Due Monday, 2/8

1. Group Brainstorm
2. Individual Programming Assignment II
   Submit Narrated Video!
You can observe a lot by just watching.
- Yogi Berra

Main Points of Today’s Lecture

Don’t just trust your intuition to make design decisions.

Observe target users in context to inform your design.
Existing copiers judged as "too complicated" by customers. But why?

Lucy Suchman (UC Berkeley grad – Anthropology) at Xerox PARC suggests videotaping interactions.

About those "average" users...

Allen Newell
(ACM Turing Award Winner)

Ron Kaplan
(ACM Fellow, Chief Scientist at Powerset/Bing)

Observation showed that difficulties were not due to lack of sophistication of users, but due to problems "reading" (making sense of) an unfamiliar artifact.
Many varieties of observation techniques:

- Ethnography / Ethnomethodology
- Task Analysis
- Contextual Inquiry
- Cultural Probes
- Diary Studies
- Prompted “pager” studies

**Goal:** Understand user’s activities in context to inform (re-)design of information technology.

**Task Analysis**

**BART Ticket Machine**

**Goals:**
- Buy new ticket
- Add value to ticket
- Pay with:
  - Debit, Credit, Cash
Problems?

How To Improve Design?

Understand users’ tasks

Designers must think about …
Who are the users?
What tasks they would want to carry out?

Observe existing practices
Create scenarios of actual use

Task Analysis Questions

1. Who is going to use system?
2. What tasks do they now perform?
3. What tasks are desired?
4. How are the tasks learned?
5. Where are the tasks performed?
6. What’s the relationship between user & data?
7. What other tools does the user have?
8. How do users communicate with each other?
9. How often are the tasks performed?
10. What are the time constraints on the tasks?
11. What happens when things go wrong?
<table>
<thead>
<tr>
<th>Who is going to use it?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity</strong></td>
</tr>
<tr>
<td>Need several typical users for broad product</td>
</tr>
<tr>
<td><strong>Background/Skills</strong></td>
</tr>
<tr>
<td>Knowledge users already have and rely on to perform task</td>
</tr>
<tr>
<td><strong>Values, Likes/Dislikes</strong></td>
</tr>
<tr>
<td>Personal characteristics</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Literacy</td>
</tr>
<tr>
<td>Physical traits, abilities/disabilities</td>
</tr>
<tr>
<td>Age</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who (BART)?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity</strong></td>
</tr>
<tr>
<td>Tourists and visitors from elsewhere</td>
</tr>
<tr>
<td>Regular BART riders</td>
</tr>
<tr>
<td>Business people, students, disabled, elderly, etc.</td>
</tr>
<tr>
<td><strong>Background/Skills</strong></td>
</tr>
<tr>
<td>Have an ATM card or credit card!</td>
</tr>
<tr>
<td>Experience with other public transit!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who (BART)?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity</strong></td>
</tr>
<tr>
<td>Types of users</td>
</tr>
<tr>
<td><strong>Background/Skills</strong></td>
</tr>
<tr>
<td>Knowledge they use to perform task</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Who (BART)?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Values, Likes/Dislikes</strong></td>
</tr>
<tr>
<td>(i.e. May not like driving)</td>
</tr>
</tbody>
</table>
### Who (BART)?

**Values, Likes/Dislikes**
- May not like driving
- Want minimum fuss
- Sometimes in a hurry
- Maybe frugal (like saving money)
- Maybe environmentalists
- Hate having money eaten
- Want to feel safe and maintain privacy
- Hate feeling stupid

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### Who (BART)?

**Personal characteristics**
- Mostly educated, fluent in English (Spanish important, too)
- Varying heights → don’t make it too high or too low!
- Mixture of ages, a few disabled users (e.g. wheelchairs).
- Some bike users (make interface one-handed?)

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### We just did it wrong.

**Don’t guess – Observe!**
- Go out and find who uses the artifact you are replacing or redesigning!
Talk to Them

Find some real users

Talk to them
Find out what they do now
How would your system fit in?
More on this a bit later

Are they too busy?
Buy their time
t-shirts, coffee mugs, etc.

Task Analysis Questions
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8. How do users communicate with each other?
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Old and New Tasks

Old
The way people do things now

New
The way you anticipate them doing things in future

Observe!
Pick the most important tasks
What Tasks (BART)?

Old
Use cash, credit or debit to buy new ticket with $x stored on it
Add fare to existing ticket

New
Use cash, credit or debit to buy new ticket
Add fare to existing ticket
Get pricing information for destination
Buy "destination" tickets

Task level of detail can vary based on goals of analysis

Example: On-Line Medical Records

Dental office installed new automated billing system

Assistants unhappy with new system

Old forms had hand-written notes
e.g., patient A's insurance takes longer than most, etc.

Task Analysis Questions

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How are Tasks Learned?

