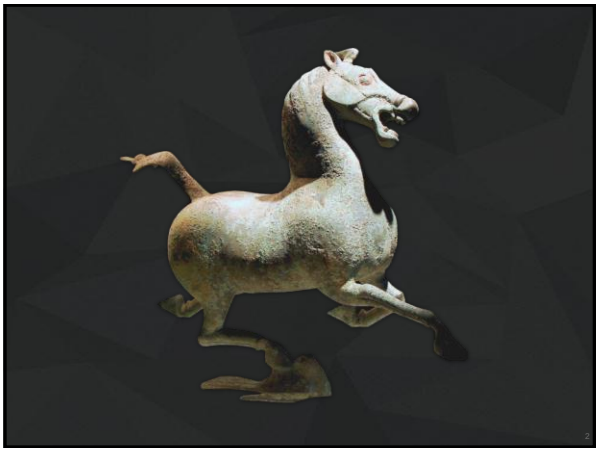
USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Introduction & Course Overview
CSE 440: Introductory HCI

Prof. James A. Landay
University of Washington

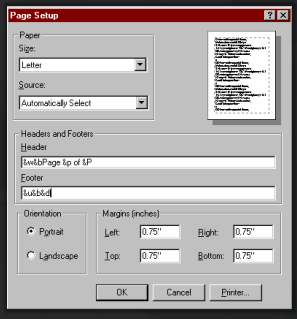
Autumn 2012

September 25, 2012



B A L A N C E

Hall of Fame or Shame?



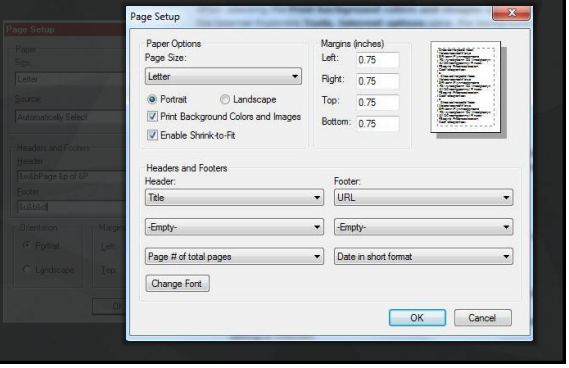
Page setup for printing in IE5

Hall of Shame!

Page setup for printing in IE5

- Page preview nice, but
- Problems
  - codes for header & footer information
    - requires recall!
    - want recognition
    - no equivalent GUI
  - help is the way to find out, but not obvious

Later Versions of IE Fix This



Hall of Fame or Shame?

Asiana Airlines interface for sending email or SMS from plane

Hall of Shame!

Asiana Airlines interface for sending email or SMS from plane

- Cool, but
  - text entry using this this input device is VERY tedious
  - crashes often

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Who are We?

James Landay

- Professor in CSE at the University of Washington
  - formerly professor in EECS at UC Berkeley
  - spent 3 years as Director of Intel Labs Seattle
  - just finished 2.5 year sabbatical at Microsoft Research Asia
- Ph.D. in CS from Carnegie Mellon '96
- HCI w/ focus on informal input (pens, speech, etc.), web design (tools, patterns, etc.), & Ubiquitous Computing (Ubicomp)
- Founded NetRaker, leader in web experience management (later sold to Keynote)
- Co-authored *The Design of Sites* with Doug van Duyne & Jason Hong
- Office Hours: Wed, 3-4 PM, 642 CSE & Mon 11 AM-12, Online
- Email: landay at cs.washington.edu

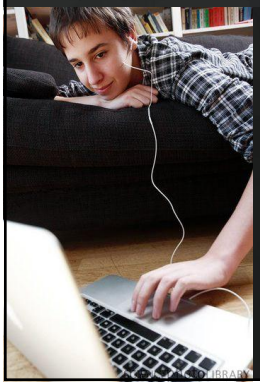
Nikki Lee

- M.S. student in HCDE at the University of Washington
- B.S. in ECE from Olin College 2010
- HCI w/ focus on interaction design, ubicomp, web
- Office Hours TBD
- Email: nblee at uw.edu

