

Week 05

## Data Gathering / Data Analysis & Interpretation

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HCI 이론 및 실습 2019 Spring

Human-Computer Interaction+Design Lab \_ Joonhwan Lee

## 오늘 다룰 내용

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- Data Gathering
- Data Analysis & Interpretation
- Workshop: Data Gathering

# Data Gathering

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# Understanding Users

- ❖ Who are they?
  - ❖ Who are the target users?
  - ❖ E.g., movie player
    - ❖ young vs. old?
    - ❖ educational purpose vs. killing times?
  - ❖ Understanding generic users are difficult
    - ❖ e.g. [kids.yahoo.com](http://kids.yahoo.com) vs. [miclub.com](http://miclub.com) vs. [daum.net](http://daum.net)

# Understanding Users

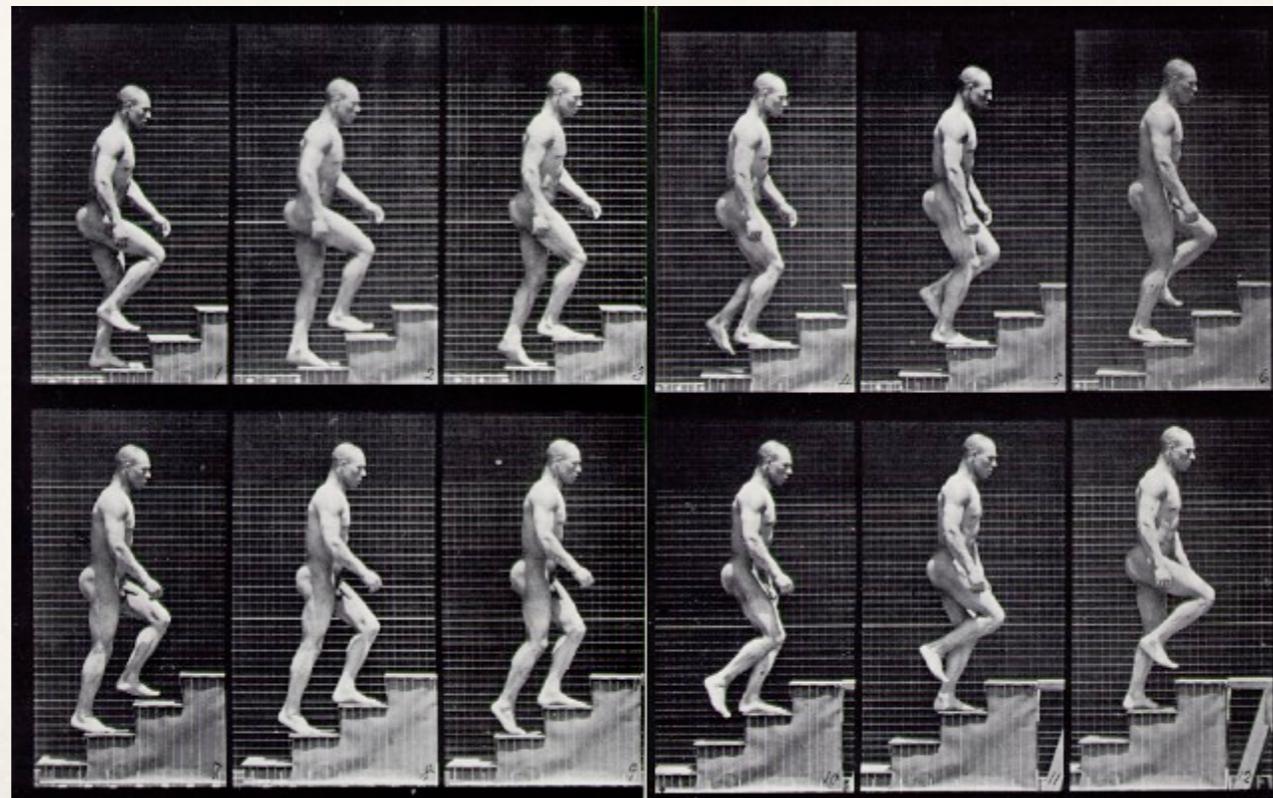
- ❖ Probably not like you!
  - ❖ do not consider yourself as an expert of a system.
  - ❖ there's no obvious thing to do!
  - ❖ consider gender differences, cultural differences.