What does the user need to know?
Do they need training?
Book/manual information
General knowledge / skills
Special instruction / training

Experience, level of education and literacy
8th grade is often reasonable in broad design contexts
### Learning Tasks (BART)

<table>
<thead>
<tr>
<th>What does the user need to know?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk up &amp; use system</td>
</tr>
<tr>
<td>Can't assume much background/training</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do they need training?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too time consuming</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experience, level of education and literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must be simple &amp; similar to existing systems</td>
</tr>
<tr>
<td>Vending machines</td>
</tr>
<tr>
<td>ATM machines</td>
</tr>
</tbody>
</table>

### Where is the Task Performed?

<table>
<thead>
<tr>
<th>Office, laboratory, point of sale, home?</th>
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<table>
<thead>
<tr>
<th>Effects of environment on users?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting, sound, comfort, interruptions, water</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Social influence of environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rituals, sacred places</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Effects of other people (bystanders)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rushing, safety, privacy</td>
</tr>
</tbody>
</table>

### Where (BART)? Train Station

- **Loud**
- **Voice I/O not a good idea**
- **Privacy**
- **Others can look over shoulder**
- **PIN must be confidential**
- **Don’t confirm with sound**
- **Lighting is dim**
- **Make sure messages are readable**
- **Rituals**
- **Panhandlers, musicians, reading the paper, cell phones**
Task Analysis Questions

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Data Relationships

- **Personal data**
  - Privacy
    - Always accessed at same machine?
    - Do users move between machines?

- **Common data**
  - Handling and processing
    - Used concurrently?
    - Passed sequentially between users?

- **Remote access required?**
- **Access to data restricted?**

Data Relationships (BART)

- **Personal data**
  - Users may use any machine
  - Store info on BART card

- **Common data**
  - Fare rules (e.g., how much for BART Plus)
  - Used concurrently

- **Access to data restricted?**
  - Only you can use your ATM or credit card

  - No need for remote access

Other Tools

- Users work with collection of tools
  - Cell phone
  - Home PC
  - Printed schedules
  - Maps

- Can we use other tools to facilitate interaction?
Other Tools (BART)

- Credit, debit cards (today)
- E-wallet in cell phone or organizer (someday)
- Real-time train info on the web
- User has PC at home
- Could provide auditing for them!
- Text on phone, use for BART delay alerts

Task Analysis Questions

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How do users communicate?

- 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

  Not so relevant in context of BART
How often are the tasks performed?

Frequent users remember more details

Infrequent users may need more help
But don’t make it tedious

Which function is performed
Most frequently? By which customers?
Optimize system for these tasks will improve perception of good performance

Frequency (BART)?

Varying frequency of customers
Some (most) take BART every day
Some take it only occasionally (depends on station!)

Varying frequency of tasks
Might do add fare or buy new ticket every day
Novices: Just one set of detailed instructions
Experienced Users: Provide overview of process

How to find out for sure?
Observe and interview customers!

Task Analysis Questions

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Time Constraints

What functions will customers be in a hurry for?

Which can wait?

Is there a timing relationship between tasks?
Time Constraints (BART)?

- Customers will almost always be in a hurry
- Lines form
- Take less than 1 minute/transaction
- Be able to do any task in any order

When Things Go Wrong

How do people deal with Errors?
Practical difficulties?
Catastrophes?

Is there a backup strategy?

When Things Go Wrong (BART)

Confusion/errors on task
“Start over” button

Practical difficulty
Generated ticket with too much money. Now What?

Catastrophe
Machine eats card - swipe instead of insert?

Backup strategy
Use cash in regular machines (and provide ATM)
## Identifying Tasks for Your Design

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 user wants to do, not how user would do it
Allows comparing different design alternatives

Often very specific
Forces us to fill out description with relevant details
Say who the users are (use personas or profiles)
Design can really differ depending on the target user
Name names (allows getting more info as necessary)
Characteristics of the users (job, expertise, etc.)

Some describe a complete job
Forces us to consider how features work together

## Using Tasks in Design

1. Write up a description of the tasks
2. Produce scenarios covering each task
3. Rough out an interface design

## 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
Using Tasks in Design

Produce scenarios covering each task
Task-based scenarios
Elaborated scenarios
Full-scale scenarios

Using Tasks in Design

Produce scenarios covering each task
Task-based scenario example:
Jill is traveling to Seattle for her job next week and she wants to check on the amount she can be reimbursed for meals and other expenses.

Using Tasks in Design

Elaborated scenario example:
It's Friday afternoon and Joe is flying to Sydney. He doesn't have enough money for a taxi to the airport, and he's running late.
He goes to the local ATM and identifies himself.
He specifies that he wants $100 from his savings account. He'd like the money in $20 notes so that he can give the taxi driver the correct change.
He doesn't want a printed receipt, as he doesn't bother keeping track of transactions in this account.

