CS 160: User Interface Design

Task Analysis & Contextual Inquiry 02/01/12

http://www.youtube.com/watch?v=KHILJw-104
San Francisco artist and entrepreneur Scott Snibbe will present selections from twenty years of interactive exhibits, interactive art, and interactive music. He will show many examples of interactive media with technologies including computer vision, haptics, multitouch, and iPads, including recent work creating the first app album with Björk: Biophilia; and the recent interactive exhibits for James Cameron’s movie Avatar. He will discuss the educational and societal benefits of interactivity; and the joys, challenges, and research involved in the creation and distribution of interactive media on the cutting edge of interactive technology.

Wed Feb 1, 4-5pm Soda 306
Borrowing a Kinect

$150 Check to UC Regents
Will leave uncashed unless not returned by end of term

We have a limited supply
Up to 2 Kinects per group

Come to Soda 514 today 3:30-5pm
More times listed on Piazza

Due Last Monday: IPA I

Grades on bSpace soon…
Regrades: Write down where you think you deserve more points and submit physical copy to us. We will regrade entire assignment. Your grade can decrease during regrading.
Due Last Monday IDA 1

More observations/interviews early on
More detail in prototypes
More extensive user testing

Grades on bSpace soon…

Review: Group Brainstorm
Upcoming Due Dates

Mon. Feb 6: Group Brainstorm
Mon. Feb 13: Individual Programming Assignment 1
Submit Narrated Video!
Wiki has instructions

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
Xerox, ca. 1983…

Existing copiers judged as “too complicated” by customers. But why?

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

Pushing the Green Button
(advertisement for the 8200 copier, c. 1983)

Perhaps Jane is dumb:
Two "average" users making two-sided copies of a 100 page original
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
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.
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?
Task Analysis Questions

1. **Who is going to use system?**
   2. What tasks do they now perform?
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Who is going to use it?

**Identity**
Need several typical users for broad product

**Background/Skills**
Knowledge users already have and rely on to perform task

**Values, Likes/Dislikes**

**Personal characteristics**

**Education**

**Literacy**

**Physical traits, abilities/disabilities**

**Age**
## Who (BART)?

### Identity

**Types of users**

- Tourists and visitors from elsewhere
- Regular BART riders
- Business people, students, disabled, elderly, etc.

### Background/Skills

- Have an ATM card or credit card?
- Experience with other public transit?
<table>
<thead>
<tr>
<th>Who (BART)?</th>
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<tr>
<td><strong>Values, Likes/Dislikes</strong></td>
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<td>(i.e. May not like driving)</td>
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Who (BART)?

Personal characteristics
Education, Physical abilities, Age, etc

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?)
We just did it wrong.

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

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**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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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

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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)

**What does the user need to know?**
- Walk up & use system
- Can’t assume much background/training

**Do they need training?**
- Too time consuming

**Experience, level of education and literacy**
- Must be simple & similar to existing systems
- Vending machines
- ATM machines
<table>
<thead>
<tr>
<th><strong>Where is the Task Performed?</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Office, laboratory, point of sale, home?</strong></td>
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<tr>
<td><strong>Effects of environment on users?</strong></td>
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<tr>
<td>Lighting, sound, comfort, interruptions, water</td>
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<tr>
<td><strong>Social influence of environment</strong></td>
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<tr>
<td>Rituals, sacred places</td>
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<tr>
<td><strong>Effects of other people (bystanders)?</strong></td>
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<tr>
<td>Rushing, safety, privacy</td>
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<table>
<thead>
<tr>
<th><strong>Where (BART)? Train Station</strong></th>
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<td><img src="image1.png" alt="Image 1" /> <img src="image2.png" alt="Image 2" /></td>
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</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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5. Where are the tasks performed?

6. **What’s the relationship between user & data?**
7. **What other tools does the user have?**
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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?

<table>
<thead>
<tr>
<th>Who communicates with whom?</th>
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<tbody>
<tr>
<td>About what?</td>
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**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

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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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10. **What are the time constraints on the tasks?**
11. **What happens when things go wrong?**
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)
When Things Go Wrong (BART)

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 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

Produce scenarios covering each task

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)
BART TICKET KIOSK REDESIGNED

LJUSA MILIKOVIC
BEN COHEN

For our final project in User Interface Design at UC Berkeley’s School of Information, we redesigned the Bay Area Rapid Transit (BART) ticket kiosk. Our goal was to improve the user interface software within the limitations of the existing kiosk, ATM-style physical interface – instead of going with a touch-screen. We believe our design offers major usability advantages, especially for infrequent riders. Pick the location of the kiosk and give it a try. Let us know what you think at bartbucks@bartkiosk.com

http://www.bartkiosk.com/

Contextual Inquiry
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?