# Understanding Users

- ❖ Talk to them
  - ❖ involved in the context where the system is used by users → participatory design
  - ❖ understand user's needs in the context

# Understanding Users

- ♦ Watch them
  - ♦ users CANNOT tell you everything.
    - ♦ they may ignore familiar but awkward things
    - ♦ they can't recognize every steps
  - ♦ Muybridge - Ascending Stairs



Eadweard Muybridge  
Ascending Stairs, 1884-85

# Understanding Users

- ❖ Watch them
  - ❖ cultural probes & diary studies
  - ❖ contextual inquiry - talk & watch users within their context
    - ❖ similar to interviews, but CI should be done in the real context
  - ❖ think aloud - clarify the user's thinking process
  - ❖ observations tell us what they do and why

# Understanding Users

- ❖ Use your imagination
  - ❖ you can't talk to everyone, can't watch every moment.
    - ❖ hospital consultant or surgery, website browsing etc.
    - ❖ use imagination to understand unobserved situations
  - ❖ persona: a user in imagination
    - ❖ personas let us imagine what a user might be doing
  - ❖ scenario: task process in imagination
    - ❖ let us imagine what a user want to do
    - ❖ let us infer user's task procedure

# Five key issues

- ❖ Setting goals
  - ❖ Decide how to analyze data once collected
- ❖ Identifying participants
  - ❖ Decide who to gather data from
- ❖ Relationship with participants
  - ❖ Clear and professional
  - ❖ Informed consent when appropriate
- ❖ Triangulation
  - ❖ Look at data from more than one perspective
  - ❖ Collect more than one type of data, eg quantitative from experiments and qualitative from interviews
- ❖ Pilot studies
  - ❖ Small trial of main study

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# Interview

- ❖ Unstructured - are not directed by a script. Rich but not replicable.
- ❖ Structured - are tightly scripted, often like a questionnaire. Replicable but may lack richness.
- ❖ Semi-structured - guided by a script but interesting issues can be explored in more depth.  
Can provide a good balance between richness and replicability.
- ❖ Focus groups – a group interview

# Interview Questions

- ❖ Two types:
  - ❖ ‘closed questions’ have a predetermined answer format, e.g. ‘yes’ or ‘no’
  - ❖ ‘open questions’ do not have a predetermined format
- ❖ Closed questions are easier to analyze
- ❖ Avoid:
  - ❖ Long questions
  - ❖ Compound sentences - split them into two
  - ❖ Jargon and language that the interviewee may not understand
  - ❖ Leading questions that make assumptions e.g. why do you like ...?
  - ❖ Unconscious biases e.g. gender stereotypes

# Running the Interview

- ❖ Introduction – introduce yourself, explain the goals of the interview, reassure about the ethical issues, ask to record, present the informed consent form.
- ❖ Warm-up – make first questions easy and non-threatening.
- ❖ Main body – present questions in a logical order
- ❖ A cool-off period – include a few easy questions to defuse tension at the end
- ❖ Closure – thank interviewee, signal the end, eg. switch recorder off.

# Questionnaire

- ❖ Questions can be closed or open
- ❖ Closed questions are easier to analyze, and may be distributed and analyzed by computer
- ❖ Can be administered to large populations
- ❖ Disseminated by paper, email and the web
- ❖ Sampling can be a problem when the size of a population is unknown as is common online evaluation

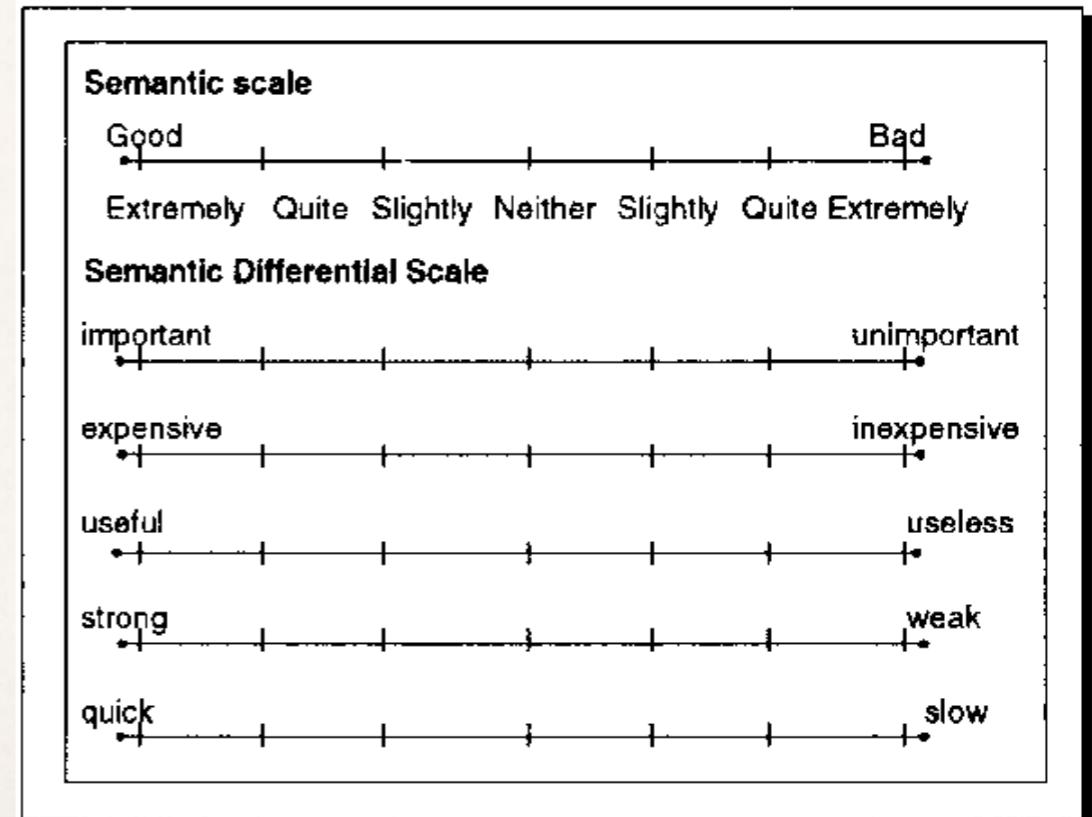
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# Questionnaire Design

