Shift to limit degrees of movement

Target Prediction
   Determine likely target,
   move it nearer or expand it
Fitts’s Law, Edge Targets, and Touch
Fitts’s Law, Edge Targets, and Touch

Avrahami finds edge targets are actually slower with touch devices, at same physical location.

Are people border cautious?
Today

Some example models of human performance

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Gestalt Psychology

Described loosely in the context of this lecture and associated work, not a real definition

Perception is neither bottom-up nor top-down, rather both inform the other as a whole
Gestalt Psychology

You can still see the dog…
Gestalt Psychology
You can still see the dog...
Spinning Wheel

Follow the red dots vs follow the yellow dots
Blind Spot Interpolation

Use right eye, look at letters
Painful Image Warning
Difficult to Reconcile
Proximity

Objects close to each other form a group
Proximity

Using Lies in Research
By Nate Bolt  •  March 8, 2011
While it might be an uncomfortable topic, uncovering the lies behind a product or interface can be one of the most effective ways to turn ailing projects around.

Considerations for Mobile Design (Part 2): Dimensions
By David Leggett  •  March 1, 2011
In part two of this series, David helps readers adapt their design regimes to the (typically) small screens of mobile devices. Using responsive design, our experiences adapt to a variety of conditions.

A Simple, Usable Review
By Paul Seys  •  February 24, 2011
In this detailed review, Paul Seys describes an up-and-coming UX title that’s jam-packed with lessons for designers both new and established. Follow along to learn how author Giles Colborne’s teaches his readers the essence of great design.
Proximity

1. Tell us about yourself...
   - My Name: First Name: Owoh
   - Gender: - Select One -
   - Birthday: - Select Month - Day Year
   - I live in: United States
   - Postal Code:

2. Select an ID and password
   - Yahoo! ID and Email: @ yahoo.com
   - Password
   - Re-type Password

3. In case you forget your ID or password...
   - Alternate Email
   - 1.Security Question: - Select One -
   - Your Answer
   - 2.Security Question: - Select One -
   - Your Answer
Similarity

Objects that are similar form a group
Similarity
Proximity and Similarity
Proximity and Similarity

After discovering that one of these accesses a menu, people will expect they all access a menu. They are the same.
Closure

Even incomplete objects are perceived as whole

Increases regularity of stimuli
Closure

The Sims

Rainbow 6
Symmetry

Objects are perceived as symmetrical and forming around a center point.

If you fight symmetry, be sure you have a reason.
Continuity

Objects perceived as grouped when they align
Remain distinct even with overlap
Preferred over abrupt directional changes

what most people see
not this
Continuity
Models from Different Perspectives

Some example models of human performance

Visual System
Model Human Processor
Fitts’s Law
Gestalt Principles

Biological Model
Higher-Level Model
Model by Analogy
Predict Interpretation
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 12: Human Performance

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh

Tuesday / Thursday
12:00 to 1:20
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 13: Interface Implementation
Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
Nigini Oliveira
Chris Seeds
Jihoon Suh
Project Status

Looking Forward

3e: Digital Mockup Due Thursday 11/16
3f: Report Due Monday 11/27
3g: Presentation Due Wednesday 11/29

4a: Initial Website Due Monday 11/27
4b: Video Prototype Due Monday 12/4

Other Assignments

Reading 5 Due Saturday 12/2, Sooner is Better
Exam

Next Tuesday 11/21, in Denny 303

Mostly short answer, some long answer

Content drawn from lecture and readings

Compilation of the lecture slides is posted

Q&A scheduled Monday at 3:00 in CSE 403
Tools and Interfaces

Why Interface Tools?
Case Study of Model-View-Controller
Case Study of Animation
Sapir-Whorf Hypothesis
Thoughtfulness in Tools
Case Study in Self-Tracking
Objectives

Be able to:

Describe benefits of tools in interface implementation, why we use them

Describe the Model/View/Controller approach to organizing interface implementation

Describe why tools eventually limit design thinking
Sequential Programs

Program takes control, prompts for input

Person waits on the program

Program says when it is ready for more input, which the person then provides
Sequential Programs

while true {
    print "Prompt for Input"
    input = read_line_of_text()
    output = do_work()
    print output
}

Person is literally modeled as a file
Event-Driven Programming

A program waits for a person to provide input.

