USER INTERFACE DESIGN + PROTOTYPING + EVALUATION

Design Discovery: Contextual Inquiry & Task Analysis

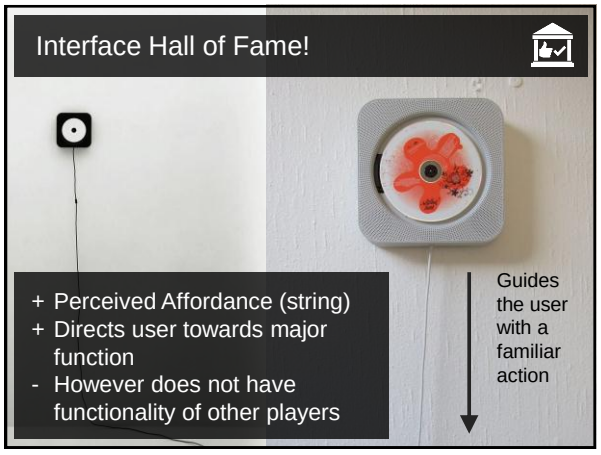
Prof. James A. Landay
University of Washington

CSE 440
January 22, 2013

Interface Hall of Shame or Fame?

Muji CD Player
by IDEO

Interface Hall of Fame!



+ Perceived Affordance (string)
+ Directs user towards major function
- However does not have functionality of other players

Guides the user with a familiar action

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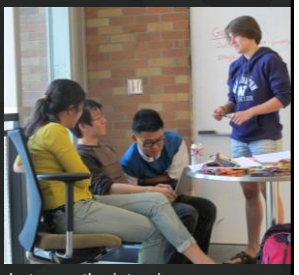
Outline

- Review
- Design Discovery
- Contextual Inquiry
- Break
- Task Analysis

Review

Characteristics of teams?

- shared leadership
- individual & mutual accountability
- specific team purpose
- collective work products
- open-ended meetings
- measures performance from work products
- does real work together



What is the model or relationship between the interviewer and the interviewee in Contextual Inquiry?

- Master - Apprentice

"You Are Not the Customer"

- Seems obvious, but…
  - different experiences
  - different terminology
  - different ways of looking at the world
- Easy to think of self as typical customer
- Easy to make mistaken assumptions

Design Process: Discovery

- **Discovery**
- Design Exploration
- Design Refinement
- Production

Assess needs

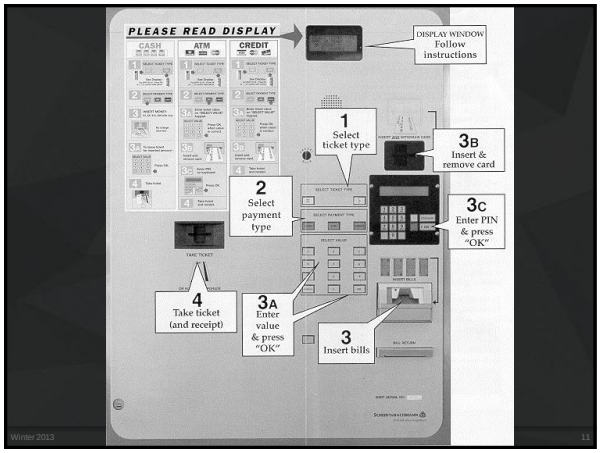
- understand client's expectations
- determine scope of project
- characteristics of customers & tasks
- evaluate existing practices & products

