Hall of Fame or Hall of Shame?

- Gas pump display

Hall of Shame!

- Hard to distinguish cost vs. # gallons
  - bad labels
  - placed inconsistently
  - displays too similar

Outline

- Review
- Understanding the user
- Task analysis
- Selecting & using tasks in design
- Contextual inquiry
- Hall of Fame/Shame Homework
- Picking teams

Review

- Conceptual model
  - mental representation of how an object works & how interface controls effect it
- Design model should equal user model
  - mismatches lead to errors
  - know the user’s likely conceptual model
- Design guides
  - make things visible
  - map interface controls to user’s model
  - provide feedback
"One most unfortunate product is the type of engineer who does not realize that in order to apply the fruits of science for the benefit of mankind, he must not only grasp the principles of science, but must also know the needs and aspirations, the possibilities and the frailties, of those whom he would serve."

-- Vannevar Bush

"You Are Not the User"

- Seems obvious, but...
  - different experiences
  - different terminology
  - different ways of looking at the world

- Easy to think of self as typical user
- Easy to make mistaken assumptions

### Design Process: Discovery

- Assess needs
  - understand client’s expectations
  - determine scope of project
  - characteristics of users & tasks
  - evaluate existing practices & products

### Understanding the User

- How do your users work?
  - task analysis, interviews, self report, & observation

- How do your users think?
  - understand human cognition
  - observe users performing tasks

- How do your users interact with UIs?
  - observe!

### Example of Design Failure

- BART “Charge-a-Ticket” Machines
  - allow riders to buy BART tickets or add fare
  - takes ATM cards, credit cards, & cash
Example of Design Failure

- BART "Charge-a-Ticket" Machines
  - allow riders to buy BART tickets or add fare
  - takes ATM cards, credit cards, & cash
- Problems
  - one "path" of operation
    - ticket type -> payment type -> payment -> ticket
  - BART Plus has minimum of $28, no indication of this until after inserting >= $1
  - can't switch to regular BART ticket
  - large dismiss transaction button does nothing

Lessons from the BART machine

- Failure to create convenient machine
- Did the designers understand or care
  - range of customers using the machine?
  - what tasks they would want to carry out?
  - that some would find the behavior of the machine disconcerting?
- How can we avoid similar results?
  - "What is required to perform the user's task?"

Task Analysis

- Find out
  - who users are
  - what tasks they need to perform
- Observe existing work practices
- Create scenarios of actual use
- This allows us to try out new ideas before building software!
  - get rid of problems early in the design process

Why Task Analysis?

- System will fail if it
  - does not do what the user needs
  - is inappropriate to the user
  - "the system must match the users' tasks"

- Can't we just define "good" interfaces?
  - "good" has to be taken in context of users
    - might be acceptable for office work, not for play
    - infinite variety of tasks and users
  - guidelines are too vague to be generative
    - e.g., "give adequate feedback"

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's the relationship between user & data?
Task Analysis Questions (cont.)

- What other tools does the user have?
- How do users communicate with each other?
- How often are the tasks performed?
- What are the time constraints on the tasks?
- What happens when things go wrong?

Who?

- Identity
  - in-house or specific customer is easy
  - need several typical users for broad product
- Background
- Skills
- Work habits and preferences
- Physical characteristics
  - height?

Who (BART)?

- Identity?
  - people who ride BART
  - business people, students, disabled, elderly, tourists
- Background?
  - may have an ATM or credit card
  - have used other fare machines before
- Skills?
  - may know how to put cards into ATM
  - know how to buy BART tickets

Who (BART cont.)?

- Work habits and preferences?
  - use BART 5 days a week
- Physical characteristics?
  - varying heights \( \rightarrow \) don't make it too high or too low!

Talk to Them

- Find some real users
- Talk to them
  - find out what they do
  - how would your system fit in
- Are they too busy?
  - buy their time
    - t-shirts, coffee mugs, etc.
  - find substitutes
    - medical students in training

What Tasks?

- Important for both automation and new functionality
- Relative importance of tasks?
- Observe users, see it from their perspective
  - on-line billing example
    - small dentists office had billing automated
    - assistants were unhappy with new system
    - old forms contained hand-written margin notes
      - e.g., patient A's insurance takes longer than most, etc.
How are Tasks Learned?
- What does the user need to know?
  - Do they need training?
    - academic
    - general knowledge / skills
    - special instruction / training

Where is the Task Performed?
- Office, laboratory, point of sale?
  - Effects of environment on users?
  - Users under stress?
  - Confidentiality required?
  - Do they have wet, dirty, or slippery hands?
  - Soft drinks?
  - Lighting?
  - Noise?

What is the Relationship Between Users & Data?
- Personal data
  - always accessed at same machine?
  - do users move between machines?
- Common data
  - used concurrently?
  - passed sequentially between users?
- Remote access required?
- Access to data restricted?

What Other Tools Does the User Have?
- More than just compatibility
  - How user works with collection of tools
    - Ex. automating lab data collection
      - 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/forams are used and how are they handled?

How Do Users Communicate With Each Other?
- Who communicates with whom?
- About what?
- Follow lines of the organization? Against it?
- Example: assistant to manager
  - installation of computers changes communication between them
  - people would rather change their computer usage than their relationship [Hersh82]

How Often Do Users Perform the Tasks?
- Frequent users remember more details
- Infrequent users may need more help
  - even for simple operations
  - make these tasks possible to do
- Which function is performed
  - most frequently?
  - by which users?
  - optimize system for these tasks will improve perception of good performance
What are the Time Constraints on the Task?

- What functions will users be in a hurry for?
- Which can wait?
- Is there a timing relationship between tasks?

What Happens When Things Go Wrong?