All communication done via events:
  - "mouse down",
  - "item drag",
  - "key up"

All events go to a queue:
  - Ensures events handled in order
  - Hides specifics from applications

How many of these queues? How can you tell?
Basic Interactive Software Loop

do {
    e = read_event();
    dispatch_event(e);
    if (damage_exists())
        update_display();
} while (e.type != WM_QUIT);

All interactive software has this somewhere
Basic Interactive Software Loop

Have you ever written this loop?
Basic Interactive Software Loop

Have you ever written this loop?

Contrast with:

“One of the most complex aspects of Xlib programming is designing the event loop, which must take into account all of the possible events that can occur in a window.”

Understanding Tools

We use tools because they
- Identify common or important practices
- Package those practices in a framework
- Make it easy to follow those practices
- Make it easier to focus on our application

What are the benefits of this?
Understanding Tools

We use tools because they

- Identify common or important practices
- Package those practices in a framework
- Make it easy to follow those practices
- Make it easier to focus on our application

What are the benefits of this?

- Being faster allows more iterative design
- Implementation is generally better in the tool
- Consistency across applications using same tool
Understanding Tools

Why is designing tools difficult?

Need to understand the core practices and problems
Those are often evolving with technology and design

Example: Responsiveness in event-driven interface

Event-driven interaction is asynchronous

How to maintain responsiveness in the interface while executing some large computation?
Understanding Tools

Why is designing tools difficult?
Need to understand the core practices and problems
Those are often evolving with technology and design

Example: Responsiveness in event-driven interface

Cursor:
WaitCursor vs. CWaitCursor vs. In Framework

Progress Bar:
Data Races vs. Idle vs. Loop vs. Worker Objects
Fundamental Tools Terminology

Threshold vs. Ceiling

Threshold: How hard to get started
Ceiling: How much can be achieved
These depend on what is being implemented

Path of Least Resistance

Tools influence what interfaces are created

Moving Targets

Changing needs make tools incomplete or obsolete

Myers et al, 2000
http://dx.doi.org/10.1145/344949.344959
Tools and Interfaces

Why Interface Tools?
Case Study of Model-View-Controller
Case Study of Animation
Sapir-Whorf Hypothesis
Thoughtfulness in Tools
Case Study in Self-Tracking
Model-View-Controller

How to organize the code of an interface?

This is a surprisingly complicated question, with unstated assumptions requiring significant background to understand and resolve.
Seeheim Model

Results from 1985 workshop on user interface management systems, driven by goals of portability and modifiability, based in separating the interface from application functionality.

Buxton, 1983
http://dx.doi.org/10.1145/988584.988586
Seeheim Model

Lexical - Presentation
External presentation of interface
Generates the display, receive input

Syntactic - Dialog Control
Parsing of tokens into syntax
Maintain state

Semantic - Application Interface Model
 Defines interaction between interface and rest of software

- e.g., “add” vs. “append” vs. “^a” vs. e.g., how to make a “menu” or “button”
- e.g., three-state model, interface modes
- e.g., drag-and-drop target highlighting
Seeheim Model

Lexical
Presentation

Syntactic
Dialogue Control

Semantic
Application Interface Model

USER

APPLICATION
Seeheim Model

Lexical

Presentation

Dialogue Control

Syntactic

Semantic

Application Interface Model

USER

APPLICATION

Huh?
Seeheim Model

Rapid Semantic Feedback
In practice, all of the code goes in here
Model-View-Controller

Introduced by Smalltalk developers at PARC
Partitions application to be scalable, maintainable
View / Controller Relationship

In theory:

Pattern of behavior in response to input events (i.e., concerns of the controller) are independent of visual geometry (i.e., concerns of the view)

Controller contacts view to interpret what input events mean in context of a view (e.g., selection)
View / Controller Relationship

In practice:

View and controller often tightly intertwined, almost always occur in matched pairs

Many architectures combine into a single class
Model-View-Controller

MVC separates concerns and scales better than global variables or putting everything together

Separation eases maintenance
- Can add new fields to model, new views can leverage, old views will still work
- Can replace model without changing views

Separation of “business logic” can require care
- May help to think of model as the client model
Model-View-Collection on the Web

Core ideas manifest differently according to needs

For example, backbone.js implements client views of models, with REST API calls to web server.

