Human Computer Interaction

Term Project / Intro to HCI

CSCI 4620 U/G | SOFE 4850

Dr. Christopher Collins

Acknowledgement: Parts of these lectures are based on material prepared by Ron Baecker, Ravin Balakrishnan, John Chattoe, Ilona Posner, Scott Klemmer, and Jeremy Bradbury.

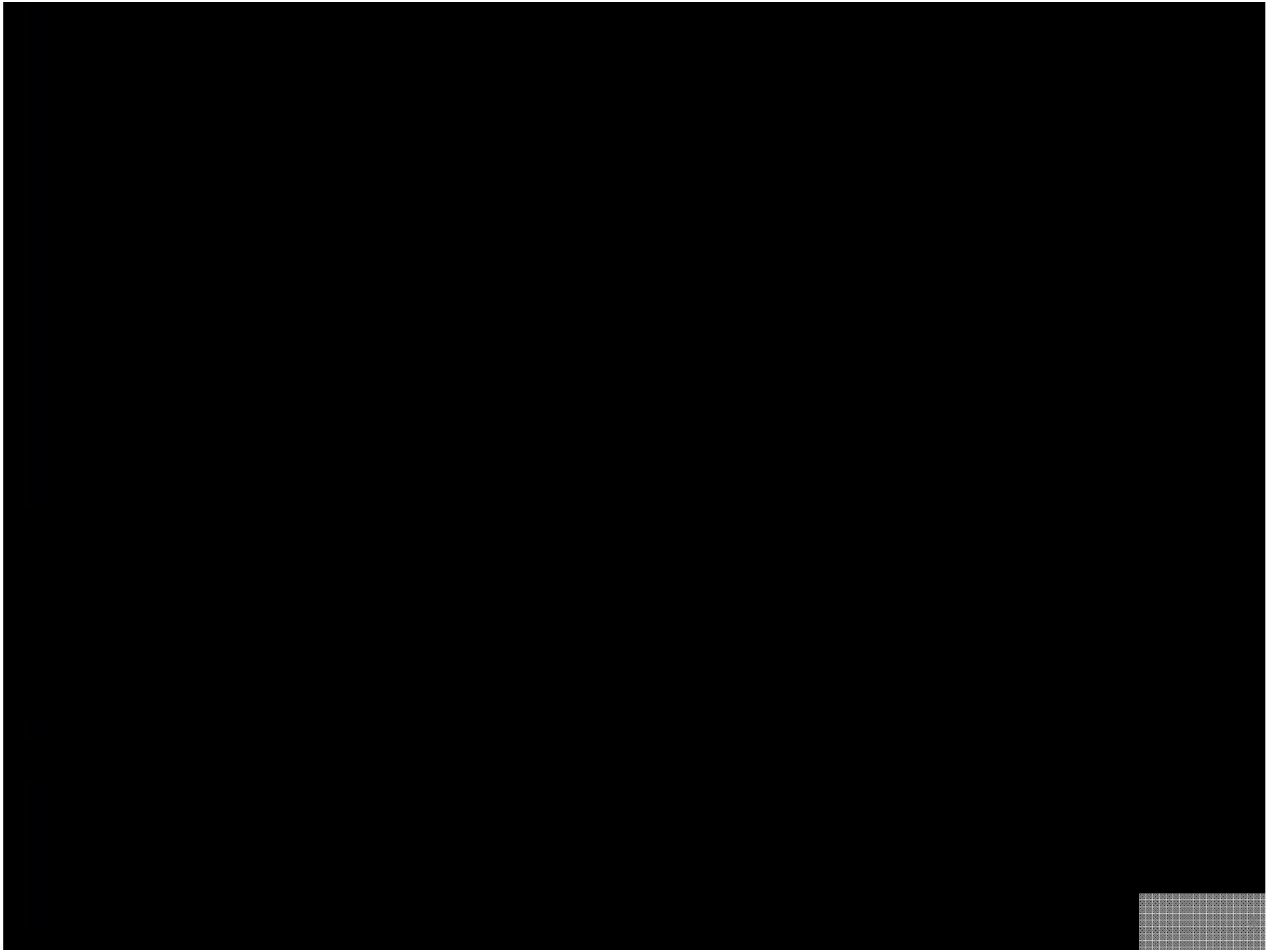
Last Time

- Last time we:
  - Introduced the scope of this course
  - Discussed the class structure
  - Outlined course policies
  - Reviewed a case study in interface design

Interaction Design in Business

- Increasing number of ID consultancies, examples of well known ones include:
  - Nielsen Norman Group: “help companies enter the age of the consumer, designing human-centered products and services”
  - IDEO: “creates products, services and environments for companies pioneering new ways to provide value to their customers”

After class activity: Watch some IDEO videos on YouTube!



IDEO Shopping Cart Design

- Stakeholders
- Expert insights
  speed learning
- Team work
  multidisciplinary, democratic, collaborative
  decision making

IDEO Design Process

- Inspirational Slogans
  - The only thing not designed is nature
  - Fail often in order to succeed sooner
  - One conversation at a time
  - Stay focused
  - Encourage wild ideas
  - Defer judgment
- Valuable Insights
  - Organized focused chaos
  - Enlightened trial and error wins over ideas of the lone genius

Course Overview

TERM PROJECT

Tentative Course Dates

Wednesday, Sept 10	Term project part 1a due (participation)
Thursday, Sept 18	Term project part 1b due (1% for submitting; must submit and receive approval before proceeding)
Sunday, Oct 5	Term project part 2a due (5%)
Friday, Oct 17	**Midterm test (20%)**
Sunday, Oct 19	Term project part 2b due (9%)
Thursday, Oct 30	Term project part 3a due (7%)
Sunday, Nov 23	Term Project part 3b due (13%)
Friday, Nov 28	Term project part 4a presentations (3%)
Wednesday, Dec 3	Term project part 4b due (7%)

Assignments are due on Blackboard at 11:59pm on the due date.

Multi-Stage Process

- 1: Project idea (1%)
- 2: Grounding Study (14%)
- 3: Prototype Design (20%)
- 4: Presentation and Evaluation Study (10%)

Phase 1: Forming Groups

- Add your brief intro to the Blackboard Discussion Thread for Part 1a:
  - Interests
  - Expertise
  - 2 project topic ideas
- Post by *Sept 10*
- In lab during week of Sept 15 we'll finalize groups of FOUR

Discussion Board

Forums are made up of individual discussion threads that can be organized around a particular subject. Create Forums to organize discussions. More Help

Create Forum | Search | Discover Content | ↑↓

Delete

	Forum	Description	Total Posts	Unread Posts	Total Participants
☐	Project Brainstorming and Introductions (Part 1a) (Tuesday Lab)	Please post a brief introduction about yourself and a project idea or two here (due Sept 10).	0	0	0
☐	Project Brainstorming and Introductions (Part 1a) (Friday Lab)	Please post a brief introduction about yourself and a project idea or two here (due Sept 10).	0	0	0

What to Look For in a Group

- complementary skills (CS & SENG mix!)
- compatible working styles
- compatible schedules
- compatible goals - outcomes, grades
- agreement on topic