Kim Brown

- Undergraduate student in HCDE at the University of Washington
- Took CSE 440 last year
- Office Hours TBD
- Email: brownks at uw.edu

Human-Computer Interaction (HCI)



Human
- the end-user of a program
- *the others they work or communicate with*

Computer
- the machine program runs on
- *split between clients & servers*

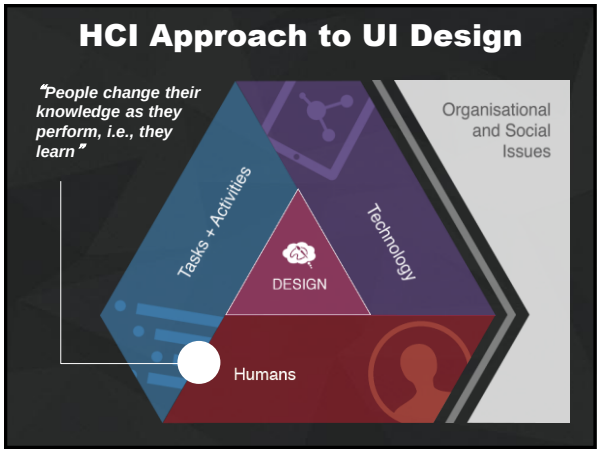
Interaction
- user tells the computer what they want
- computer communicates results

User Interfaces (UIs)

- Part of application that allows people
  - to interact with computer
  - to carry out their task
- User vs. Customer vs. Client
  - user is a term only used by 2 industries → bad!
  - *customer* – person who will use the product you build
  - *client* – the company who is paying you to build it

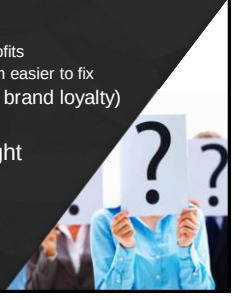
HCI = design, prototyping, evaluation, & implementation of UIs

HCI Approach to UI Design



Why is HCI Important?

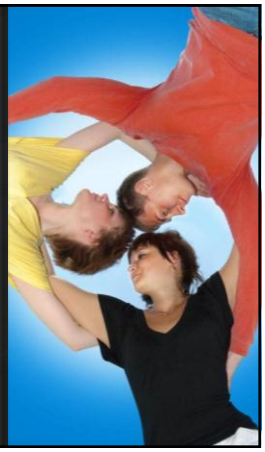
- Major part of work for "real" programs
  - approximately 50%
- Bad user interfaces cost
  - money
    - 5%↑ satisfaction → up to 85%↑profits
    - finding problems early makes them easier to fix
  - reputation of organization (e.g., brand loyalty)
  - lives (Therac-25)
- User interfaces hard to get right
  - people are unpredictable
  - intuition of designers often wrong



Who Creates UIs?

A team of specialists (ideally)

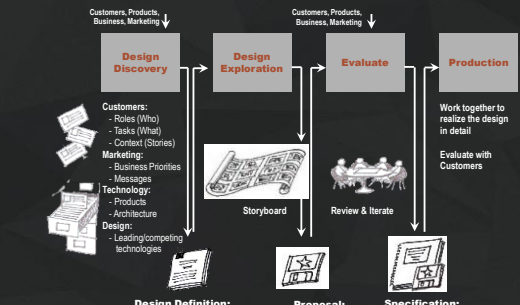
- graphic designers
- interaction / interface designers
- information architects
- technical writers
- marketers
- program managers
- test engineers
- usability engineers
- researchers (ethnographers, etc.)
- software engineers
- hardware engineers
- industrial designers
- customers



