CS160

USER INTERFACE DESIGN

SPRING 2016

TASK ANALYSIS, SKETCHING, AND AFFORDANCE

3 FEB 2016

ERIC PAULOS
www.paulos.net

UNIVERSITY OF CALIFORNIA Berkeley

ANNOUNCEMENTS

- Admissions is done!
- PROG 01 due Friday midnight
- PROG 01 We need your executable
- PROG 01 executable submission -> remove .apk from .gitignore? (or use git add --force)
- You handed in DESIGN 01, right?
- Late assignment policy…see website
- No external links in submission
- Section — affordances, watch design patterns, Android activities vs services, and setting up the emulator)
- Look for the “how to set up your watch emulator” guide on Piazza
- FEED 01 — for balancing groups (next week)

TASK ANALYSIS

You can observe a lot by just watching.

— Yogi Berra

HOW DO I SETUP FOR CLASS?

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

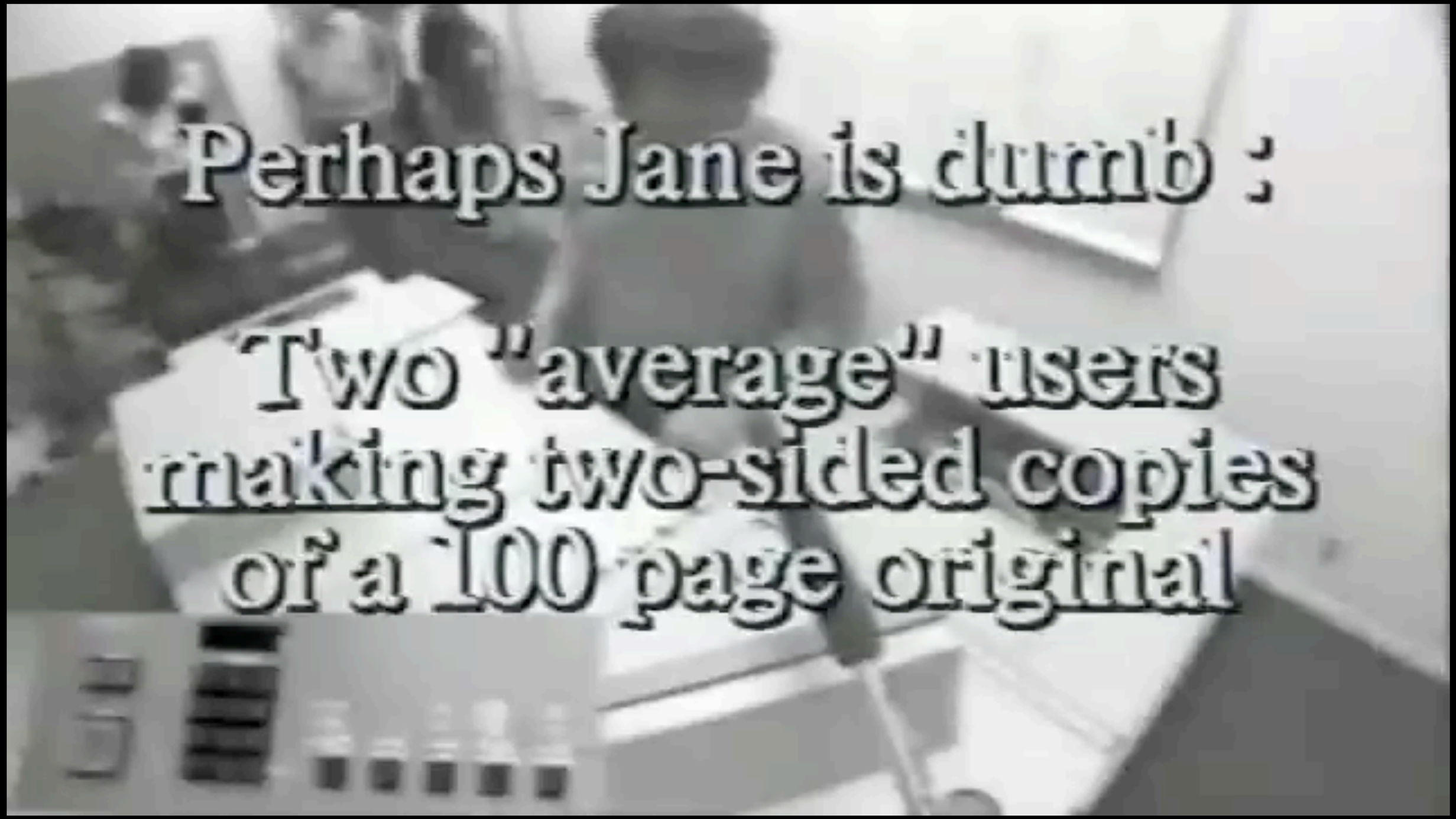
XEROX, CA. 1983...