- ❖ The impact of a question can be influenced by question order.
- ❖ You may need different versions of the questionnaire for different populations.
- ❖ Provide clear instructions on how to complete the questionnaire.
- ❖ Avoid very long questionnaires
- ❖ Decide on whether phrases will all be positive, all negative or mixed.

# Question and Response Format

- ❖ ‘Yes’ and ‘No’ checkboxes
- ❖ Checkboxes that offer many options
- ❖ Rating scales
  - ❖ Likert scales
  - ❖ semantic scales
  - ❖ 3, 5, 7 or more points
- ❖ Open-ended responses



# Encouraging a Good Response

- ❖ Make sure purpose of study is clear
- ❖ Promise anonymity
- ❖ Ensure questionnaire is well designed
- ❖ Offer a short version for those who do not have time to complete a long questionnaire
- ❖ If mailed, include a stamped addressed envelope
- ❖ Follow-up with emails, phone calls, letters
- ❖ Provide an incentive
- ❖ 40% response rate is good, 20% is often acceptable

# Advantages of Online Questionnaires

- ❖ Relatively easy and quick to distribute
- ❖ Responses are usually received quickly
- ❖ No copying and postage costs
- ❖ Data can be collected in database for analysis
- ❖ Time required for data analysis is reduced
- ❖ Errors can be corrected easily

# Example of an Online Questionnaire

World Summit on the Information Society - Microsoft Internet Explorer

File Edit View Favorites Tools Help Back Search Favorites Folders Address http://www.itu.int/wsis/stocktaking/scripts/jq.asp Go

**D. Internationally-agreed development goals outlined in the Millennium Declaration :**

Is this activity relevant to achieving the MDGs listed below? (see [www.un.org/millenniumgoals/](http://www.un.org/millenniumgoals/) and the [targets](#) for each goal)  Yes  No  
If yes, please tick all goals that apply

1.  Eradicate poverty and hunger  
2.  Achieve Universal Primary Education  
3.  Promote gender equality & empower women  
4.  Reduce child mortality  
5.  Improve maternal health  
6.  Combat HIV/AIDS, Malaria and other diseases  
7.  Ensure environmental sustainability  
8.  Develop a global partnership for development

**E. More Information :**

Please provide a website for this activity  
Website (URL) :[http://www.ethiopia.child\\_mortality](http://www.ethiopia.child_mortality)

**F. Geographical Coverage\* :**

Please tick a box to indicate the geographical coverage  
 Local  National  Regional  International  
Please specify coverage :Ethiopia/Eritrea

**G. Timescale \* :**

Please tick a box to indicate the timescale of the activity  
 Completed  Planned for future  Ongoing  
Specify dates using the format day/month/year (dd/mm/yyyy) :  
From: 01/05/2010 To: 30/04/2013

**H. Activity Type \* :**

Please tick one or more boxes to indicate the type of activity described above  
 Project  Programme  WSIS Thematic Meeting  Conference  Publication  Training initiative  
 Guidelines  Tool-kit  Website  Database  
Other (please specify) :

Done Internet

Figure 7.8 An excerpt from a web-based questionnaire showing check boxes, radio buttons, and pull-down menus

# Tools for Online Questionnaire

- ❖ SurveyMonkey: <https://www.surveymonkey.com/>
- ❖ Google Doc: <https://docs.google.com/forms/>

Page 1 of 1

## Untitled form

Form Description

Question Title

Help Text

Question Type Multiple choice ▾  Go to page based on answer

Option 1  
 Click to add option or Add "Other"