OBSERVE


Start Now

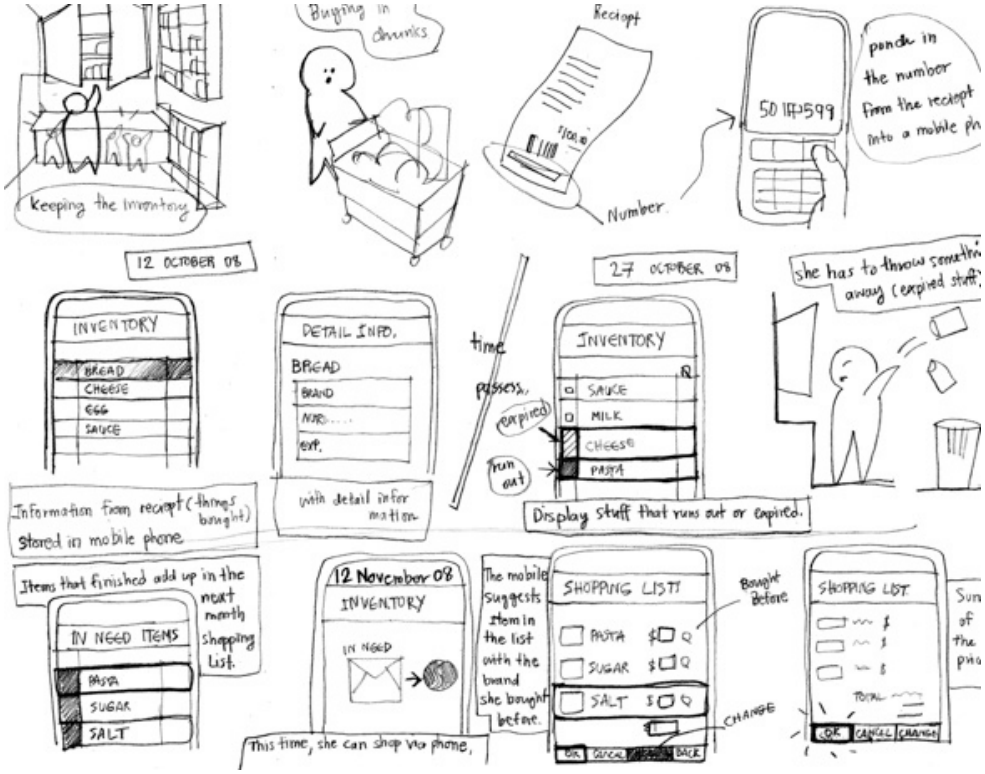
Phase 2: Requirements

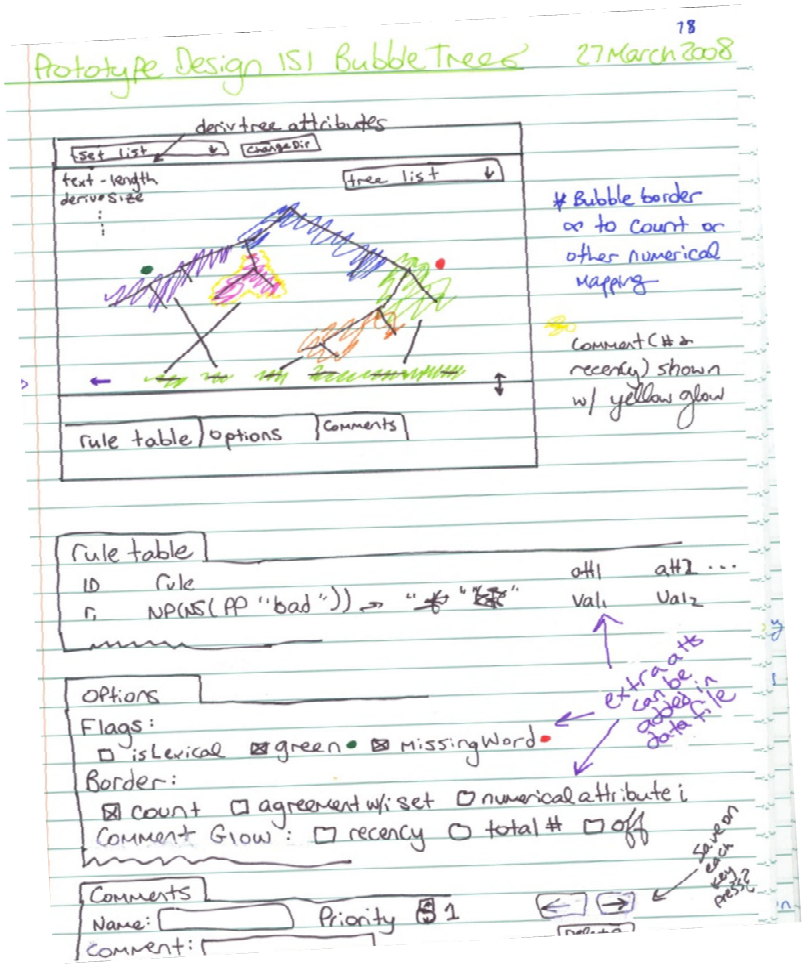
- Conduct questionnaires, interviews with target audience
- Understand relationship to technology, tasks, challenges, context
- Description of current practice via “Day in the Life Scenario”
  - Stakeholders
  - Artifacts
  - Tasks
  - Personas

Phase 3: Design & Prototyping

- Assignment 3a: Design
  - Specification of functionality
  - Concept design
  - Information display, possibly with paper prototype
- Assignment 3b: Prototyping the Interface
  - Design and construction of interactive system prototype illustrating functionality & look-and-feel
  - Possible physical prototype