Web tools often implement views as templates.
Model View View-Model

Design to support data-binding by minimizing functionality in view

Also allows greater separation of expertise
Tools and Interfaces

Why Interface Tools?
Case Study of Model-View-Controller
Case Study of Animation
Sapir-Whorf Hypothesis
Thoughtfulness in Tools
Case Study in Self-Tracking
Luxor Jr.
Luxor Jr.
Animation Case Study

Principles of Traditional Animation Applied to 3D Computer Animation

Lasseter, 1987

http://dx.doi.org/10.1145/37402.37407
Squash and Stretch
Squash and Stretch
Squash and Stretch

FIGURE 4a. In slow action, an object's position overlaps from frame to frame which gives the action a smooth appearance to the eye.

FIGURE 4b. Strobing occurs in a faster action when the object's positions do not overlap and the eye perceives separate images.

FIGURE 4c. Stretching the object so that its positions overlap again will relieve the strobing effect.
Just two drawings of a head, the first showing it leaning toward the right shoulder and the second with it over on the left and its chin slightly raised, can be made to communicate a multitude of ideas, depending entirely on the Timing used. Each inbetween drawing added between these two "extremes" gives a new meaning to the action.

**NO inbetweens........** The Character has been hit by a tremendous force. His head is nearly snapped off.

**ONE inbetweens........** The Character has been hit by a brick, rolling pin, frying pan.

**TWO inbetweens........** The Character has a nervous tic, a muscle spasm, an uncontrollable twitch.

**THREE inbetweens.....** The Character is dodging a brick, rolling pin, frying pan.
Timing

FOUR inbetweens........... The Character is giving a crisp order, "Get going!" "Move it!"

FIVE inbetweens........... The Character is more friendly, "Over here." "Come on-hurry!"

SIX inbetweens............ The Character sees a good looking girl, or the sports car he has always wanted.

SEVEN inbetweens........... The Character tries to get a better look at something.
EIGHT inbetweens........... The Character searches for the peanut butter on the kitchen shelf.

NINE inbetweens...........The Character appraises, considering thoughtfully.

TEN inbetweens........... The Character stretches a sore muscle.
Anticipation
FIGURE 6. Andre’s scratch was staged to the side (in "silhouette") for clarity and because that is where his itch was.
FIGURES 7-8. In Luxo Jr., all action was staged to the side for clarity.
Follow Through, Overlap, Secondary
Pose-to-Pose, Slow In, Slow Out

Objects with mass must accelerate and decelerate. Interesting frames are typically at ends, tweaks perception to emphasize these poses.
Arcs
Luxor Jr.
Luxor Jr.
Animation: From Cartoons to the User Interface

Chang and Ungar, 1993

http://dx.doi.org/10.1145/168642.168647
Frames Three Principles

Solidity
- Desktop objects should appear to be solid objects

Exaggeration
- Exaggerate physical actions to enhance perception

Reinforcement
- Use effects to drive home feeling of reality
Solidity: Motion Blur

No Motion Blur

Motion Blur

time
Solidity: Arrival and Departure
Solidity: Arrival and Departure
Exaggeration: Anticipation

Figure 7. Objects anticipate major actions with a quick contrary motion that draws the user eye to the object in preparation for the main motion to come.
Figure 8. Objects ease out of their beginning poses and ease into their final poses. Although these motions are slower than that during the main portion of the movement, they are still quite fast.
Reinforcement: Arcs

Figure 9. When objects travel under their own power (non-interactively), they move in arcs rather than straight lines.
Reinforcement: Follow Through

Figure 10. When objects come to a stop after moving on their own, they exhibit follow through in the form of wiggling back and forth quickly. This is just suggested by the "wiggle lines" in the figure—in actuality, the object moves back and forth, with motion blur.
Animation Support in a User Interface Toolkit: Flexible, Robust, and Reusable Abstractions

