CS160: User Interface Design

Task Analysis & Contextual Inquiry

02/02/11
New Office Hours!

Bjoern:
W, 3-4pm, 629 Soda
(30 mins later than before)

Anuj:
F 12-1pm, BiD lab

Prayag:
F 2-3pm, BiD lab
Review: Group Brainstorm
Due Next Week

1. Monday:  
   Group Brainstorm

2. Wednesday:  
   Individual Programming Assignment II
   Submit Narrated Video!
   Section/wiki have instructions
Individual Programming Assignment 2

This assignment is still under construction.

Overview

In this assignment you will build a painting application that lets the user create artwork on their mobile device (see [New yorker covers @ painted on the iPad](http://example.com)).

The purpose of the assignment is to deepen your understanding of drawing and touch event-handling on the Android platform, and to introduce you to screencasting.

You will submit three things:

1. your source code
2. your executable (Make sure your executable has all resources that it needs to run.)
3. a narrated video demo of your app.

Instructions

Requirements:

- **Application:**
  - Create an application that recognizes and responds to touch events.
  - Using the touch data, draw points and lines on a canvas
  - User must be able to switch between drawing and erasing
  - User must be able to clear the screen
  - User must be able to select the color for drawing
  - User must be able to change the brush size for drawing

- **Video:** Submit a narrated video demo of your application. It should show and describe the features.

One way to satisfy the application functionality requirements is to create an application with two views: one of the canvas, and another of an options screen that lets the user change modes and adjust settings.

Extra credit: Up to 5 extra credit points are available if you design and implement more features, such as:

- Saving and loading pictures to device memory (see [Data Storage](http://example.com))
- Additional drawing tools such as shapes or different brushes
- Zooming and panning the canvas.
- Layers (hard).

Notes

- [DirectManipulation-H.pdf]
- [Raskin-Chap2.pdf]
Thanks for trying iShowU HD

Choose the type of demo (you can always change it later) and click "Use Demo".

If you have a registration key you can enter it by clicking the Register button.

Options:
- HD
- HD Pro
- Use Demo
- Register
- Purchase

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.
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.
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?
Task Analysis Questions

1. **Who is going to use system?**
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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

**Background/Skills**
Knowledge they use to perform task
Who (BART)?

**Identity**
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?
Who (BART)?

Values, Likes/Dislikes
(i.e. May not like driving)
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
Who (BART)?

Personal characteristics
Education, Physical abilities, Age, etc
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?)
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.
Video by Ljuba Miljkovik & Ben Cohen
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
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
Where is the Task Performed?

Office, laboratory, point of sale, home?

Effects of environment on users?
Lighting, sound, comfort, interruptions, water

Social influence of environment
Rituals, sacred places

Effects of other people (bystanders)?
Rushing, safety, privacy
Where (BART)? Train Station
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
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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?
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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?
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)
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 8-button, 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 feedback@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?
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! Its not a lesson!
Its hard not designing on the fly
Personas
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)
Persona Examples

I’m Julie, an account manager. I’m responsible for the purchases for my division.

Yo, I’m Mike, I work out in the field, and I need durable tools I can throw in my truck.

Hi I’m John. I’m an engineer, and I suggest what products might work best.

Brad Colbow (http://carsonified.com/blog/design/how-to-understand-your-users-with-personas/)
Why Personas?

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

General users have too many conflicting goals.

http://simpsons.wikia.com/wiki/File:TheHomer.png
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></th>
<th>AMANDA</th>
<th>GLORIA</th>
<th>CHARLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7</td>
<td>34</td>
<td>66</td>
</tr>
<tr>
<td>Occupation</td>
<td>Second grade student</td>
<td>Part-time office administrator</td>
<td>Retired accountant</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>
<td>Lives with his wife in the suburbs; has four children and six grandchildren.</td>
</tr>
<tr>
<td>Education</td>
<td>In elementary school</td>
<td>Has a bachelor degree</td>
<td>Has an MBA</td>
</tr>
<tr>
<td>Lifestyle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Plays soccer, reads, and takes ballet lessons; saves 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>
<td>Likes to work in the garden and drink wine. Enjoys traveling with his wife and investing in the stock market.</td>
</tr>
<tr>
<td>Ultimate Goal</td>
<td>Goal is to turn 10 so that her parents will let her baby-sit her cousins.</td>
<td>Goal is to make sure her family is taken care of and to find a little time for herself.</td>
<td>Goal is to make sure he and his wife have enough money to enjoy retirement.</td>
</tr>
</tbody>
</table>
Personas vs. Observations

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

**Task analysis**
Understand users and their tasks
Real tasks with reasonable functionality coverage
Do your best to anticipate new tasks

**Contextual inquiry**
Helps answer the task analysis questions
Hybrid between interview and observation
Use master-apprentice model to get them to teach you

**Personas**
Specific archetype of target user
Build based on contextual inquiries/interviews
Next Time

**Conceptual Models**

*Cognetics and the Locus of Attention.*  
*The Humane Interface.* Chap 2. Raskin.

Start Reading Sections 1+2 of Direct Manipulation Interfaces.

Don’t forget to read, then write comment on Piazza!

You should get started on Programming Assignment II right away!