▶ Advanced settings

Done  Required question

Add item ▾

mati bba

# Tools for Online Questionnaire

- ❖ SurveyMonkey: <https://www.surveymonkey.com/>
- ❖ Google Doc: <https://docs.google.com/forms/>

The screenshot shows the Google Forms interface for creating an 'Untitled form'. At the top left, it says 'Page 1 of 1'. Below that is the title 'Untitled form'. Underneath the title is a 'Form Description' section. On the left side, there are fields for 'Question Title' (containing 'Untitled'), 'Help Text' (empty), and 'Question Type' (set to 'Multiple choice'). To the right of these fields is a large white button with a blue border. A dropdown menu is open over this button, listing various question types: 'Text', 'Paragraph text', 'Multiple choice' (which is highlighted in grey), 'Checkboxes', 'Choose from a list', 'Scale', 'Grid', 'Date', and 'Time'. In the bottom right corner of the dropdown menu, there is a link 'Add "Other"'. At the bottom of the main form area, there are buttons for 'Done' and 'Requires response'. Below these buttons is a 'Add item' button with a dropdown arrow. The bottom of the screen shows a navigation bar with icons for 'Survey' and 'BAA'.

# Tools for Online Surveys

Gender, age, household income, education, and census region; automatically included!

- ♦ SurveyMonkey: <http://www.surveymonkey.com>
- ♦ Google Doc: <https://docs.google.com/forms/u/0/>