How to Design and Build Good UIs

- UI Development process
- Usability goals
- User-centered design
- Design discovery
- Rapid prototyping
- Evaluation
- *Programming*

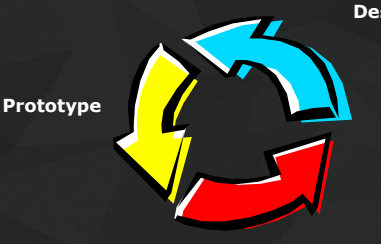
User Interface Development Process



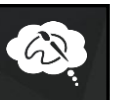
based on slide by Sara Redpath, IBM & Thyra Trauch, Tivoli

Iteration

At every stage!



Design



Design is driven by requirements

- what the artifact is for
- not how it is to be implemented
- e.g., phone not as important as *mobile* app.

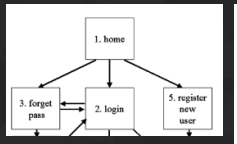
A design represents the artifact

- for UIs these representations include (?)
  - screen sketches or storyboards
  - flow diagrams/outline showing task structure
  - executable prototypes
- representations simplify

Write essay
start word processor
write outline
fill out outline
Start word processor
find word processor icon
double click on icon
Write outline
write down high-level ideas
.
.
.

UI Design Representations

Flow / Site Maps



Storyboards

Schematics

Mock-ups

Usability(?)

According to the ISO:
The *effectiveness*, *efficiency*, and *satisfaction* with which specified users achieve specified *goals* in particular environments

This does not mean you have to create a "dry" design or something that is only good for novices – it all depends on your goals

Usability/User Experience Goals

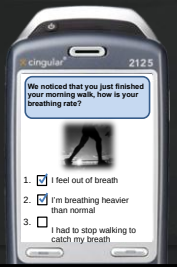
- **Set goals early & later use to measure progress**
- **Goals often have tradeoffs, so prioritize**
- **Example goals(?)**
  - Learnable
    - faster the 2nd time & so on
  - Memorable
    - from session to session
  - Flexible
    - multiple ways to do tasks
  - Efficient
    - perform tasks quickly
  - Robust
    - minimal error rates
    - good feedback so user can recover
  - Discoverable
    - learn new features over time
  - Pleasing
    - high user satisfaction
  - Fun

User-centered Design
"Know thy User"

- Cognitive abilities
  - perception
  - physical manipulation
  - memory
- Organizational / educational job abilities & skills
- Keep users involved throughout
  - developers working with target customers
  - think of the world in users terms
  - not technology-centered/feature driven

Design Discovery
Task Analysis & Contextual Inquiry

- Observe existing work practices
  - augment with self-report tools (e.g., ESM)



Design Discovery
Task Analysis & Contextual Inquiry

- Observe existing work practices
  - augment with self-report tools (e.g., ESM)
- Create examples & scenarios of actual use
- Discover tasks to design for
- Answer key questions about tasks & users
- "Try-out" new ideas before building software

Video Prototyping

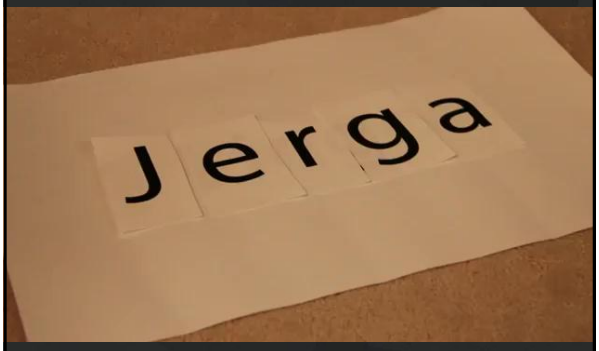
- Illustrate how users will interact w/ system
- Unlike brainstorming…
  video prototyping contracts the design space

- Quick to build
- Inexpensive
- Forces designers to consider details of how users will react to the design
- May better illustrate context of use