Hudson and Stasko, 1993

http://dx.doi.org/10.1145/168642.168648
Events and Animation

Figure 5. Animation Event Translation and Dispatch
Not Just an Implementation

Provides tool abstractions for implementing previously presented styles of animation

Overcomes a fundamental clash of approaches

Event loop receives input, processes, repaints

Animations expect careful control of frames, but the event loop has variable timing
Events and Animation

Figure 5. Animation Event Translation and Dispatch
Transition Object

Figure 3. Parts of a Transition Object
Pacing Function

Figure 4. Two Example Pacing Functions
Computing a Frame

Figure 8. Translation from Time to Space
Animation Case Study

Based on increased understanding of how animation should be done in the interface, increasingly mature tools develop.

Now built into major commercial toolkits (e.g., Microsoft’s WPF, JavaFX, jQuery).

Once mature, begins to be used as a building block in even more complex behaviors.
Animation Case Study

The Kinetic Typography Engine: An Extensible System for Animating Expressive Text

Lee et al, 2002

http://dx.doi.org/10.1145/571985.571997
Kinetic Typography Engine

Kinetic Typography

Johnny Lee, Jodi Forlizzi, Scott Hudson
Carnegie Mellon University
Human-Computer Interaction Institute
2002
Kinetic Typography Engine

Kinetic Typography

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Goals of Kinetic Type

- Emotional content
- Creation of characters
- Direction of attention

Animation Composition

Figure 6. Waveform addition by chaining

Figure 7. Waveform scaling by functional composition with amplitude
Tools and Interfaces

Why Interface Tools?
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Sapir-Whorf Hypothesis

Roughly, some thoughts in one language cannot be stated or understood in another language.

Our tools define the language of interaction

Beyond the simple matter of code
Frame how we think about possibilities.

Sapir-Whorf Hypothesis

Roughly, some thoughts in one language cannot be stated or understood in another language

Language is not simply a way of voicing ideas, but is the very thing which shapes those ideas

Our tools define the language of interaction

Beyond the simple matter of code
Frame how we think about possibilities

You must be aware of this when choosing tools, designing applications, and creating new tools
Phosphor: Explaining Transitions in the User Interface Using Afterglow Effects

Baudisch et al, 2006

http://dx.doi.org/10.1145/1166253.1166280
Phosphor

Animation can help people follow interface transitions

But the right speed is crucial
  Too fast increases error rate
  Too slow increases task time

The right speed depends on familiarity, distraction, etc.
  It cannot be determined
Phosphor

Phosphor shows the outcome immediately, then explains change in retrospect using a diagrammatic depiction.
Phosphor

phosphor
Phosphor

phosphor
Challenging Assumptions of Tools

Phosphor breaks from the assumptions that have evolved into current transition tools
Prefab

Prefab uses pixel analysis to modify existing applications from the outside, using only pixels.

Prefab is informed by how toolkits work, but not linked to any particular toolkit implementation.

Allows trying and fielding new ideas that are not supported by existing applications or toolkits.
Prefab
Prefab
Understanding Tools

Tools promote and encapsulate proven practices
   Reduce expertise barriers
   Enable more rapid and iterative implementation

Codification eventually constrains design
   Inevitable consequence of codification versus evolving understanding of emerging technologies

Codification goes deeper than the code
   Frames how we think about our applications

Rebuilding the Language

We regularly rebuild the entire system
- Command Line, Text Screens
- Multiple Generations of Desktop
- Multiple Generations of Web
- Mobile Apps

We will do it again
- Several near-term challenges require it
  e.g., Touch, Cloud, Distributed Interfaces

Backward compatibility helps, but is not required

Informing the Next Language

Research explores the next generation of language, while being limited by the current

We therefore conflate:

- Ideas
- Proof of Concept
- Engineering
- Implementation
- Broken Metaphors
- Unspeakably Dirty Hacks
Informing the Next Language

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Prefab is not just about ‘do everything with pixels’, but about exploring new possibilities in the current ecosystem of interface tools.
Mobile Phones as Pagers

Our notion of technology design for journals / ESM / EMA has been anchored by papers journals and pager-based reminders.