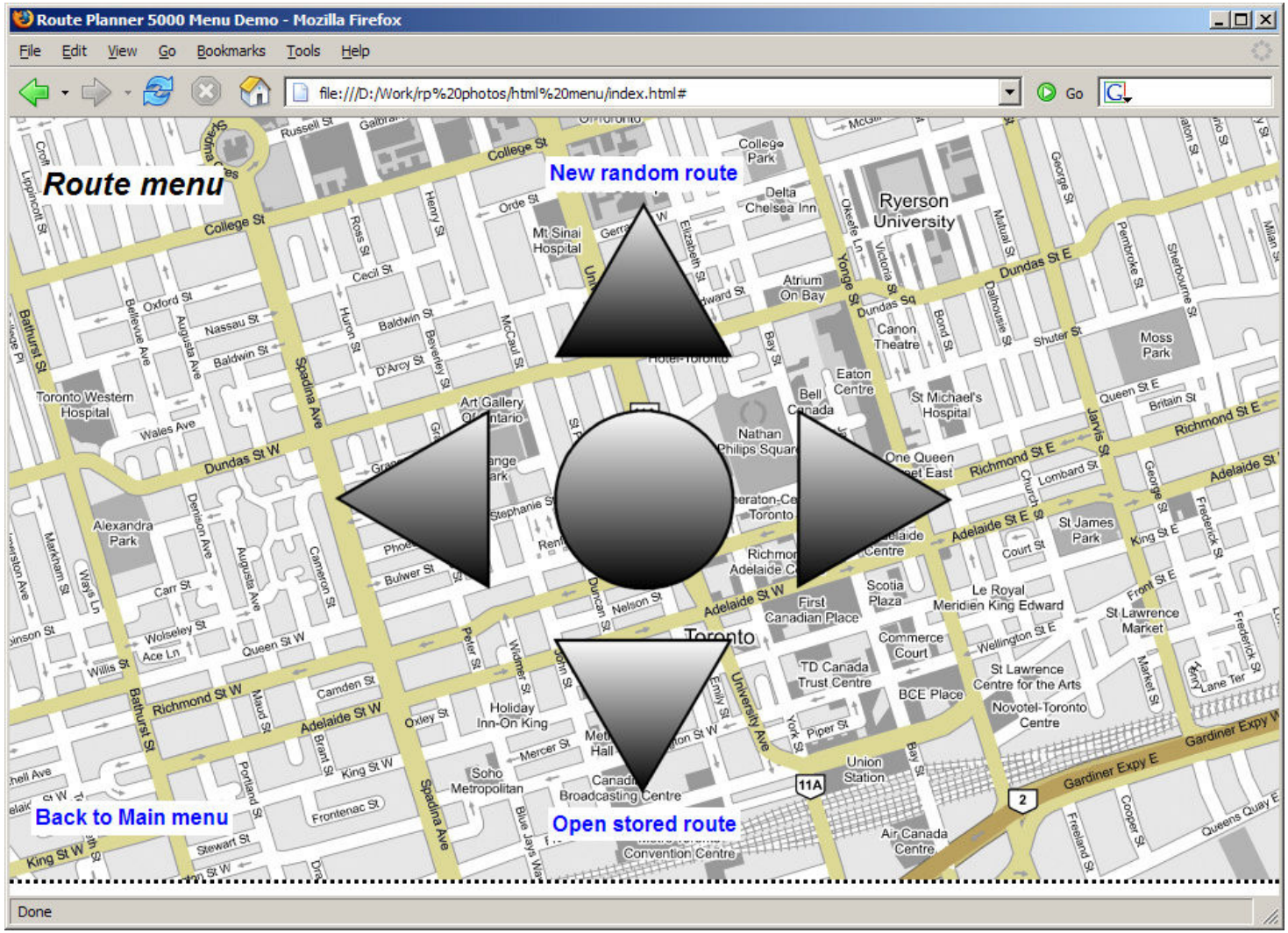
Storyboards and Paper Prototypes



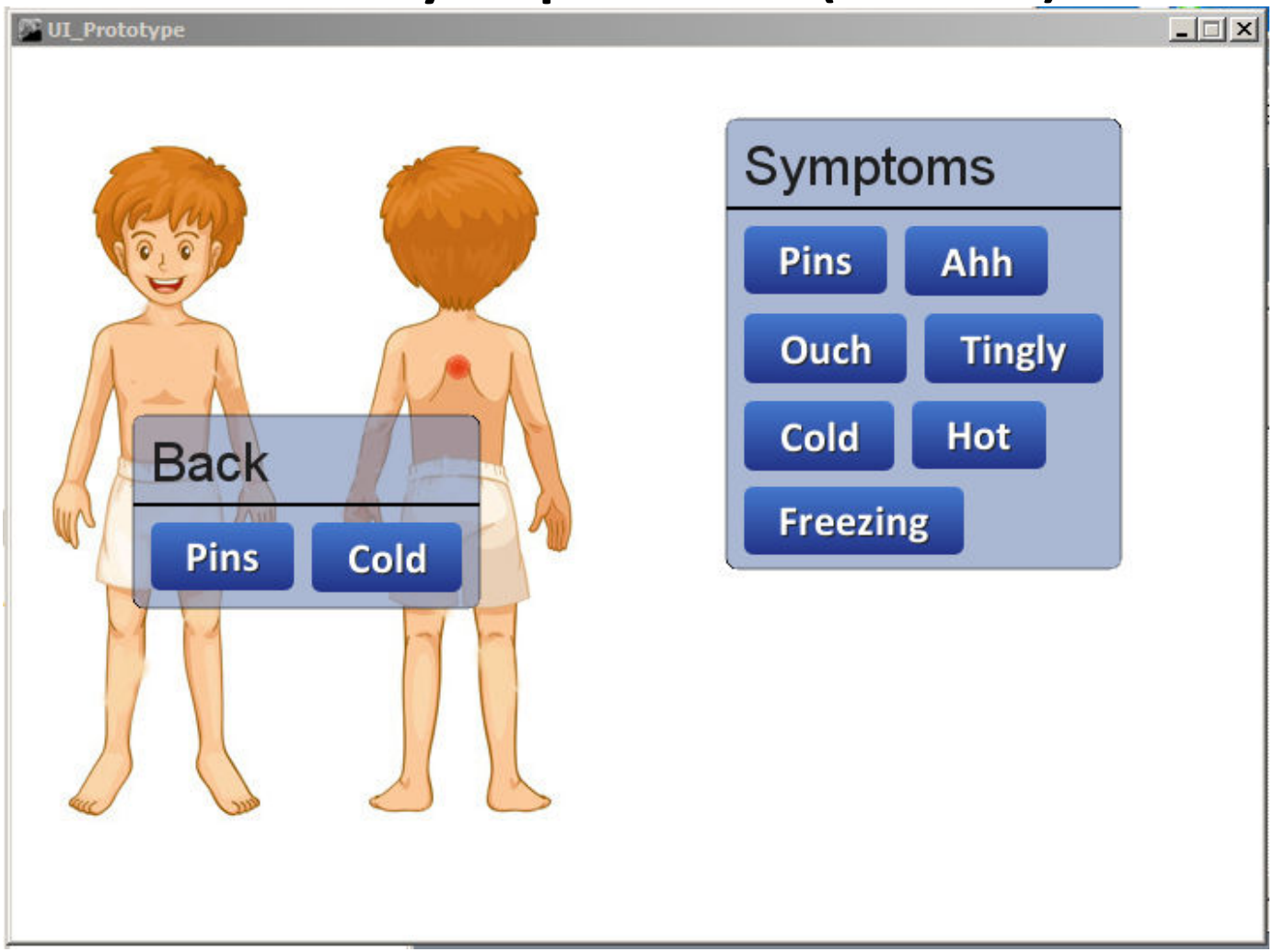


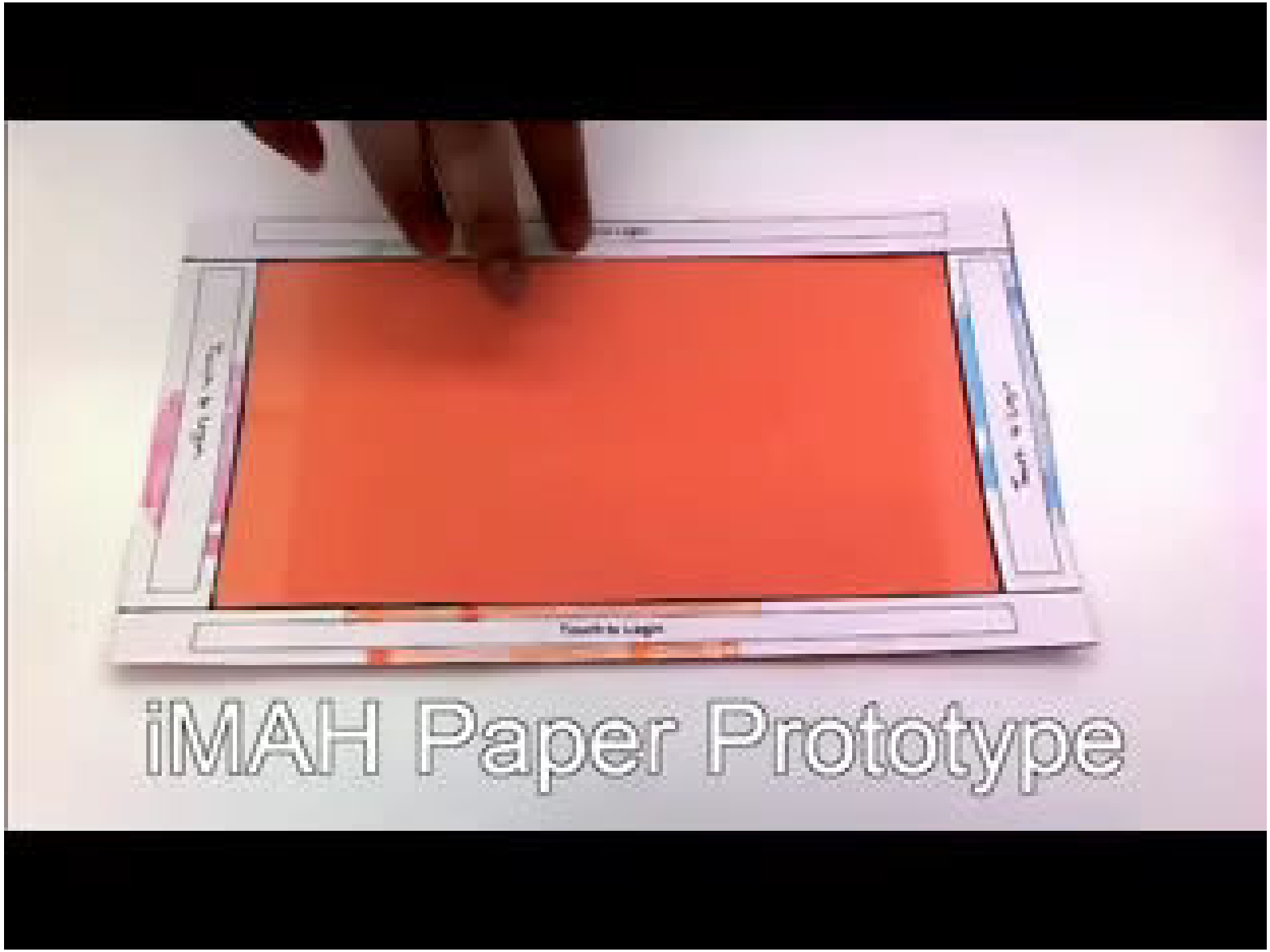
Hardware Prototyping

Interactive Prototypes



Interactive Prototype – TouchSymptoms (2012)