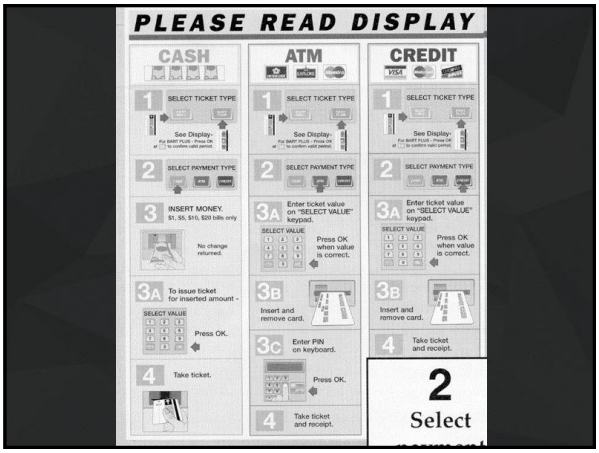
Understanding the Customer

- How do your customers work?
  - task analysis, interviews, self report, experience sampling (ESM), & observation
- How do your customers think?
  - understand human cognition
  - observe users performing tasks
- How do your customers 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: *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 ticket
- Large dismiss transaction button does nothing
- Multiple keypads/screens
- Order of actions around panel feels random

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 customer's task?"

A Better BART Machine

Hong Kong MTR System

Contextual Inquiry

- Way of understanding customers' 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
- contact real/intended customers
- 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
- contact real/intended customers
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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?"
    - No, not here. It means safety for personnel/equipment
  - 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")

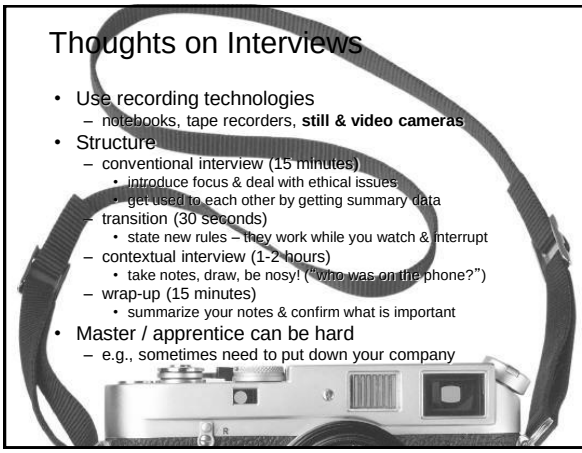
Users: Unique or One of Many?

"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
    - get used to each other by getting summary data
  - transition (30 seconds)
    - state new rules – they work while you watch & interrupt
  - 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

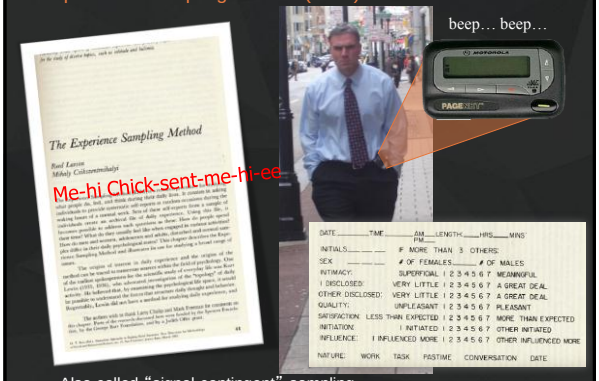
What Customers Might Say

- "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 customers

In Situ ("in place")

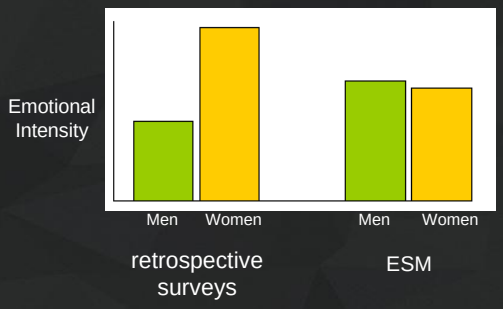
- Studying people in naturalistic settings
  - direct observation
  - indirect observation
  - diary method
  - Experience Sampling Method (ESM)
- Naturalistic data collection method
  - outside the lab
    - "Ecologically valid"
  - studying behaviors in real-life situations…
- Key for places we will deploy contextually-aware and/or mobile apps

Experience Sampling Method (ESM)



Also called "signal-contingent" sampling...

Why is ESM Interesting?