Team Buddy Map

Backcountry Savior

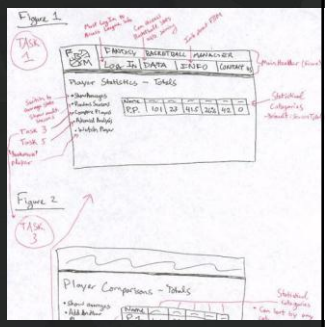
Craig Panthen : Philip Kuo : Heidi Tanamulia : Christopher White
CSE 440F : Professor Landay



Rapid Prototyping

Fantasy Basketball

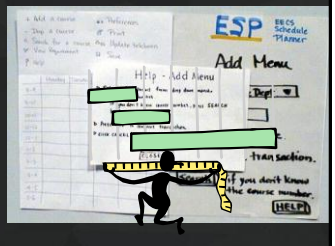
- Build a mock-up of design so you can test
- Low fidelity techniques
  - paper sketches
  - cut, copy, paste
- Interactive prototyping tools
  - HTML, Visual Basic, Flash, DENIM, SketchFlow, Balsamiq, etc.
- UI builders
  - Expression Blend + Visual Studio, etc.



Evaluation

- Test with real customers (participants)
  - w/ interactive prototype
  - low-fi with paper "computer"
- Build models
  - GOMS
- Low-cost techniques
  - expert evaluation
  - walkthroughs
  - online testing

ESP



Goals of the Course

1) Learn to design, prototype, & evaluate UIs
   - the needs & tasks of prospective customers
   - cognitive/perceptual constraints that affect design
   - technology & techniques used to prototype UIs
   - techniques for evaluating a user interface design
   - importance of iterative design for usability
   - how to work together on a team project
   - communicate your results to a group
     - key to your future success
2) Understand where technology is going & what UIs of the future might be like

Course Format

- Interactive lectures
- Quarter long project & homework
- Readings
- All material will be online
  - slides, exercises, readings, schedule
- Have fun & participate!

How HCI Fits into CS Curriculum

- Most courses for learning technology
  - compilers, operating systems, databases, etc.
- HCI concerned w/ *design & evaluation*
  - technology as a tool to evaluate via prototyping
  - skills will become very important upon graduation
    - complex systems, large teams
    - don't look for large immediate impact in other CS courses

Project Proposal (due Thursday)

- Each of you will propose an interface idea
  - fixing something you don't like or a new idea
- Groups
  - 4-5 students to a group
  - work with students w/ different skills/interests
  - groups meet with teaching staff every 2 weeks
- Cumulative
  - apply several HCI methods to a single interface

Project Process Overview

- Project proposal (individual)
  - due Thursday (September 27)
- Break-up into groups the following week
- Project contextual inquiry
- Project task analysis & sketches
  - based on CI & field work
- In class presentations & critiques
- Design sketching & video prototyping
  - i.e., rough proposals that can & will change
- Low fidelity prototyping & user testing
- In class presentations & critiques

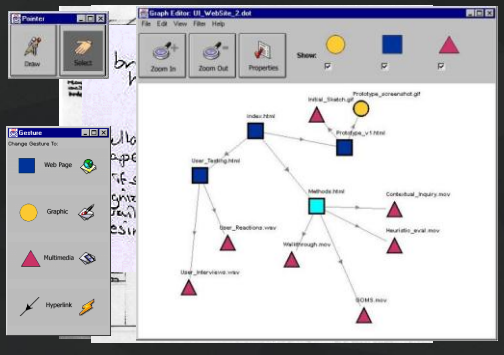
Project Process Overview

- Rapid prototype using tools
- Heuristic Evaluation
- Final presentations & project fair with industry guests

Project Examples

- *SiteSketch*
  - web page design
  - sketch-based

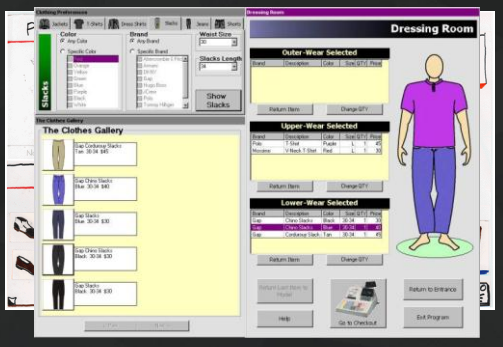
SiteSketch



Project Examples (cont.)