Using Tasks in Design

Rough out an interface design
Discard features that don't support your tasks
(or add a real task that exercises that feature)
Sketch major screens & functions (not too detailed)
**Goals**

**Method:**
“Go where the customer works, observe the customer as she works, and talk to the customer about their work” [Holtzblatt]

**Goals:**
Get inside the user’s head
See their tasks the way they do
A middle ground between pure observation and pure interview

**Guideline: Master-Apprentice Model**

Allows user to teach us what they do
- Skill knowledge is usually tacit (can’t put it in books)
- Sometimes literal apprenticeship is best

Matsushita Home Bakery – First automatic bread maker to have twist/stretch motion [Nonaka 95]
Principles of Contextual Inquiry

1. Context
2. Partnership
3. Interpretation
4. Focus

Principles: Context

Go where the work is:
Conduct inquiry in a normal work environment
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?”
Look for skipped steps, ask user to fill them in.

Principles: Partnership

Master / Apprentice + intermittent probing

Alternative models (what’s wrong with them?)
Interviewer / Interviewee
Expert / Novice
Guest / Host

Why not just interview folks?
Problems with Master-Apprentice?

A potential problem with the master/apprentice model that is not addressed in the reading is the sole focus on daily activities during the design process. [...] It is not guaranteed that every topic will come up in the master/apprentice model, depending on what events occur during the time the two spend together and the level of skill of the master.

(David Nguyen)

Problems with Master-Apprentice?

I think that one disadvantage of the master/apprentice model is that it is not natural. The idea is to exhibit one’s actions and behaviors during their work, trying to capture what they do in their natural environment. I know that if someone followed me around all day I would have a hard time staying focused on my usual work routine.

(Matt Vaznaian)

Example: Paper Flight Strips

W. Mackay. Is Paper Safer? The Role of Paper Flight Strips in Air Traffic Control
Example: Paper Flight Strips

Principles: Partnership

Stick with master-apprentice; avoid other models, i.e. Avoid interviewer/interviewee
Above all, don’t “teach”!

Partnership allows more apprentice interaction
OK to be a designer and interrupt!
… but go back “in role” afterwards.

Alternate watching & probing (withdrawal & return)

Principles: Interpretation

Good facts only the starting point
Design based on interpretations

Validate & rephrase
Check interpretations with user
Be committed to hearing what user is really saying

Principles: Focus

You need data about specific tasks
Steer conversation to stay on useful topics

Respect “intrapersonal triggers”
(flags to change focus/understanding)
“Why would they do that?”
Admit your ignorance
Thoughts on Inquiries

Establish rapport before diving in

Use recording technologies
Notebooks, tape recorders, still & video cameras

Master/apprentice can be hard
Staying in role — it’s a lot like acting
Don’t correct! It’s not a lesson!
It’s hard not designing on the fly

Personas (from Cooper)

“Hypothetical Archetypes”
Archetype: (American Heritage)
An original model or type after which other similar things are patterned; a prototype
An ideal example of a type; quintessence

A precise description of user in terms
Capabilities, inclinations, background
Goals (not tasks)
Why Personas?

It’s hard to reason about users in aggregate, and impossible to please everyone.

General users have too many conflicting goals.

Why Personas?

It’s easier to reason about specific fictional people.

Specific personas have clear, well-articulated goals.

Defining and Using Personas

**Defining them**
- Identify major clusters from multiple user interviews/inquiries
- Synthesize their goals
- Check for completeness and specificity
- Specificity prevents “elastic user”
- Try them out by developing narrative

**Design each interface for a single primary persona**
Yet other type might use the interface

<table>
<thead>
<tr>
<th>AMANDA</th>
<th>GLORIA</th>
<th>CHARLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7</td>
<td>34</td>
</tr>
<tr>
<td>Occupation</td>
<td>Second grade student</td>
<td>Part-time office administrator</td>
</tr>
<tr>
<td>Home Life</td>
<td>Lives with her mother, father, and younger sister in the suburbs of a large city.</td>
<td>Lives with her husband and two children in a mid-sized city.</td>
</tr>
<tr>
<td>Education</td>
<td>In elementary school</td>
<td>Has a bachelor degree</td>
</tr>
<tr>
<td>LIFESTYLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Plays soccer, reads, and takes ballet lessons. Sews her birthday money and allowance to spend at the mall.</td>
<td>Enjoys crossword puzzles and reading mystery novels. Spends a lot of time driving her children to activities.</td>
</tr>
<tr>
<td>Ultimate Goal</td>
<td>Goal is to turn 10 so that</td>
<td>Goal is to create more love</td>
</tr>
</tbody>
</table>
Personas vs. Observations

How do personas differ from the people you observed in your inquiry?

Summary

<table>
<thead>
<tr>
<th>Task analysis</th>
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</thead>
<tbody>
<tr>
<td>Understand users and their tasks</td>
</tr>
<tr>
<td>Real tasks with reasonable functionality coverage</td>
</tr>
<tr>
<td>Do your best to anticipate new tasks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contextual inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps answer the task analysis questions</td>
</tr>
<tr>
<td>Hybrid between interview and observation</td>
</tr>
<tr>
<td>Use master-apprentice model to get them to teach you</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific archetype of target user</td>
</tr>
<tr>
<td>Build based on contextual inquiries/interviews</td>
</tr>
</tbody>
</table>

Next Time

**Conceptual Models**

- Cognetics and the Locus of Attention.

Don't forget to read, then write comment on wiki!

You should be well on your way with Programming Assignment II!