Unlock Journaling for Self-Report

Zhang, Pina, Fogarty. Examining Unlock Journaling with Diaries and Reminders ... CHI 2016.
Unlock Journaling for Self-Report

Unlock Journaling for Self-Report

Pleasure and Accomplishment (e.g., self-monitoring depressive symptoms)

Lejuez, Hopko, Acierno, Daughters, Pagoto. ... Behavioral Activation Treatment for Depression ... Behav Modif 2011.
Unlock Journaling for Self-Report

Russell’s Affect Grid

Unlock Journaling vs. Notifications

Unlock journaling is:

rated less intrusive
(1.77 vs. 2.22 on a 5-point scale)
yields greater frequency
(15.0 vs. 9.8 per 12-hour day)
comparable timeliness
(8.6 vs. 9.3 minutes)

Instead of reminders to journal, unlock journaling makes the opportunity visible, easy, and optional

It should not have taken 10 years to get here
Mobile Food Journals

Origins in daily recall

Self-monitoring of food can support many goals

- Weight Loss
- Diabetes Management
- Trigger Identification

High burdens detract from potential benefit, data is often wrong

Mobile Food Journals

Mobile devices provide real-time feedback

Search for each food in a large database, often breaking into components

Typically provide calorie-based feedback

High burdens detract from potential benefit, data is often wrong

Perceptions of Healthy Eating

“What does healthy eating look like to you?”

Food types:
- “vegetables”
- “fruits”
- “protein”

Food qualities:
- “low processed”
- “organic”
- “fresh”

Diet qualities:
- “balanced”
- “variety”
- “portion”

Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal … CHI 2015.
Difficulty as a Negative Nudge

“I just avoided eating things that were hard to log” – SP132

“Prepackaged meals were the easiest because of bar codes but those aren’t healthy” – SP123

“I could make life easier by eating the same things regularly” – SP97

“It discourages you from eating out or at a friend’s, even if it is healthy” – SP42

Cordeiro, Epstein, Thomaz, Bales, Jagannathan, Abowd, Fogarty. Barriers and Negative Nudges ... CHI 2015.
Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal ... CHI 2015.
Deploying a Photo-Based Journal

Mobile capture and review

Web review and annotation

Cordeiro, Bales, Cherry, Fogarty. Rethinking the Mobile Food Journal … CHI 2015.
Leveling the Difficulty of Journaling

With prior techniques:

- 60% report not journaling because it was too difficult
- 65% report not journaling because they did not know

With photo-based capture:

- 22% report not journaling because it was too difficult
- None report not journaling due to food knowledge

“For some meals, it’s just really easy to take a picture … than sit there and type in every ingredient” – FP20
Journaling without Judgment

With prior journals, participants report choosing not to journal because they would exceed a calorie budget or because a food was unhealthy

13% of survey participants
45% of field participants

Photos enable mindfulness while avoiding judgment

“[it was] easier because there were no calorie counts, no judgments, but still makes you aware” – FP14

“Do I really want to eat this? I’m capturing this” – FP17
Triggers and Trends

“I eat too much pizza” – FP10

“I’m surprised at how many times I’m seeing things that I consider an exception to my diet!” – FP4

“I don’t branch out as much as I thought I did, even when I go somewhere new, I kind of get what I always get somewhere else” – FP10
Food Journals as Daily Recall

“it should be noted that much of the use of food journaling is in a more clinical setting with the purpose being sharing and evaluating the journal with nutritionists and care providers …

it’s not relevant if photos are more or less easily understood by the user if a nutritionist is the eventual consumer of the data”

– Actual Anonymous Grumpy R3
Tools and Interfaces

Tools embody expertise and assumptions

Tools evolve based on emerging understanding of how to address categories of problems

Be conscious of your tool decisions

Try to think about designs before tying to a tool
Choose good and appropriate tools
Understand what you are getting in a tool
Push yourself to think outside the tool
CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 13: Interface Implementation

Tuesday / Thursday
12:00 to 1:20

James Fogarty
Kailey Chan
Dhruv Jain
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Chris Seeds
Jihoon Suh