Barrett, *Cognition and Emotion*, 1998

Computerized ESM

Advantages

- ensures compliance
- sophisticated presentation
  - conditionals
  - probabilities
  - "question pools"
- record reaction times
- data already in computer
  - reduces data entry error

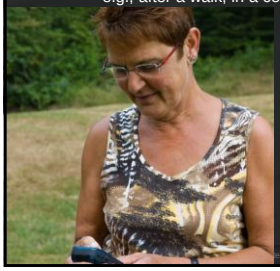
Computerized ESM

Disadvantages

- input constraints (limited free response)
- human factors
  - small screen, buttons, etc.
  - requires some prior experience with technology
- costs (if need to handout devices…)

Context-Triggered Sampling

- Use sensors to achieve targeted triggers
- Do not need to bug the customers as often
  - e.g., after a walk, in a certain place, etc.



Example Triggers
Activity == walking
DeviceIdle > 15 mins
Place.State == "Home"

Example Actions
SurveyAction
ScreenshotAction
LogAction

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

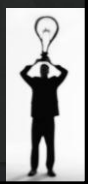
Administrivia

- Contextual Inquiry Assignment
  - Report due next Tuesday (1/29)-no talk
  - Interview 3 customers using CI
    - no classmates
  - Describe them & your results!
  - *Include pictures!*
  - Sketch 30 ideas
    - turn in top 3-4 that also show big differences
    - everyone on team contributes
- Task Analysis Assignment & Talk (2/5)
- Discussion Sections
  - Thur/Fri 1:30-2:30 (location TBD)

B R E A K

Task Analysis

- Use this to organize contextual inquiry data
- Find out
  - who customers 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



Task Analysis Questions (11)

- 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 customer & data?

Task Analysis Questions (cont.)

- What other tools does the customer 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?

Sound Transit Link Light Rail

Who (Link)?

- Identity?
  - people who ride Link
    - 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 Link tickets

What Tasks?

- Important for both automation and new functionality
- Relative importance of tasks?
- Observe customers, 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 customer 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 customers?
- Users under stress?
- Confidentiality required?
- Do they have wet, dirty, or slippery hands?
- Soft drinks?
- Lighting?
- Noise?

What is the Relationship Between Customers & Data?

- Personal data
  - always accessed at same machine?
  - do users move between machines?
- Common data
  - used concurrently?
  - passed sequentially between customers?
- Remote access required?
- Access to data restricted?

What Other Tools Does the Customer Have?

- More than just compatibility
- How customer 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/forms are used and how are they handled?

How Do Customers Communicate with Each Other?

- Who communicates with whom?
- About what?
- Follow lines of the organization? Against it?

How Often Do Customers Perform the Tasks?

- Frequent customers remember more details
- Infrequent customers may need more help
  - even for simple operations
  - make these tasks possible to do
- Which function is performed
  - most frequently?
  - by which customers?
  - optimize system for these tasks will improve perception of good performance

What are the Time Constraints on the Task?

- What functions will customers 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?

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
- Customers are not always right
  - cannot anticipate new technology accurately
  - job is to build system customers will want
    - not system customers *say* they want
    - be very careful about this (you are outsider)
      - if you can't get customers interested in your hot idea, you're probably missing something
- Design/observe forever without prototyping
  - rapid prototyping, evaluation, & iteration is key

Further Reading

Task Analysis & Personas

- Books
  - *User and Task Analysis for Interface Design* by Joann T. Hackos, Janice C. Redish
  - *The Inmates are Running the Asylum* by Alan Cooper

Summary

- Know thy user & involve them in design
- Contextual inquiry
  - way to answer the task analysis questions
  - interview & observe real customers
  - use what model to get them to teach you?
    - the master-apprentice model to get them to teach you
- Experience Sampling Method (ESM)
  - way to get self-report data where?
    - *in situ*

Summary

- 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 customer & data?
  - What other tools does the customer 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?

Next Time

- Lecture
  - Design Exploration
- Readings
  - Pg. 35-51 from Buxton's *Sketching User Experiences*