Page 1 of 1

### Untitled form

Form Description

Question Title

Help Text

Question Type  Multiple choice

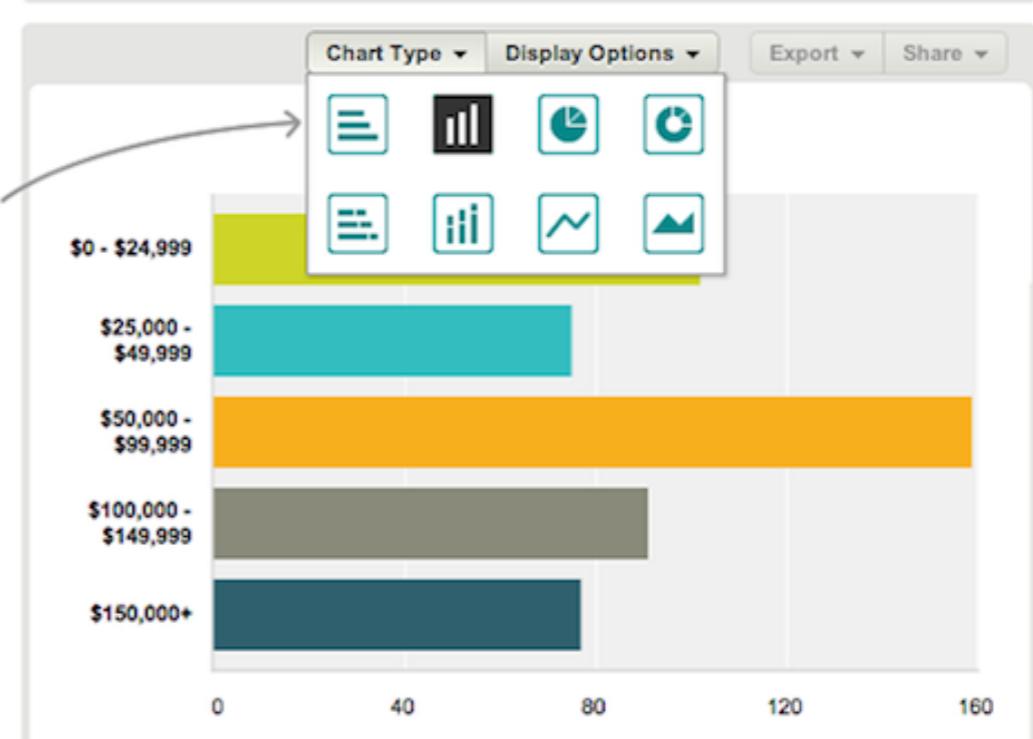
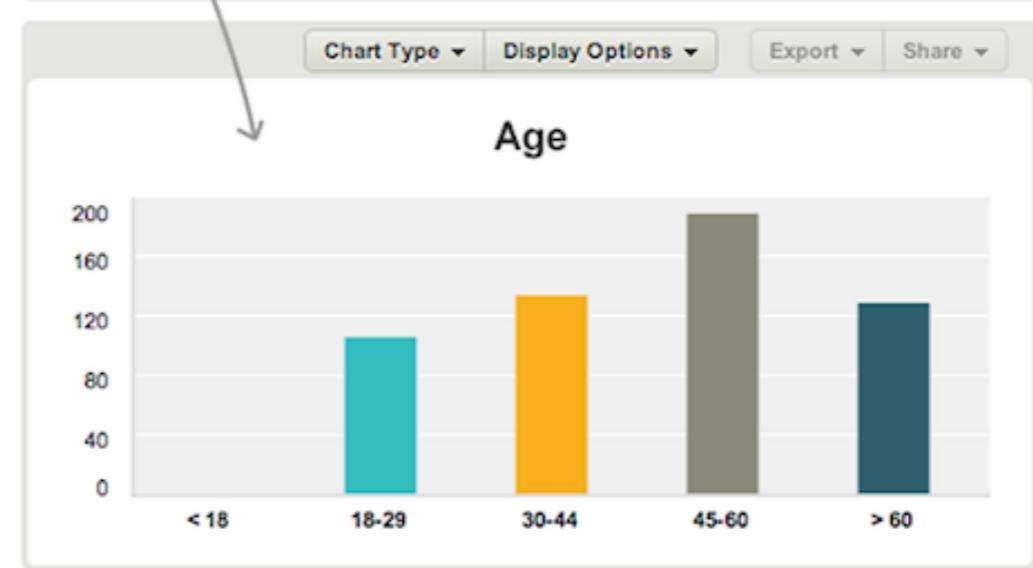
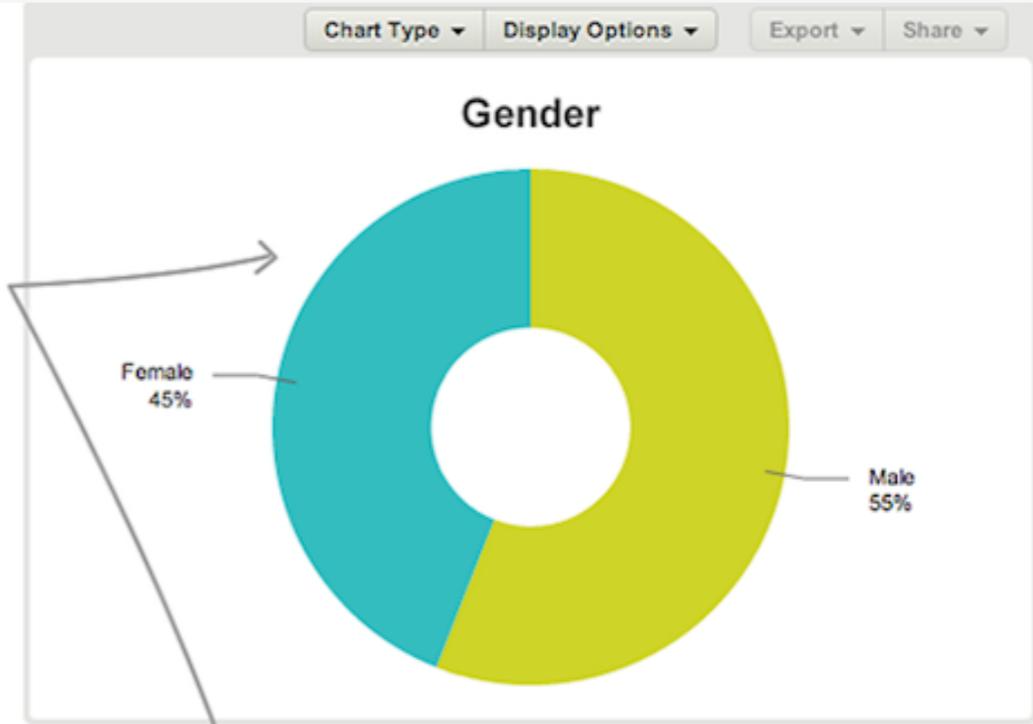
Open text  
 Closed text

Advanced settings

Required

Add item ▾

choose from 8 chart types and display options



# Problems with Online Questionnaires

- ❖ Sampling is problematic if population size is unknown
- ❖ Preventing individuals from responding more than once can be a problem
- ❖ Individuals have also been known to change questions in email questionnaires

# Observation

- ❖ Direct observation in the field
  - ❖ Structuring frameworks
  - ❖ Degree of participation (insider or outsider)
  - ❖ Ethnography
- ❖ Direct observation in controlled environments
- ❖ Indirect observation: tracking users' activities
  - ❖ Diaries
  - ❖ Interaction logging
  - ❖ Video and photographs collected remotely by drones or other equipment

# Structuring Frameworks to Guide Observation

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- ❖ Three easy-to-remember parts:
  - ❖ The person: Who?
  - ❖ The place: Where?
  - ❖ The thing: What?