- *Clothes Shopper*
  - online shopping
  - knows your prefs & sizes

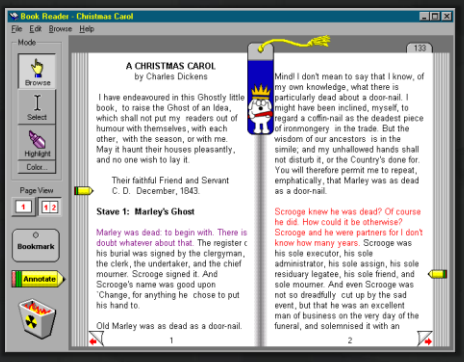
Clothes Shopper



Project Examples (cont.)

- *Electronic book reader*
  - take advantage of all the online texts on the net

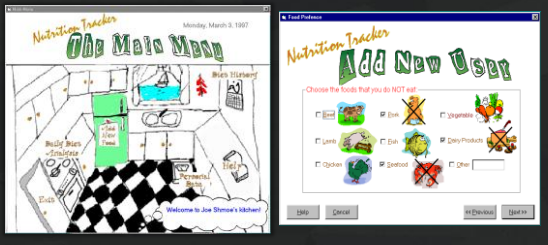
Electronic Book Reader



Project Examples (cont.)

- *Nutrition tracker*

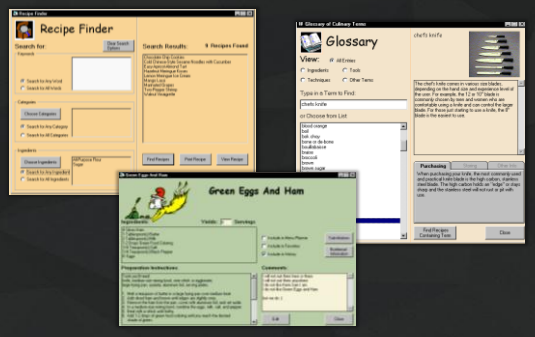
Nutrition Tracker



Project Examples (cont.)

- *cUIzine*
  - recipe tool for the home

cUIzine

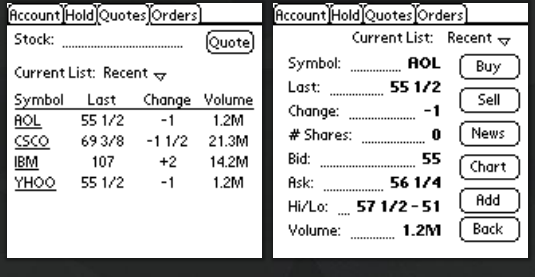


Project Examples (cont.)

- *PDA Baseball score keeper*
  - have stats of the players on your PDA
  - keep track of what happens during the game
  - upload stats after the game

PDA Baseball Scorekeeper

PalmStock



InkChat

Nutrition/Exercise Tracker

Progress Report

From: Oct 1, 1998

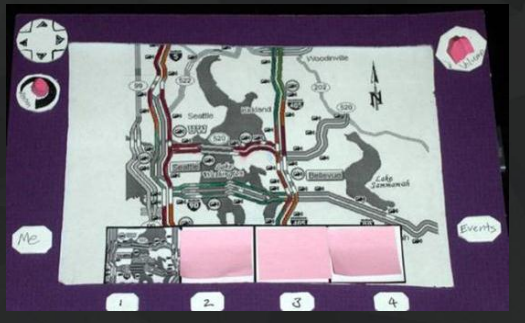
To: Oct 31, 1998

Category	Intake	Sugg.	%
Cals.burned	9398	3049	308
Calories	2862	6027	47
Total fat	5483	1107	495
Satd. fat	7657	4631	165
Cholesterol	3578	1003	356
Sodium	2050	3208	63
Proteins	9472	2004	472