Existing copiers judged as “too complicated” by customers.

But why?

Lucy Suchman
UC Berkeley grad in 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

Vice President and Distinguished Scientist at Nuance Communications

ACM Fellow, Chief Scientist at Powerset/Bing

Consulting Professor in the Linguistics Department at Stanford University

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

Experience Sampling methods (ESM)

Prompted “pager” studies”

MANY VARIETIES OF OBSERVATION TECHNIQUES

Ethnography / Ethnomethodology

Task Analysis

Contextual Inquiry

Cultural Probes

Diary Studies

Experience Sampling methods (ESM)

Prompted “pager” studies”

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

TASK ANALYSIS

The listing of actions a user carries out in performing a task

For example, a person preparing an overhead projector for use would be seen to carry out the following actions

1. Plug in to main and switch on supply.
2. Locate on/off switch on projector
3. Discover which way to press the switch
4. Press the switch for power
5. Put on the slide and orientate correctly
6. Align the projector on the screen
7. Focus the slide

In HCI, task analysis is the recording of physical and perceptual actions of the user whilst executing the task.

GOALS OF TASK ANALYSIS

Verify that the set of actions employed by the user does accomplish the task.

Explicitly describe the procedure that the user actually employs since this may be different from the expected series of actions.

Task analysis is used to:

- predict the time taken to learn a new task and become a proficient user of the particular application / machine
- reveal how difficult one method is to learn compared to another
- *predict the time taken for a proficient user to accomplish the set task - this can reflect whether the interface is good at supporting exploration. Is it quicker to simply explore by trial and error or attempt to find out through help?*
- *predict the time taken for expert execution of the set task - how long does it take to become expert once a procedure has been discovered? This can be affected by the design of an interface.*
- To improve the delivery of information to the user. This involves identifying any problems with the delivery of information to the user and the consideration of possible solutions.