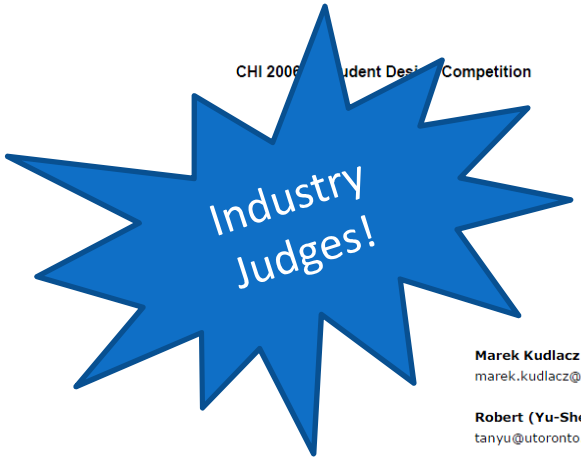

iMAH Paper Prototype

Phase 4: Evaluation

- Usefulness and usability evaluation of prototype(s)
  - Does it do what is needed?
  - Does it work well?
- Review and synthesis of entire experience
- Group presentation

Evaluate: User Studies

Become Famous!



RoutePlanner

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CHI 2006, April 22–27, 2006, Montréal, Québec, Canada.
ACM 1-59593-298-4/06/0004.

Abstract
This paper discusses the *RoutePlanner*, a portable personal training and motivational aide, which displays real-time statistical and locational data. We focus on the iterative design techniques associated with developing requirements and functionality, while looking at the role user testing and feedback played in the refinement of our design.

Keywords
Human-computer interaction, design, interface, RoutePlanner

ACM Classification Keywords
Category: H5.m. Information interfaces and presentation (E.g., HCI): Miscellaneous.

Introduction
In addressing the Design Problem of the CHI 2006 Student Design Competition – Nutrition and Health – we chose to focus specifically on improving physical fitness. Relating back to the Design Problem, information released by organizations such as the World Health Organization (WHO), and Statistics Canada all imply that lower levels of physical activity correlate with increased chances of obesity [1, 2], which in turn increases the risks of chronic diseases, such as type 2 diabetes, stroke, cardiovascular disease, and certain forms of cancer [1]. Our response employs

Summary: Design Process

- Designs are for people.
- In design, quality is not arbitrary. But it is contextual.
  - It's about fit to a task.
- People's ability to use a design is the ultimate test of its quality.
- The process we will use:
  - Observe people and find an actual problem worth solving
  - Rapidly and iteratively create many designs
  - Create multiple prototypes in parallel to explore alternatives
  - Seek feedback from peers and target audience

DESIGN COMPETITIONS

CHI Student Design Competition

- 2003—present
- Many countries represented
- Specific theme each year
- Student teams of 2-4 people

2011 Winner: Time Capsule

- Theme: Connecting People
- Social network across generations
  - Audience: Tourists, families and old friends, senior citizens
  - Features: Stories, Memory Box, Flash-back location based augmented reality

figure 3. Upload analog images.

http://www.chi2011.org/authors/sdc/sdc-winners.html

2011 Winner: Lingua

- Theme: Connecting People
- Cross-Lingual Communication Tool
  - Audience: People interested in cultural exchange
  - Process: Interviews, Personas, Affinity diagramming

Figure 1: Turning notes from the contextual inquiry process into an affinity wall

Figure 2: The Curious Student
© Jose Jimenez, 2010

Figure 3: The Ambitious Professional, © Jose Jimenez 2010

http://www.chi2011.org/authors/sdc/sdc-winners.html

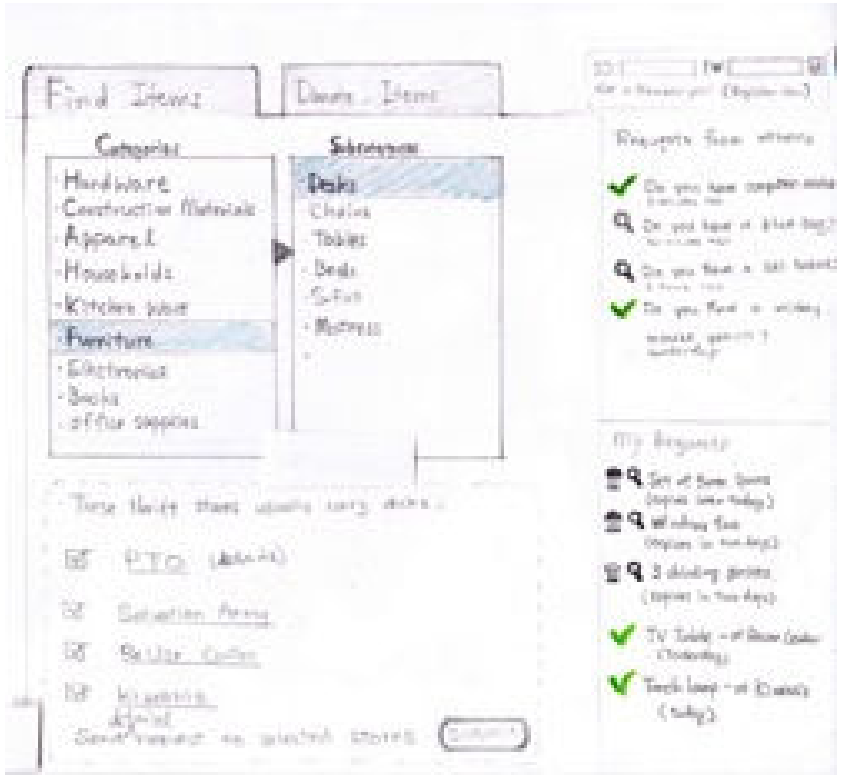
2009 Winner: TreasureHunter

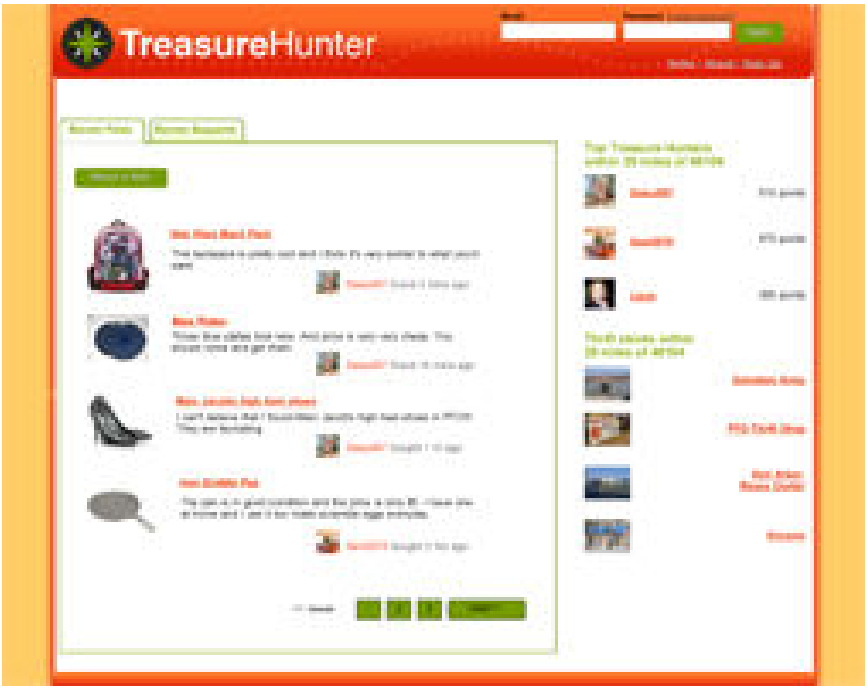
- Theme: Encourage use of local resources
- Idea: Connect thrift store enthusiasts ("treasure hunters") with busy consumers unaware of what is available
- Process used low- and high-fidelity prototypes

http://www.debralauterbach.com/blog/2010/09/advice-to-chi-student-design-competition-participants/

http://debralauterbach.com/projects/treasurehunter.html

2009 Winner: TreasureHunter





2015 Challenge – ***Appropriating Technologies for New Cultures***

- We are asking you to design a product, application, technology, or service that enable people who are a new and completely unexplored user group in any country to appropriate things and technologies around them. This user group may be a minority, an extreme case, or somehow disconnected from the mainstream. We ask you to showcase your best abilities of "maker cultures" to build new connections and to make less-voiced cultures be better heard. We ask you to use technology as a material for crafting and tinkering, and to make sure that you solve real problems, empower people in a unique way, and let them express their colors and needs.