# Structuring Frameworks to Guide Observation

- ❖ A more detailed framework (Robson, 2014):
  - ❖ Space: What is the physical space like and how is it laid out?
  - ❖ Actors: What are the names and relevant details of the people involved?
  - ❖ Activities: What are the actors doing and why?
  - ❖ Objects: What physical objects are present, such as furniture
  - ❖ Acts: What are specific individual actions?
  - ❖ Events: Is what you observe part of a special event
  - ❖ Time: What is the sequence of events?
  - ❖ Goals: What are the actors trying to accomplish
  - ❖ Feelings: What is the mood of the group and of individuals?

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# Planning and Conducting Observation in the Field

- ❖ Decide on how involved you will be: passive observer to active participant
- ❖ How to gain acceptance
- ❖ How to handle sensitive topics
  - ❖ eg. culture, private spaces, etc.
- ❖ How to collect the data:
  - ❖ What data to collect
  - ❖ What equipment to use
  - ❖ When to stop observing

# Ethnography

- ❖ Ethnography is a philosophy with a set of techniques that include participant observation and interviews
- ❖ Ethnographers immerse themselves in the culture that they study
- ❖ A researcher's degree of participation can vary along a scale from 'outside' to 'inside'
- ❖ Analyzing video and data logs can be time-consuming
- ❖ Collections of comments, incidents, and artifacts are made

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# Ethnography

- ❖ Co-operation of people being observed is required
- ❖ Informants are useful
- ❖ Data analysis is continuous
- ❖ Interpretivist technique
- ❖ Questions get refined as understanding grows
- ❖ Reports usually contain examples

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## Observations and materials that might be collected (Crabtree, 2007)

- ❖ Activity or job descriptions.
- ❖ Rules and procedures that govern particular activities.
- ❖ Descriptions of activities observed.
- ❖ Recordings of the talk taking place between parties.
- ❖ Informal interviews with participants explaining the detail of observed activities.
- ❖ Diagrams of the physical layout, including the position of artifacts.

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## Observations and materials that might be collected (Crabtree, 2007)

- ❖ Other information collected when observing activities:
  - ❖ Photographs of artifacts (documents, diagrams, forms, computers, etc.)
  - ❖ Videos of artifacts.
  - ❖ Descriptions of artifacts.
  - ❖ Workflow diagrams showing the sequential order of tasks.
  - ❖ Process maps showing connections between activities.

# Observation in a Controlled Environment

- ❖ Direct observation
  - ❖ Think aloud techniques
- ❖ Indirect observation – tracking users' activities
  - ❖ Diaries
  - ❖ Interaction logs
  - ❖ Web analytics
- ❖ Video, audio, photos, notes are used to capture data in both types of observations

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# Diary

- ❖ A method to record everyday life events
- ❖ A method to collect sequence of events and related mood that users feel
- ❖ Most observation methods in HCI → direct observation
- ❖ Diary study can collect natural user's interaction data with the system and also collect implicit needs - need longitudinal study

# Diary

- ❖ Downside of Diary study
  - ❖ participant doesn't know what's happening - do not record the event
  - ❖ recorded event time is incorrect
    - ❖ e.g. recored time → 10 min, measured time → 7:35 min
  - ❖ could be intrusive, so hard to find participants
  - ❖ data types are usually qualitative form → take times for analyzing the data
  - ❖ not easy to collect “enough” data → participants sometimes forgot to record data

# **Appendix A Frustration Experience Form (Time Diary)**

*Source:* Ceaparu, I., Lazar, J., Bessiere, K., et al. (2004) Determining causes and severity of end-user frustration. *International Journal of Human-Computer Interaction*, 17(3):333–356. Reproduced by permission.

## **FRUSTRATING EXPERIENCE**

Please fill out this form for each frustrating experience that you encounter while using your computer during the reporting session. This should include both major problems such as computer or application crashes, and minor issues such as a program not responding the way that you need it to. Anything which frustrates you should be recorded.

1. What were you trying to do?
2. On a scale of 1 (not very important) to 9 (very important), how important was this task to you?

Not very important 1 2 3 4 5 6 7 8 9 Very Important

3. What software or program did the problem occur in? If the problem was the computer system, please check the program that you were using when it occurred (check all that apply).