TASK ANALYSIS

Task decomposition

splitting tasks into (ordered) subtasks

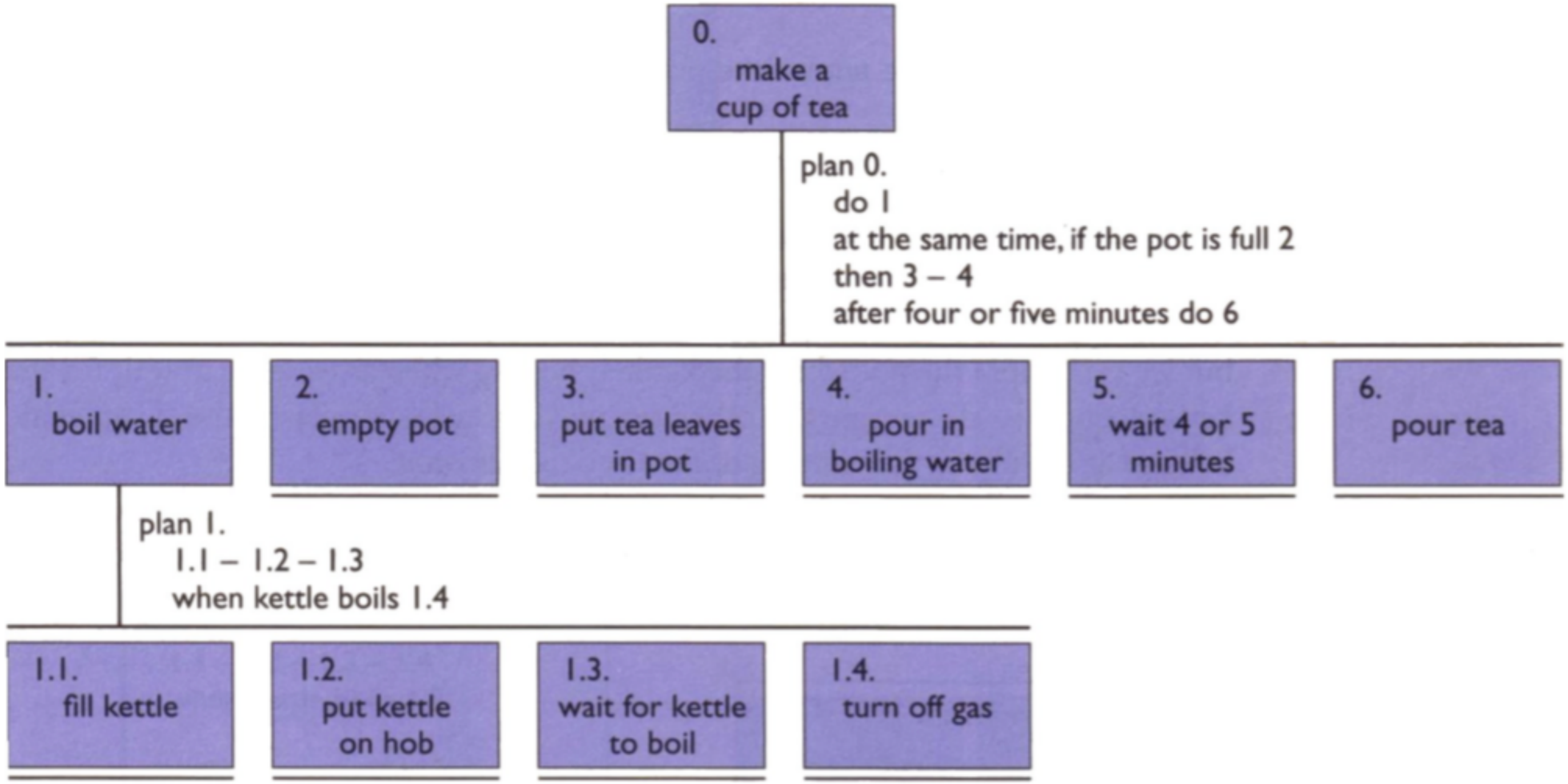
Knowledge based techniques

what the user knows about the task and how it is organized

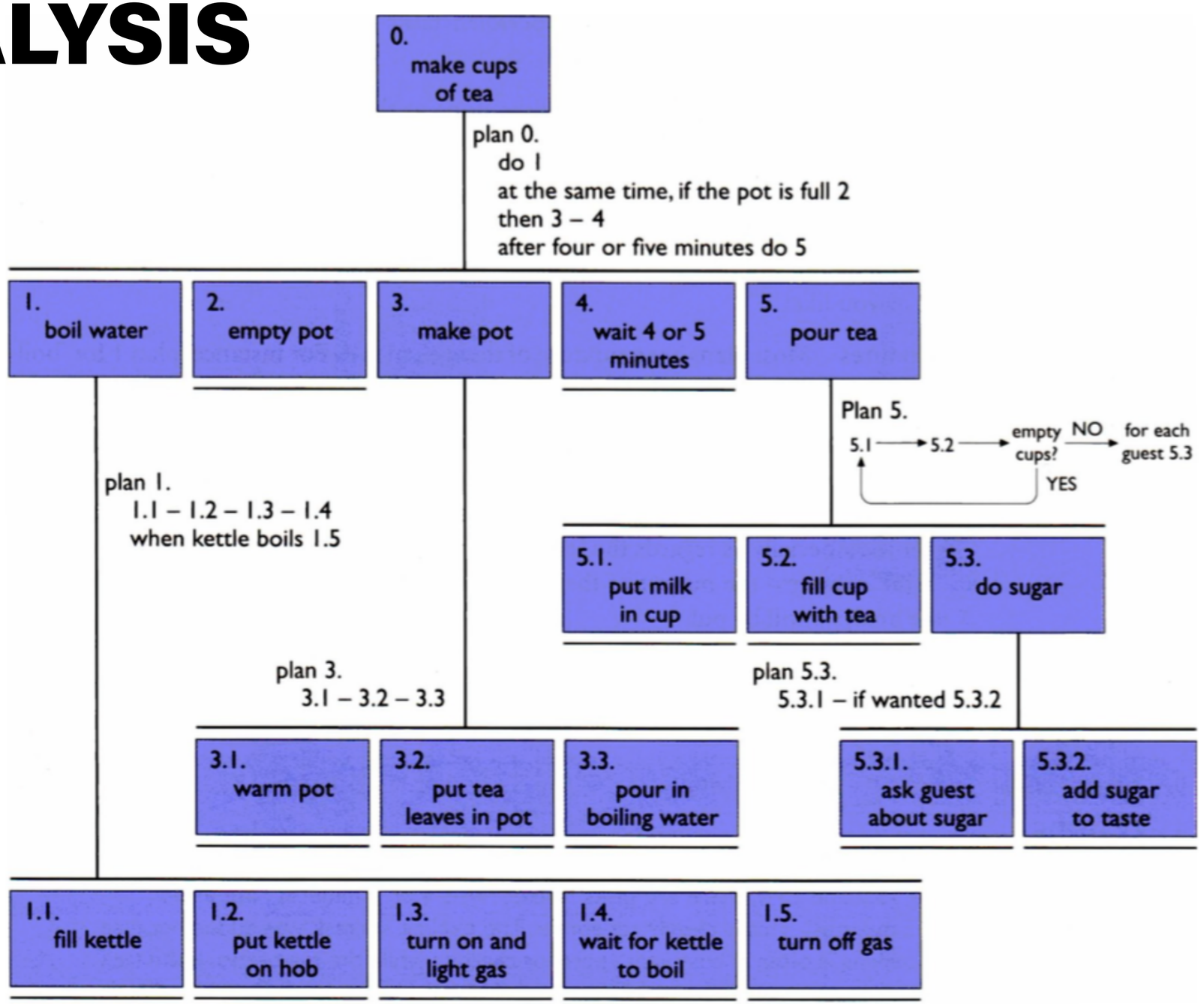
Object based analysis

relationship between objects, actions, and the people who perform them

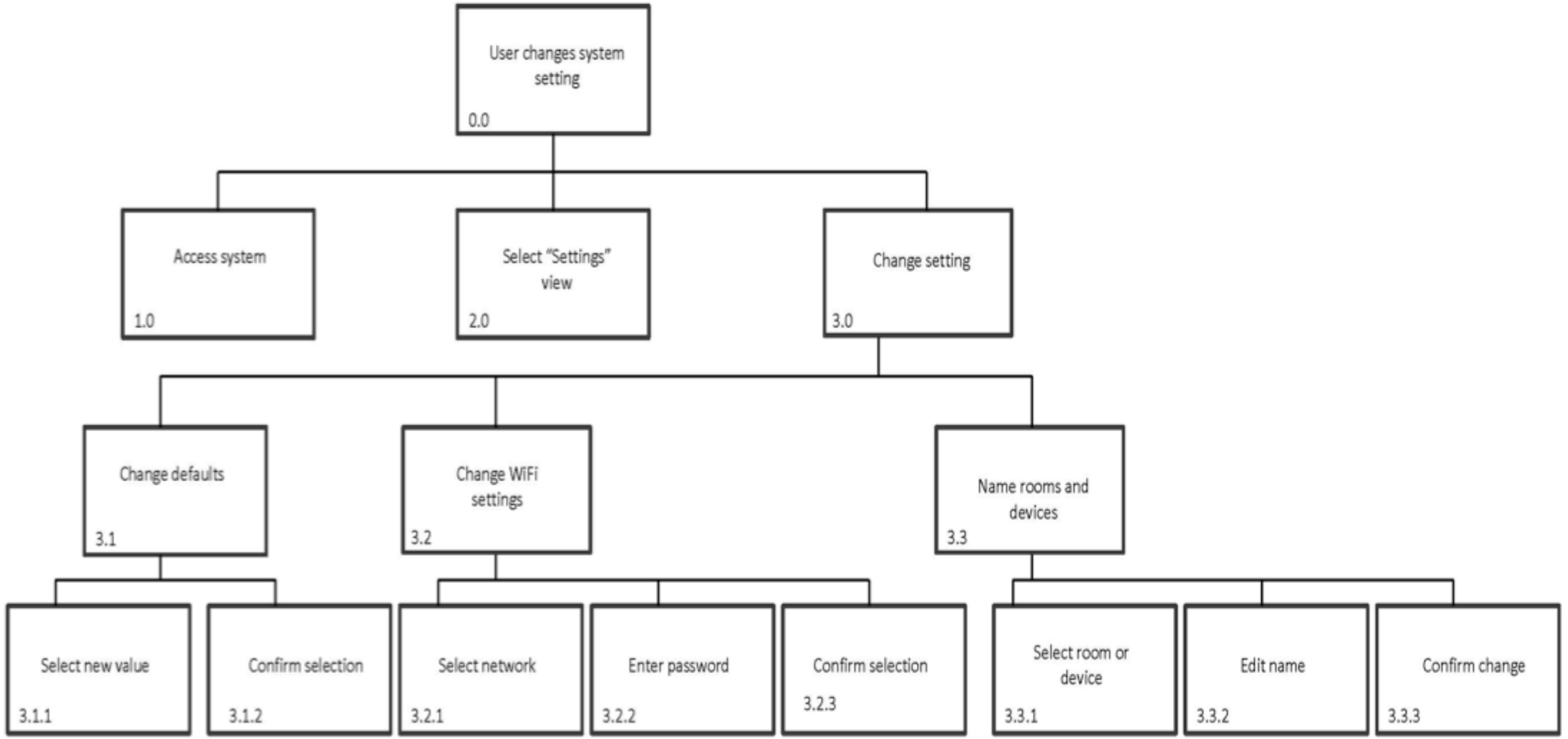
TASK ANALYSIS



TASK ANALYSIS



TASK ANALYSIS



TASK ANALYSIS: BART

BART TICKET MACHINE

Goals:

Buy new ticket

Add value to ticket

Pay with: Debit, Credit, Cash

PROBLEMS?

TICKETS
& MAGNETS
DON'T MIX
TICKETS
1
2
3
BART Fares
2
Welcome to BART, insert...
Bill/Coin
Credit/ATM Card
Old Ticket
A
B
C
D
E
F
G
H
CREDIT/ATM
1
COINS
BILLS
AUDIO
TICKET
3

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?
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?

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)?

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.

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?

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

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?

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, mobile phones

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?

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

Maybe for accessing Clipper Card balance

OTHER TOOLS

Users work with collection of tools