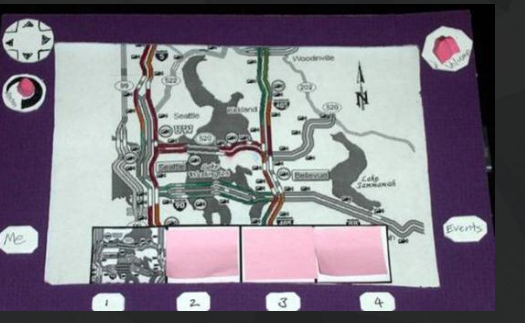
Done

Trippin'

Traffic Monitor



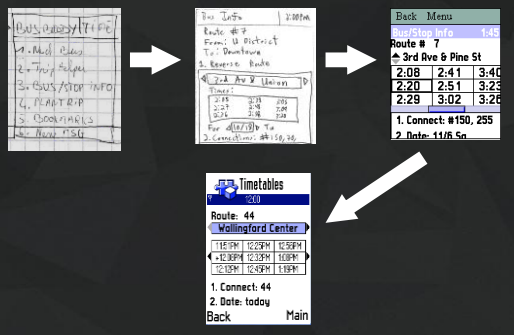
Traffic Monitor



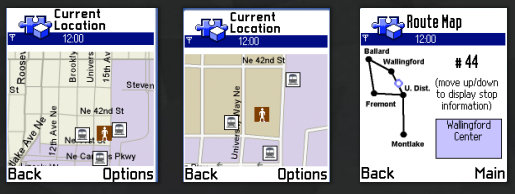
Traffic Monitor

Otto: Location-based Photos

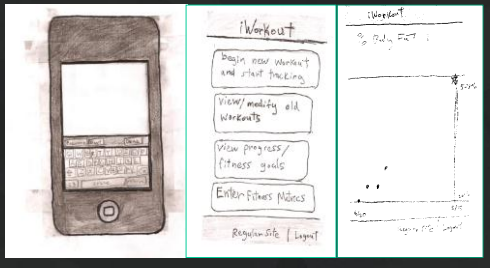
Bus Buddy



Bus Buddy

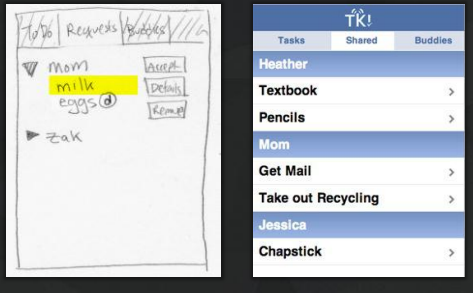


iWorkout



Radr

TaskKaster

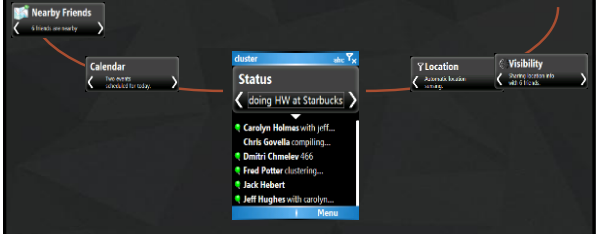


Swickr

Bargain Hunter

Cluster

Cluster

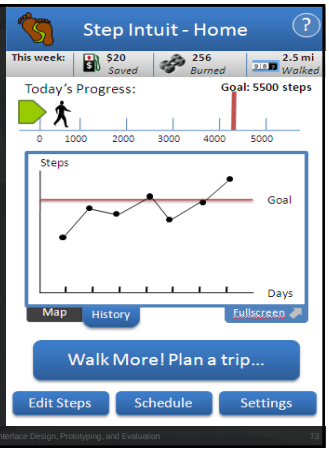


SmallWorld

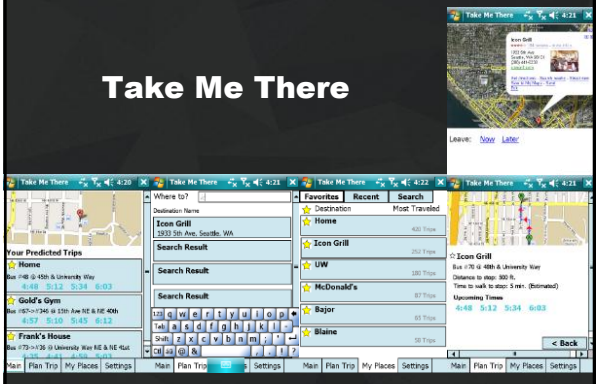
GreenBean

MyTransTracker

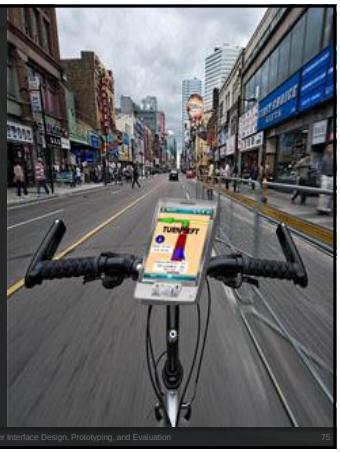
StepIntuit



Take Me There

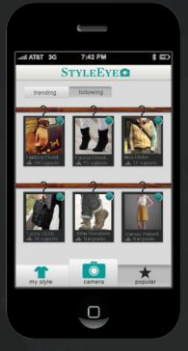


BikeNav



CarbonShopper

StyleEye



Project Themes

- Mobile computing (e.g., phone)
- Projects should address one of the following briefs
- Change
  - Transform your or your family's behavior
  - Past examples: fitness, sustainability, etc.
- Crowd-sourced mobile AI
  - Use Mechanical Turk to give an application perfect vision, speech recognition, sorting data, etc.
  - Design two UIs: 1 for end-user and 1 for Turk worker
- Creativity
  - Help people be more creative in their everyday live

Books

- The Design of Sites by van Duyne, Landay, & Hong
  - online copies of the 4-5 chapters we will use
- We will also hand out other papers, give you web links, & refer to lecture slides
- Recommended textbooks
  - *Designing the User Interface: Strategies for Effective Human-Computer Interaction* by Shneiderman & Plaisant, 5th edition (2009)
  - order from Amazon.com (link off class web page)
- Other recommended books on web page

Assignments

- Individual
  - 3 written + in-class studio + one talk each
- Group
  - 6 written assignments
    - 4 presentation/demos with the write-ups + poster
  - all group work handed in on Web
    - group web site & blog

Grading

- A combination of
  - midterm (20%)
  - individual assignments & presentation (15%)
  - group project (60%)
    - demos/presentations/poster (group component)
    - project write-ups and exercises
    - ratings given by other team members & class
  - in class participation (5%)
- No curve
- No final (though late midterm)

Tidbits

- Late Policy
  - no lates on group assignments
  - individual assignments lose one letter grade/day
- Cheating policy
  - will get you an failing grade in the course

Administrivia

- Roll
- Waiting list for those who want to add
  - sort out after 1st week

Summary

- HCI an important part of most software produced today
- Getting the interface right is hard, but…
- Solution in *Iterative Design* including repeated cycles of
  - Design
  - Prototyping
  - Evaluation