- How do people deal with
  - task-related errors?
  - practical difficulties?
  - catastrophes?
- Is there a backup strategy?

Involve Users to Answer Task Analysis Questions

- Users help designers learn
  - what is involved in their jobs
  - what tools they use
  - i.e., what they do
- Developers reveal technical capabilities
  - builds rapport & an idea of what is possible
  - user’s can comment on whether ideas make sense
- How do we do this?
  - observe & interview prospective users in work place!

A Better BART Machine

Hong Kong MTR System

Contextual Inquiry

- Way of understanding users’ needs and work practices
- Master / Apprentice model allows customer to teach us what they do!
  - master does the work & talks about it while working
  - we interrupt to ask questions as they go
- The Where, How, and What expose the Why

Principles

- 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
    - “We usually get reports by email”, ask “Can I see one?”
Principles (cont.)

- **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
      - “We usually get reports by email”, ask “Can I see one?”

- **Interpretation**
  - facts are only the starting point, design based on interpretation
  - validate & rephrase
    - share interpretations to check your reasoning
      - Ex. “So accountability means a paper trail?”
  - people will be uncomfortable until the phrasing is right
    - be committed to listening (“Huh?”, “Umm…”, “Yes, but…”)

Principles (cont.)

- **Focus**
  - interviewer needs data about specific kind of work
    - “steer” conversation to stay on useful topics
  - respect triggers (flags to change focus)
    - shift of attention (someone walks in)
    - surprises (you know it is “wrong”)

Users: 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*)

Thoughts on Interviews

- **Use** recording technologies
  - notebooks, tape recorders, still & video cameras
- **Structure**
  - conventional interview (15 minutes)
    - introduce focus & deal with ethical issues
    - present to each other by getting summary data
    - transition (30 seconds)
  - contextual interview (1–2 hours)
    - take notes, draw, be nosy! (”who was on the phone?”)
    - wrap-up (15 minutes)
    - summarize your notes & confirm what is important
- **Master / apprentice** can be hard
  - e.g., sometimes need to put down your company

What Users Might Say

- “This system is too difficult”
- “You don’t have the steps in the order we do them”
- Do not take comments personally
  - you shouldn’t have a personal stake
- Be careful not to judge participants
- Goal is to make the system easy to use for your intended users

Using the Data

- **Figure out what is important**
- **Affinity diagramming**
  - group info & find relations between groups
  - Post-its on large surfaces
    - haptic UI
    - immersive
    - persistent
    - brainstorming
    - also used for creating web info architecture
**Selecting Tasks**

- Real tasks users have faced
  - collect any necessary materials
- Should provide reasonable coverage
  - compare check list of functions to tasks
- Mixture of simple & complex tasks
  - easy task (common or introductory)
  - moderate task
  - difficult task (infrequent or for power users)

**What Should Tasks Look Like?**

- Say what the user wants to do, but not how
  - allows comparing different design alternatives
- Be very specific – stories based on facts!
  - say who the users are (use personas or profiles)
  - design can really differ depending on who
  - name names (allows getting more info later)
  - characteristics of the users (job, expertise, etc.)
  - forces us to fill out description w/ relevant details
- Some should describe a complete job
  - forces us to consider how features work together
  - example: phone-in bank functions

**Using Tasks in Design**

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

Manny is in the city at a club and would like to call his girlfriend, Sherry, to see when she will be arriving at the club. She called from a friends house while he was on BART, so he couldn’t answer the phone. He would like to check his missed calls and find the number so that he can call her back.

**Using Tasks in Design (cont.)**

- Rough out an interface design
  - discard features that don't support your tasks
  - or add a real task that exercises that feature
  - major screens & functions (not too detailed)
  - hand sketched
- Produce scenarios for each task
  - what user has to do & what they would see
  - step-by-step performance of task
  - illustrate using storyboards
  - sequences of sketches showing screens & transitions

**Scenarios (cont.)**

- Scenarios are design specific, tasks aren’t
- Scenarios force us to
  - show how various features will work together
  - settle design arguments by seeing examples
  - only examples → sometimes need to look beyond
- Show users storyboards
  - get feedback

**Caveats of User-Centered Design Techniques**

- Politics
  - “agents of change” can cause controversy
  - get a sense of organization & bond w/ interviewee
  - important to get buy-in from all those involved
- Users are not always right
  - cannot anticipate new technology accurately
  - job is to build system users will want
  - not system users say they want
  - be very careful about this (you are outsider)
  - if you can’t get users interested in your hot idea, you’re probably missing something
- Design/observe forever without prototyping
  - rapid prototyping, evaluation, & iteration is key
Summary

- Know thy user & involve them in design
  - answer questions before designing
    - who, what, where, when, how often?
    - users & data?, other tools? when things go wrong?
- Selecting tasks
  - real tasks with reasonable functionality coverage
  - complete, specific tasks of what user wants to do
- Contextual inquiry
  - way to answer the task analysis questions
  - interview & observe real users
  - use the master-apprentice model to get them to teach you

Further Reading

Task Analysis, Contextual Inquiry, & Personas

- Books
  - User and Task Analysis for Interface Design by Joann T. Hackos, Janice C. Redish
  - Contextual Design by Hugh Beyer & Karen Holtzblatt
  - The Inmates are Running the Asylum by Alan Cooper
- Articles
- Web Sites
  - Beyer, Hugh, "Getting Started with Contextual Techniques"

Hall of Fame/Shame Homework

Project Team Ideas

- Let’s hear 1 minute from each proposer
- At the end rank the top 3 projects you’d like to work on
- Don’t pick groups with your friends

Next Time

- Experience Sampling Method
- Human Abilities
- Working as a Team
- Read
  - Chapter 2 Human Information Processing from The Psychology of Human-Computer Interaction (handout)
  - The Discipline of Teams (online)