Smartphone

Smartwatch

Home PC

Printed schedules

Maps

Signs

Can we use other tools to facilitate interaction?

OTHER TOOLS (BART)

Credit, debit cards (today)

E-wallet in phone or watch (ApplePay, Google Wallet)

Real-time train info on the web/phone

Could provide auditing for them?

Phone/Watch apps to for BART delay alerts?

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?

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

MAKE COMMON CASE FAST…UNCOMMON CASE POSSIBLE

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

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?**

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)

GET BART DISCOUNTS
WITH CLIPPER.
OUT OF SERVICE
GET CLIPPER.
LOAD IT. TAG IT. GO.
3227
GET BART DISCOUNTS
WITH CLIPPER.
GET CLIPPER.
LOAD IT. TAG IT. GO.

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)

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

Write up a description of the tasks

Produce scenarios covering each task

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.

SCENARIO FOR A MAIL ORDER ENQUIRY

It is a busy morning with a long queue of telephone calls. John, who only started the job this week, takes a call from Mr Jones. Mr Jones says he still has not received the goods he ordered 3 months ago. Mr Jones does not know his account number, but gives his name and address. John retrieves the account, and checks the status of the order. It shows that the goods were dispatched 7 days ago. He informs Mr Jones that they should arrive shortly. He also notices an error in the post code for the address, which he corrects.

SCENARIO FOR PURCHASING AN AIRLINE TICKET

Jackie wants to fly to Prince Albert, Saskatchewan next Thursday, returning on the last flight on Friday. She wants to know how much this would cost, and whether it would be cheaper to take a different flight back. She is not quite sure how Saskatchewan is spelled on the computer. When she has found the right flight, she wants to confirm the purchase with a credit card.

SCENARIO FOR PLANNING A ROUTE

Sue is going to a wedding in Lake Tahoe, and needs a route to drive from her home in Berkeley to the Church in Truckee, and from there to the reception at Heavenly Ski Resort. She has not been to these places before. She wants to know the fastest route, and needs clear instructions as she will be traveling alone.

ADVANTAGES OF USING SCENARIOS

Providing concrete scenarios of this type helps focus design around the real needs of the user.

They give a design team gain a better understanding of how the system will be used.

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)

SUMMARY

Task analysis

Understand users and their tasks

Real tasks with reasonable functionality coverage

Do your best to anticipate new tasks