2015 Challenge – ***Appropriating Technologies for New Cultures***

For this year's design problem, we particularly invite students' careful considerations of the following criteria:

- Does the solution solve a real problem of a real user group?
- Is the user group disconnected from current technologies?
- Does the solution use technology in a unique and creative way to solve the problem?
- Were relevant prior works properly cited?
- Were analysis, synthesis, design and evaluation sufficient and systematic?
- Was the fidelity of the prototypes sufficient to demonstrate the ideas?
- Was the solution well-presented?

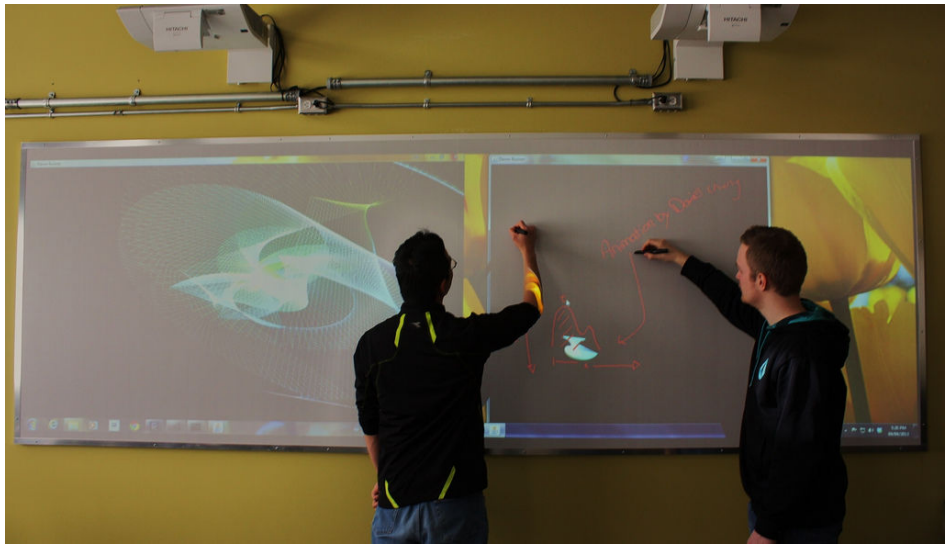
2015 CHI Student Design Competition

- Entries due 5 January, 2015
- We will mentor any groups whose projects are of high enough quality to enter
- At least one representative from any team that gets into the semi-finals will receive at least partial funding to attend the conference… in KOREA!

- More info: http://chi2015.acm.org/authors/student-design-competition/

Touch Technology

- Projects will focus on multitouch technology

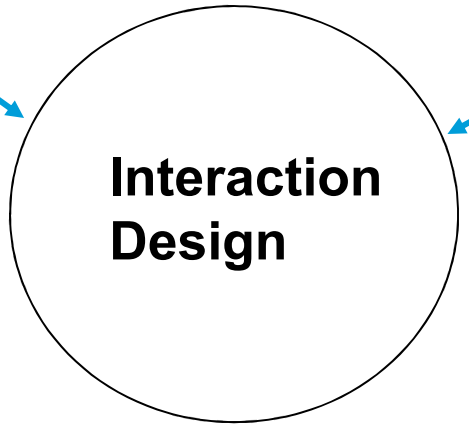


DESIGN PROCESSES

Relationship between Interaction Design, HCI, and other fields

Academic Disciplines
- Computer Science
- Psychology
- Social Science
- Engineering
- Ergonomics

Design Practices
- Graphic Design
- Industrial Design
- Artistic Design
- Film Industry



Interdisciplinary fields that do Interaction Design
- HCI, Human Factors, Cognitive Engineering
- Computer Supported Cooperative Work
- Information Systems

Thoughts about Design (1)

- Design is:
  - conscious, can be done systematically, ie, using process
  - creative, requires brainstorming
  - infinitely improvable, i.e., must be iterative

- Design involves:
  - focus on people, keeps human concerns at the center
  - experimentation with materials, various prototyping
  - interaction between user & technology

Thoughts About Design (2)

- Design has social consequences:
  - Design is a social activity and occurs in a context such as that of an organization or a society
- Contributions from many disciplines:
  - Computer science
  - Domain expertise
  - Behavioral science — psychology, sociology, anthropology
  - Design disciplines — graphic design, industrial design, animation, cinematography, video, music

PACT Framework

HCI deeply considers:

- People
- Activities
- Context
- Technologies

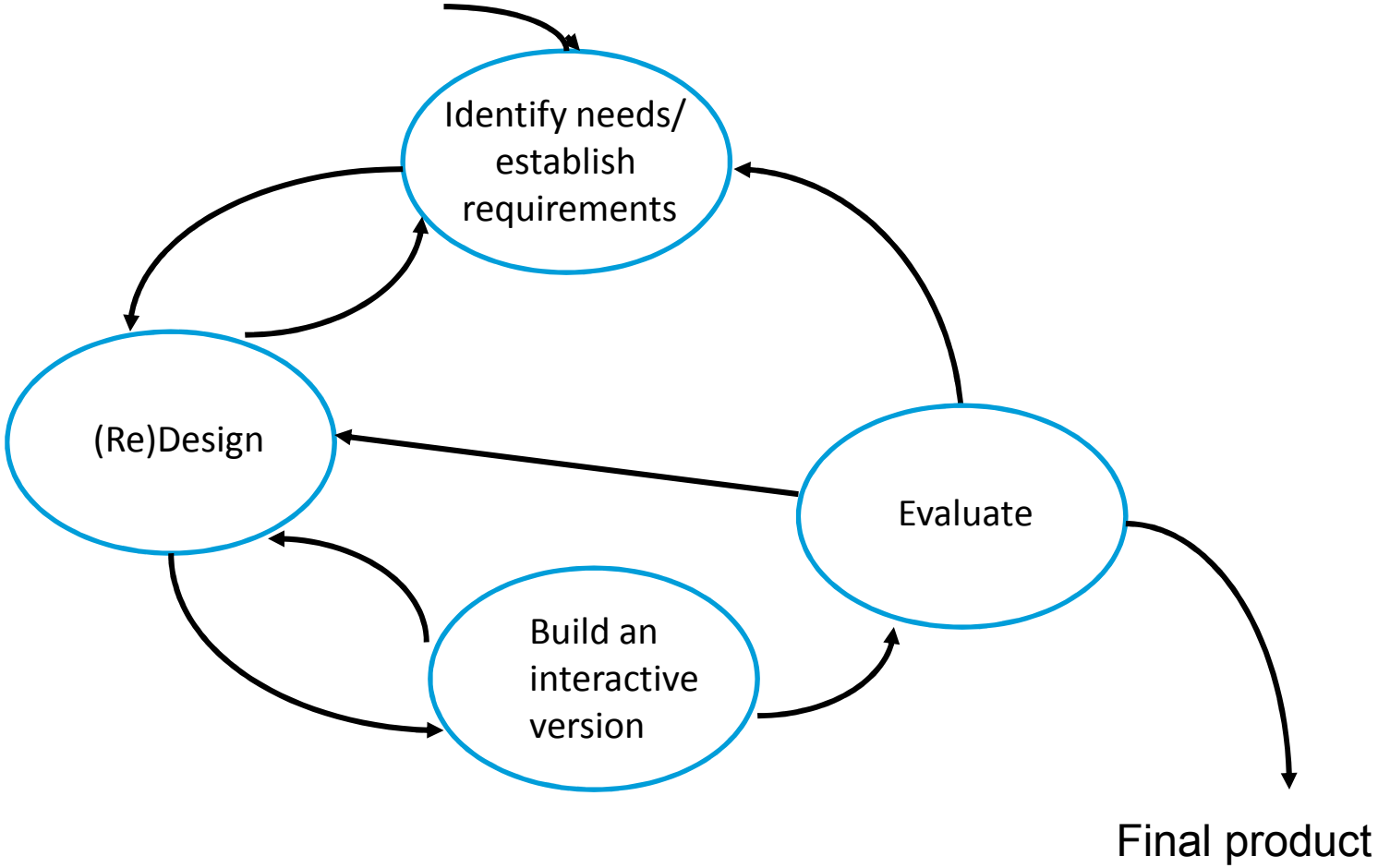
Benyon text, chapter 2

Interaction Design Process

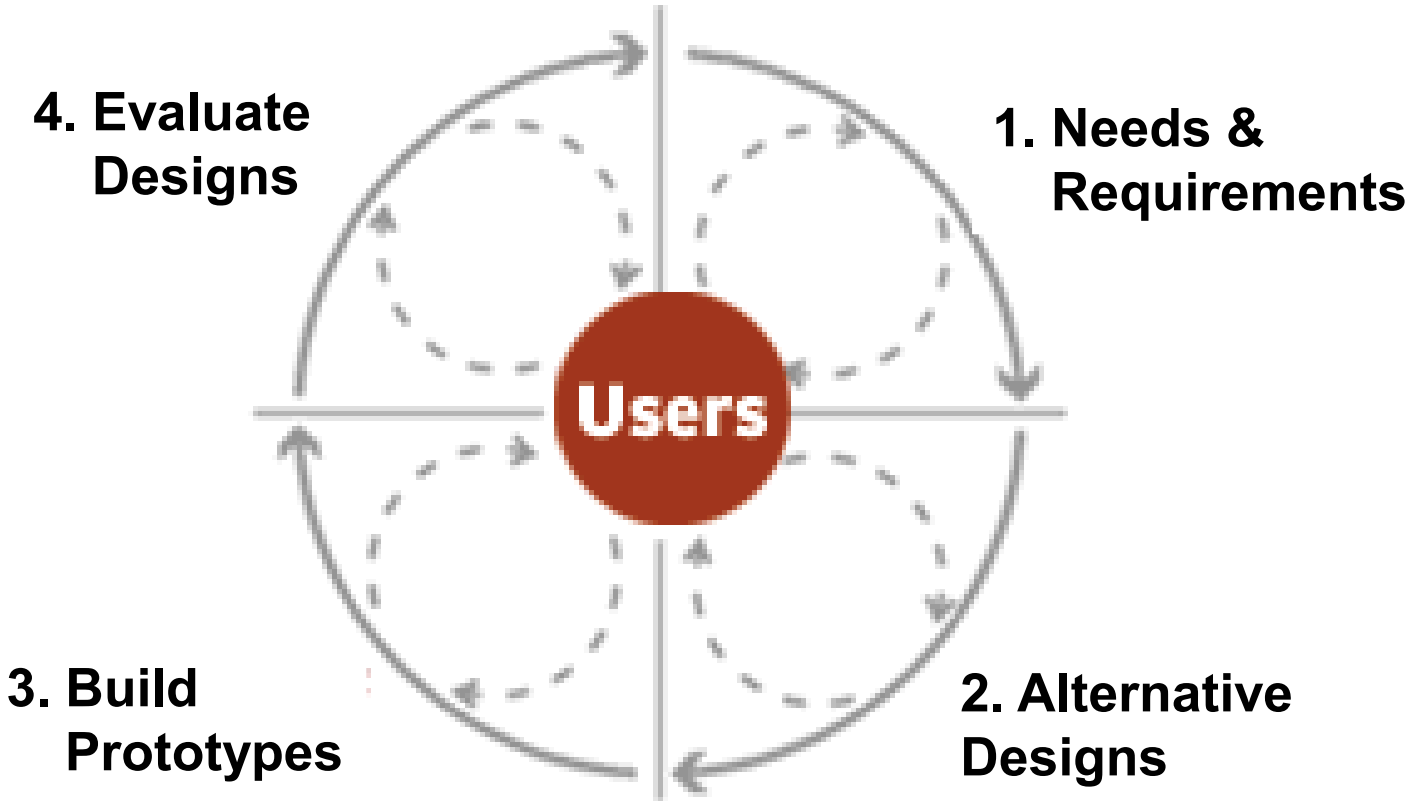
- Term project process is linear:

A more realistic process is iterative

Iterative Interaction Design Process



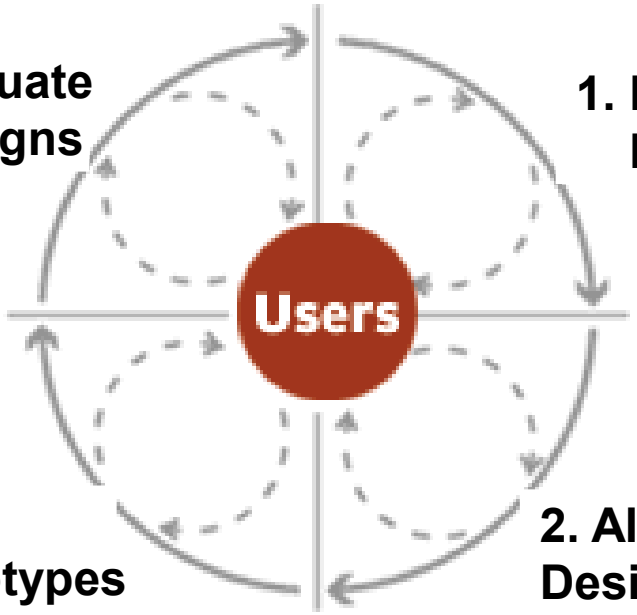
User Centered Design Process



User Centered Design Methods

usability tests
focus groups
user surveys
user experiments
heuristic evaluations
user observations

4. Evaluate Designs



1. Needs & Requirements

user profiles,
needs,scenarios
task analysis
environment
technology
work practices
business goals
competition
personas