- |   |  |
|---|--|
| <input type="checkbox"/> email                      | <input type="checkbox"/> spreadsheet programs (e.g. Excel)       |
| <input type="checkbox"/> chat and instant messaging | <input type="checkbox"/> graphic design                          |
| <input type="checkbox"/> web browsing               | <input type="checkbox"/> programming tools                       |
| <input type="checkbox"/> other internet use         | <input type="checkbox"/> database programs                       |
| <input type="checkbox"/> word processing            | <input type="checkbox"/> presentation software (e.g. PowerPoint) |
| <input type="checkbox"/> file browsers              | <input type="checkbox"/> other: _____                            |

4. Please write a brief description of the experience:

5. How did you solve this problem?

4. Please write a brief description of the experience:

5. How did you solve this problem?

- I knew how to solve it because it has happened before
- I figured out a way to fix it myself without help
- I asked someone for help. Number of people asked \_\_\_\_\_
- I consulted online help or the system/application tutorial
- I consulted a manual or book
- I rebooted
- I ignored the problem or found an alternative solution
- I was unable to solve it
- I tried again
- I restarted the program

6. Please provide a short step by step description of the process you used to resolve this incident.

7. How often does this problem happen?  more than once a day  one time a day  several times a week  once a week  several times a month  once a month  several times a year  first time it happened

8. On a scale of 1 (not very frustrating) to 9 (very frustrating), how frustrating was this problem for you?

Not very frustrating 1 2 3 4 5 6 7 8 9 Very frustrating

9. Of the following, did you feel:  Angry at the computer  angry at yourself  helpless/resigned  
 determined to fix it  other

10. How many minutes did it take you to solve this problem? \_\_\_\_\_

11. Other than the amount of time it took you to solve the problem, how many minutes did you lose because of this problem? (if this has happened before, please account only for the current time lost). \_\_\_\_\_

Please explain:

## Appendix B Excel Time Diary Form

Source: Czerwinski, M., Horvitz, E., and Wilhite, S. (2004) A diary study of task switching and interruptions. *Proceedings of the ACM Conference on Human Factors in Computing Systems*, 175–182. Reproduced by permission.

Please enter your daily activities in the columns below (you might need to scroll to the right to see all columns). For each activity, please enter:

- a) the time you started it
- b) a brief description of the task
- c) the application or the device you used to perform the task
- d) the priority of the task (hi, med or low)
- e) what caused you to switch to the task
- f) level of difficulty getting started (hi, med, or low)
- g) what other documents or data you needed to find to start the task
- h) whether or not it was on your to do list
- i) whether you forgot anything related to the task, or any other comments you might have

Remember to use the worksheet at the bottom of the spreadsheet corresponding to the day of the week.

At the end of each day, please go to row 50 and fill out the 3 questions listed there. Thanks again!

Please email your diary as it stands at the end of each day to [marycz@microsoft.com](mailto:marycz@microsoft.com).

(a) Time (HH:MM)	(b) Project/task description	(c) Application or device	(d) Priority (hi, med, low)?	(e) What caused the switch?	(f) Difficulty initiating task (hi, med, low)? Why?	(g) What docs/data needed to be found?	(h) On ToDo List (if keep one)?	# of Interruptions?	Time completed (if done)?	(i) Forget anything? Comments?
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# Cultural Probe

- ❖ A method to gathering inspirational data about people's lives, values and thoughts.
- ❖ Participants record data by themselves.
- ❖ Criticism
  - ❖ hard to get scientifically valid information from data that is so subjective.
  - ❖ the data generated is not suitable for deep analysis and requirements list.
  - ❖ a risk of few returns.

# Cultural Probe

- ♦ probe packs
  - ♦ The probes are small packages that can include any sort of artifact (like a map, postcard, camera or diary) along with evocative tasks, which are given to participants to allow them to record specific events, feelings or interactions.
  - ♦ Informal data collection method
    - help to understand cultural aspect of users and their environment
      - ♦ e.g. emotions, values, connections, trust
  - ♦ <http://www.infodesign.com.au/ftp/CulturalProbes.pdf>



## Data Analysis & Interpretation

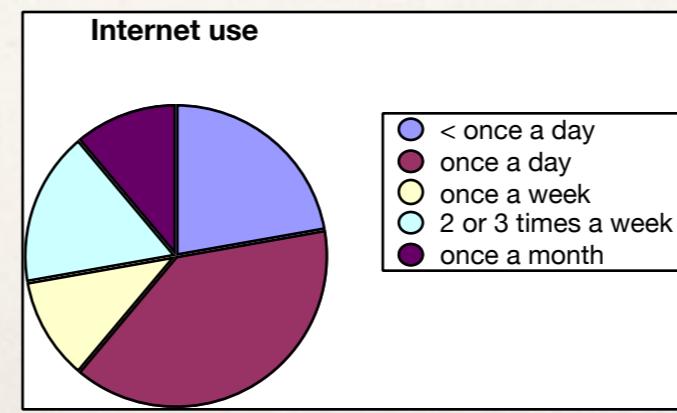
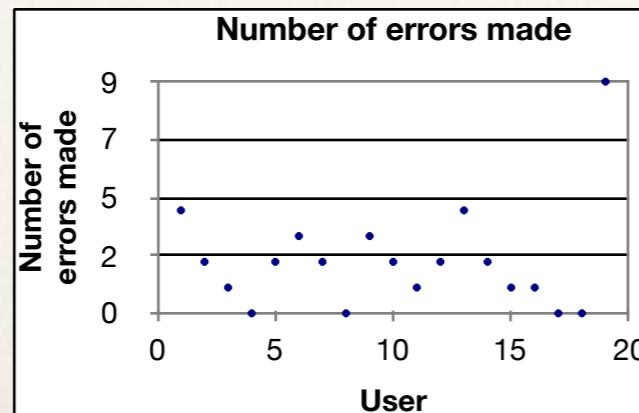
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# Quantitative and Qualitative

