User Interface Dᴇsɪɢɴ, Pʀoᴛoᴛʏᴘɪɴɢ, and Evaluation

Design Discovery:
Contextual Inquiry

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Hall of Fame or Hall of Shame?

• **Gas pump display**

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Hall of Shame!

• **Hard to distinguish cost vs. # gallons**
  – **bad labels**
  – **placed inconsistently**
  – **displays too similar**

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Outline

• **Picking teams**
• **Review**
• **Understanding the user**
• **Contextual inquiry**
• **ESM**
• **How to use the data you collect**

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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**
• **Groups will be on web site by end of day**
  – **get together soon & start talking**
  – **contextual inquiry assignment due next Thur. (online today)**

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Review

- **Computers do not need to be the way we see them today**
- **Predict the future by inventing it**
- **What were some of the key things envisioned by Vannevar Bush?**
- **What were some of the things Engelbart invented?**

"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."

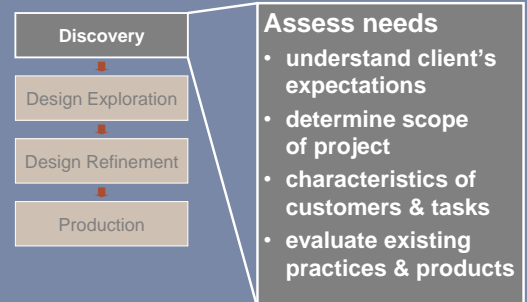**– Vannevar Bush**

"You Are Not the 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?**
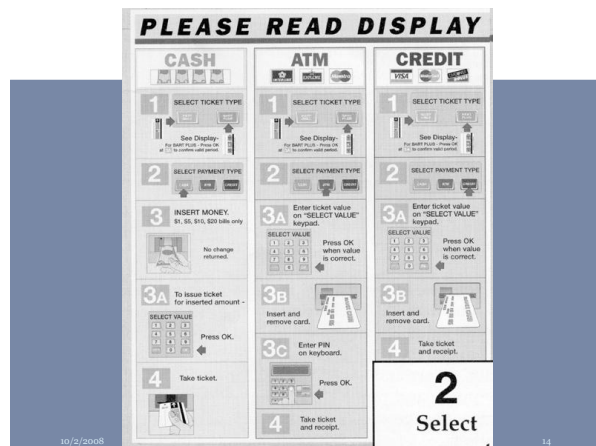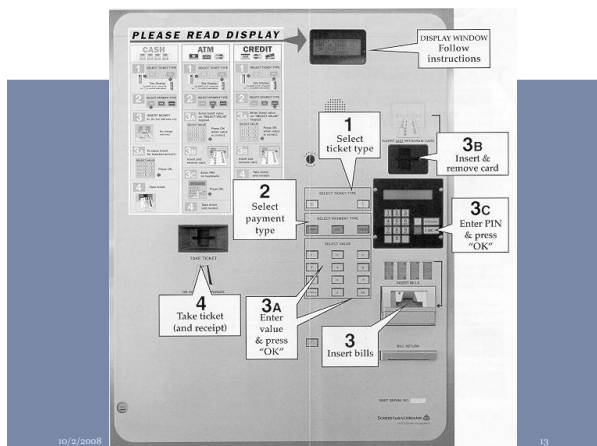 - **observe!**

Example of Design Failure

- **BART "Charge-a-Ticket" Machines**
  - **allow riders to buy BART tickets or add fare**
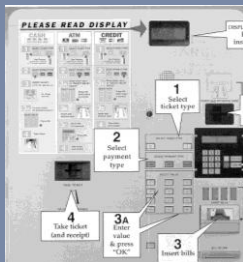 - **takes ATM cards, credit cards, & cash**

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**

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**
  - **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?"**
      - **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…")**

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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")**

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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*)

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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**

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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/mobile apps**

Primary Sampling Technique

(Random Beeps)

+
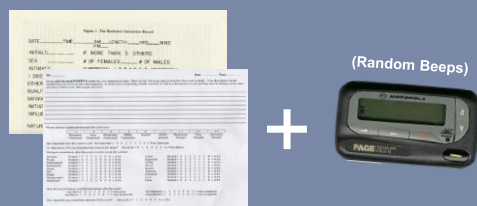
Called "signal-contingent" sampling...

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**

Context-Triggered Sampling

- **Use sensor data to achieve more targeted triggers**
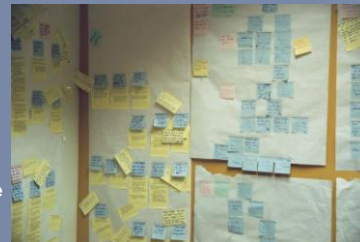- **You will use the MyExperiences tool on phones**
  - **docs here:**
    http://myexperience.wikispaces.com/

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**

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*

Further Reading
Contextual Inquiry

- **Books**
  - *Contextual Design* by Hugh Beyer & Karen Holtzblatt
- **Articles**
  - **Beyer, Hugh, and Holtzblatt, Karen, "Apprenticing with the Customer: A Collaborative Approach to Requirements Definition," *Communications of the ACM*, May 1995.**
- **Web Sites**
  - **Beyer, Hugh, "Getting Started with Contextual Techniques"**
    - http://www.incent.com/connection.indx/techniques.html

Next Time

- **Discussion**
  - **Experience Sampling Method**
  - **Phone Handout**
- **Lecture**
  - **Task Analysis**
  - **Read**
    - **Chapter 3 of *The Design of Sites***
    - **The Discipline of Teams**