paper prototype
prototype
interface
alpha, beta
product

3. Build Prototypes

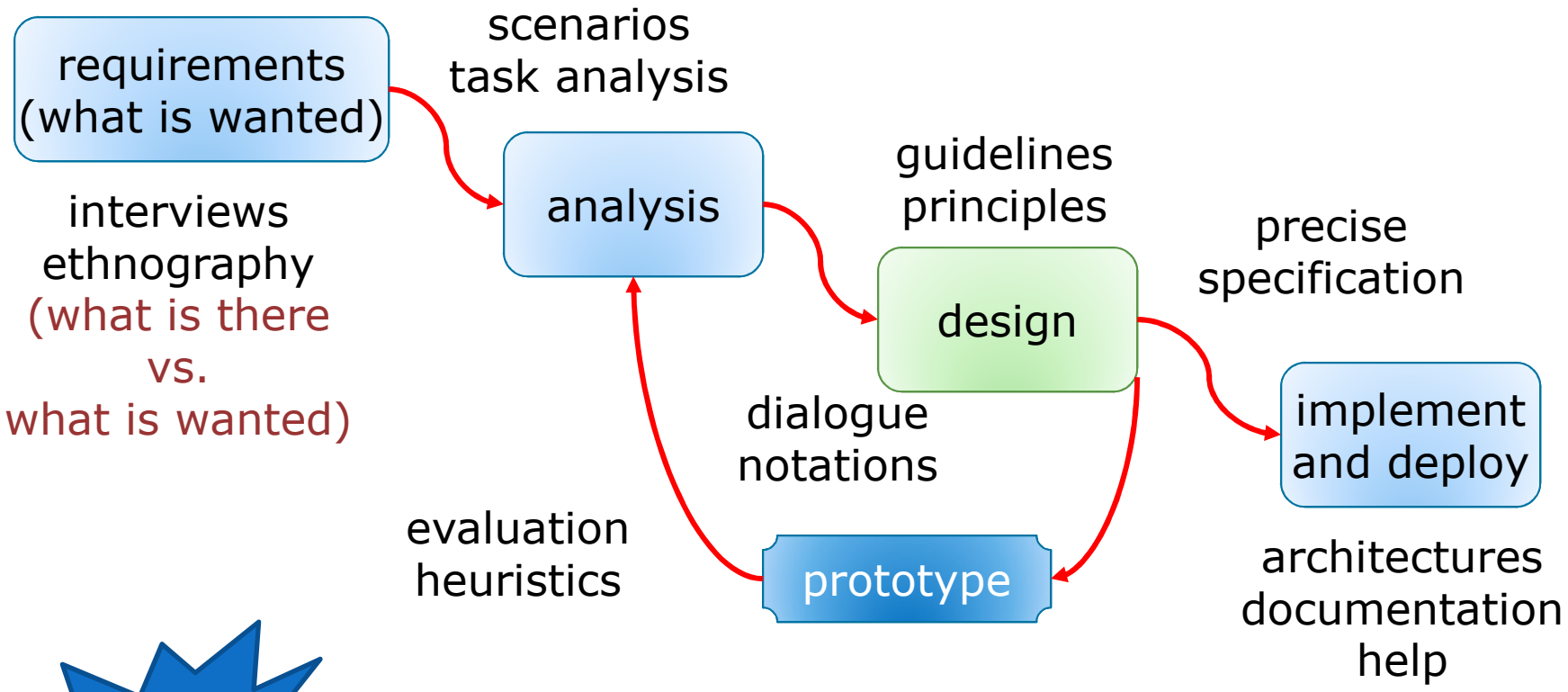
2. Alternative Designs

conceptual model
proposed scenarios
interaction process
interface
prototype
product

User Centered Design involves:

- multidisciplinary teamwork, iterative work process
- methods of acquiring user input and converting it into design.

Our Design Process



Memorize!

(Source: Dix, Finley, Abowd, Beale, *"Human-Computer Interaction")*

Usefulness & Usability

INTRODUCTION TO HCI

Definition: Human Computer Interaction

Definition has evolved with the changes in technology.

- 1980's
  - "HCI is the set of processes, dialogues and actions through which a human user employs and interacts with a computer."

  Baecker , Buxton 1987

- 1990's
  - "HCI is a discipline concerned with the design, evaluation and implementation of interacting computing systems for human use and with the study of major phenomena surrounding them."

  ACM SIGCHI 1994

- 2000's
  - "Human computer interaction is the study and practice of usability."

  HCI in the New Millenium 2002
  - "The study of how humans interact with computers, and how to design computer systems that are easy, quick and productive for humans to use."

  The Free On-line Dictionary of Computing (27 SEP 03)

Human-Computer Interface

- The place where humans and computers meet
- The human's image (view) of the computer
  - Allows interaction with the computer
  - Should be invisible, allowing user to focus on task

Interaction Design

- *Designing interactive products to support people in their everyday and working lives*
  - Sharp, Rogers and Preece (2002)
- *The design of spaces for human communication and interaction*
  - Winograd (1997)

Total Experience

- Everything the person sees, hears, and touches:
    1. Find product information
    2. Order product
    3. Get - Receive product
    4. Unpack & Install
    5. Use
    6. Help & Support
    7. Upgrade

Usability

- The effectiveness, efficiency, and satisfaction with which users can achieve tasks in a particular environment of a product.

  High usability means a system is: easy to learn and remember; efficient, visually pleasing and fun to use; and quick to recover from errors.

  {(http://www.orrnet.com/)}. (1999-04-01) The Free Online Dictionary of Computing.

Usefulness

- Meeting specific needs & supporting real tasks

- Usefulness, noun: the quality of being of **practical** use [syn: utility] (WordNet 2.0)

- Useful, adj.: **helpful** toward advancing any purpose; **beneficial**; profitable; **advantageous**; useful knowledge; useful arts. (Webster's)

Example: General Purpose Hardware

- Smartphones:
  - Inexpensive, small, light, hand-held device
  - Keyboards, touch, or pen input (all can do text entry)
  - Capabilities for address book, to-do list, and calendar, apps
  - Communication with networks
  - Synchronization with desktop computers
- Issues and methods of differentiation
  - Price, weight, size, form factor
  - Target users
  - Memory, peripherals
  - Software environment and capabilities (variety of apps)
  - Interface, look & feel, metaphor — how user thinks about it

Examples: Software

- The web
- Email
- Instant messaging systems (e.g. SMS)
- Spreadsheets (e.g., Excel)
- Personal finance managers (e.g., Quicken)
- Virtual reality (3D) environments
  - Games
  - Simulators (e.g., for flight or surgery training)
- Video authoring and publishing systems
- Writing systems

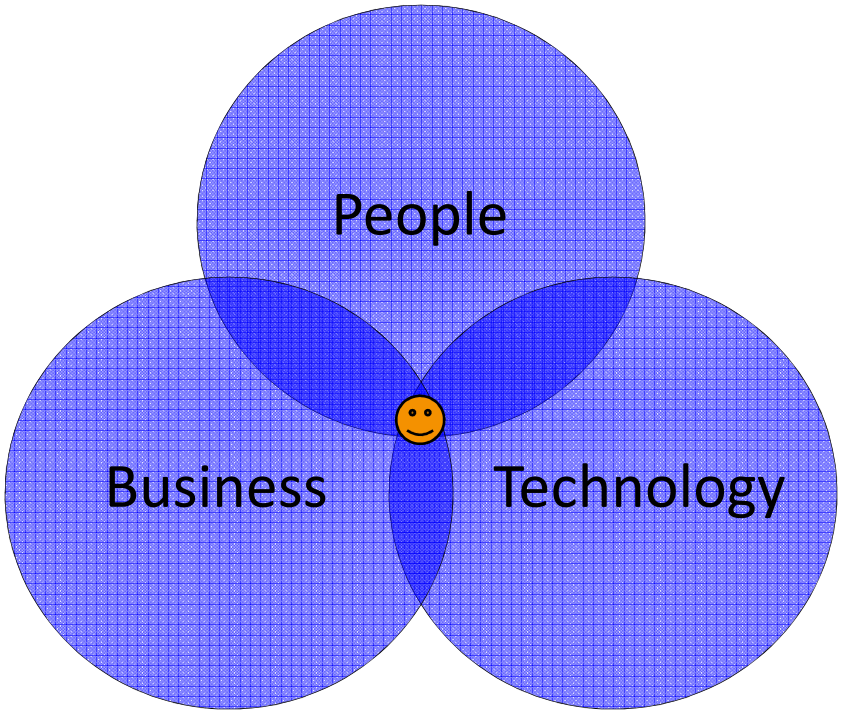
Example: Specializing the Hardware

- General-purpose handheld devices can be specialized via software
- Example: hand-held language translation for travelers
  - Target customer — Tourist, businessperson, student
  - Functionality — Words, phrases, sentences, single language, multiple languages
- Example: reminding device for individuals
  - Target customers — Busy people
  - Functionality — Reminders about appointments, medications, etc., given in various modalities (e.g., image, sound, vibration)

Trinity for Success

Balance:

- People
- Business
- Technology



Iteration & Evaluation are Key

- Bruce Tognazzini of AskTog.com discusses design and evaluation:

  "**Iterative design**, with its repeating cycle of design and testing, is the only validated methodology in existence that **will consistently produce successful results**. If you don't have user-testing as an integral part of your design process you are going to **throw buckets of money down the drain**."

Importance of “User Friendly” Systems

- Easier to market,
  ~40% Software Review Criteria is Usability
- Consumers expect “Easy to use” products
- Productivity - improvements or not
- Safety - Life and death critical systems (planes, reactors, medical devices)
- Note: **Usefulness** first, then **Usability**!

Cost of Failure

- Customer frustration and bad user experience
- Lost customer opportunity and acquisitions
- Increased support costs
- Channel costs - diversion of customer away or to more expensive channels
- Brand erosion - marketing $$ wasted!
- Examples?

Cost Benefits of User Centered Design

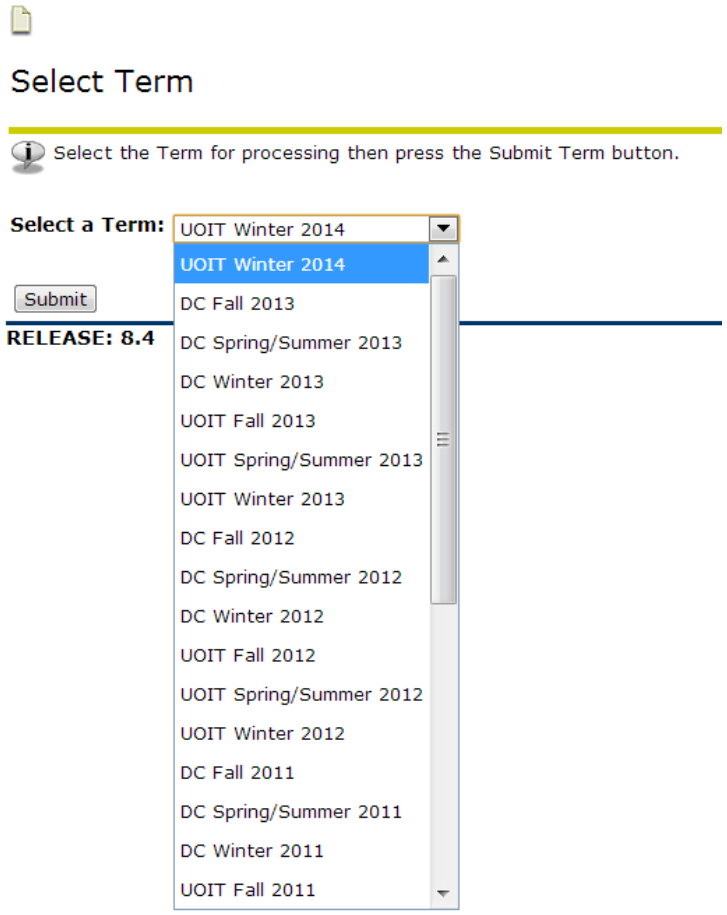
- Development Costs
  - ~ 50% of User Interface
  - develop only useful & unusable functionality
- Software Maintenance Costs
  - 20% maintenance costs due to bugs
  - 80% of cost due to unforeseen user requirements
- Cost of Fixing Problems
    - = $1 during design
    - = $10 during development
    - = $100 after release

Time Benefits of User Centered Design

- Time to market
  - Reduced due to user centered design
  - Reduction of overall costs - focused development
- Time to breakeven
  - Usable products influence early adopters and speed time to mass adoption
  - Superior usability attracts more customers
  - Superior usability supports higher price

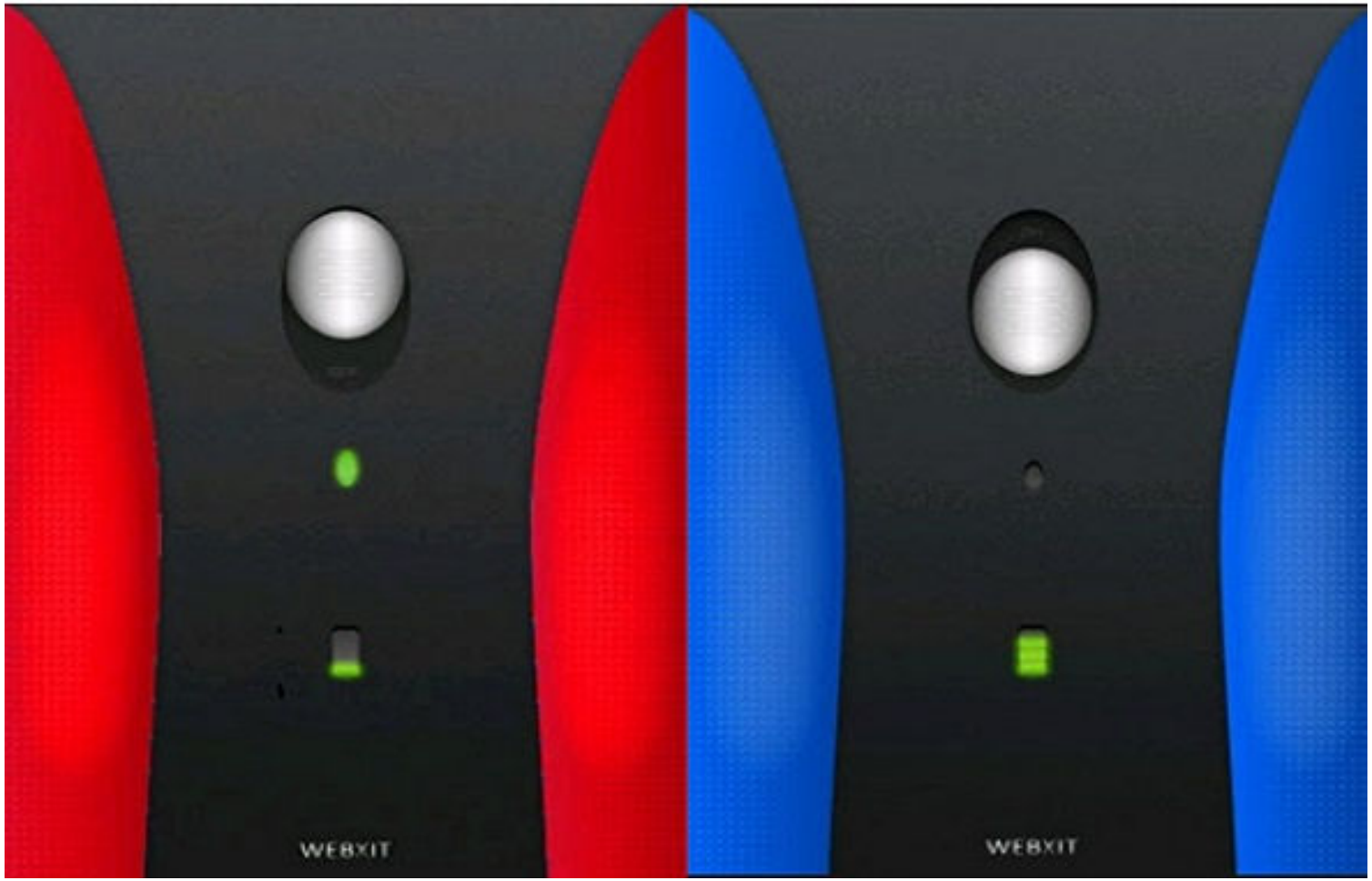
Examples: Useful but not Usable?

Mycampus term selection (and everything else about mycampus)



Examples: Usable but not Useful?

Electric shaver app

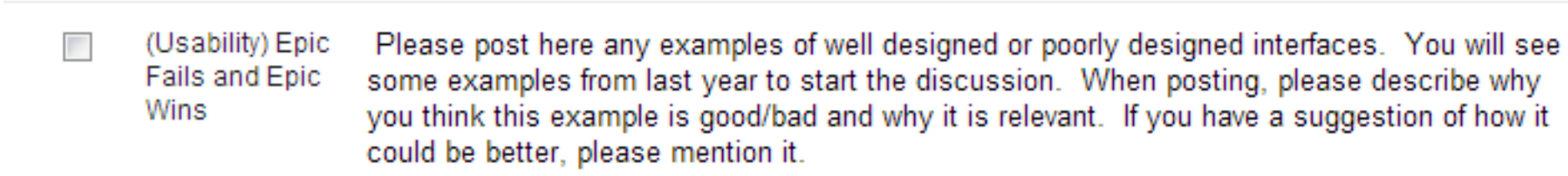


Summary

- Today we:
  - Discussed the term project process
  - Introduced HCI

Your Action Items

- Post your personal introduction to the discussion board **before Sept 10**
- Pay attention and keep up with the required readings (items have been posted!)
- Post “fails” and “wins” for interface design to our ongoing discussion:



Lab next week

- Talk with classmates and the TA about project ideas
- Try to find team members

Ongoing Course Evaluation

- Feedback form in lecture folder:

Lecture 1 Daily Feedback

Next Time

- Introduction to surface computing