- ❖ Quantitative data – expressed as numbers
- ❖ Qualitative data – difficult to measure sensibly as numbers
  - ❖ e.g. count number of words to measure dissatisfaction
- ❖ Quantitative analysis – numerical methods to ascertain size, magnitude, amount
- ❖ Qualitative analysis – expresses the nature of elements and is represented as themes, patterns, stories
- ❖ Be careful how you manipulate data and numbers!

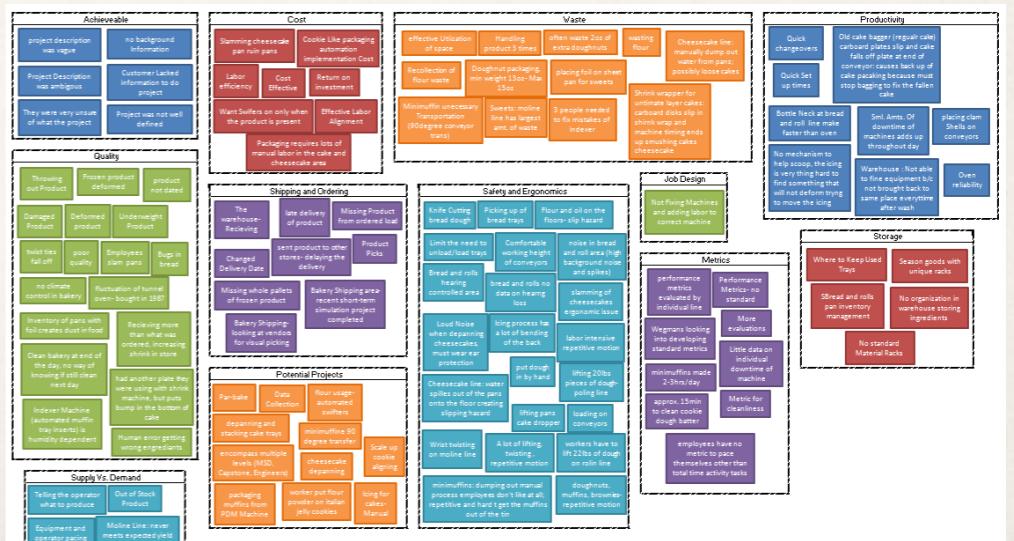
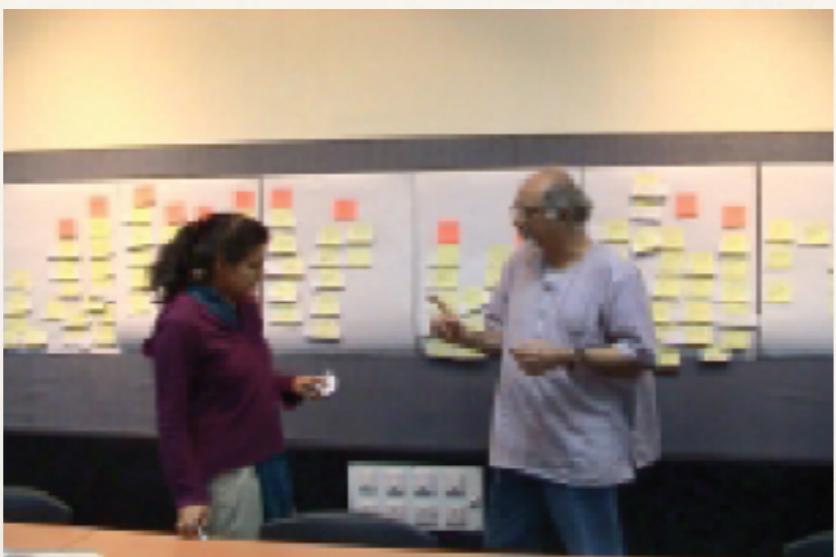
# Simple Quantitative Analysis

- ♦ Averages
  - ♦ Mean: add up values and divide by number of data points
  - ♦ Median: middle value of data when ranked
  - ♦ Mode: figure that appears most often in the data
- ♦ Percentages
- ♦ Be careful not to mislead with numbers!
- ♦ Graphical representations give overview of data

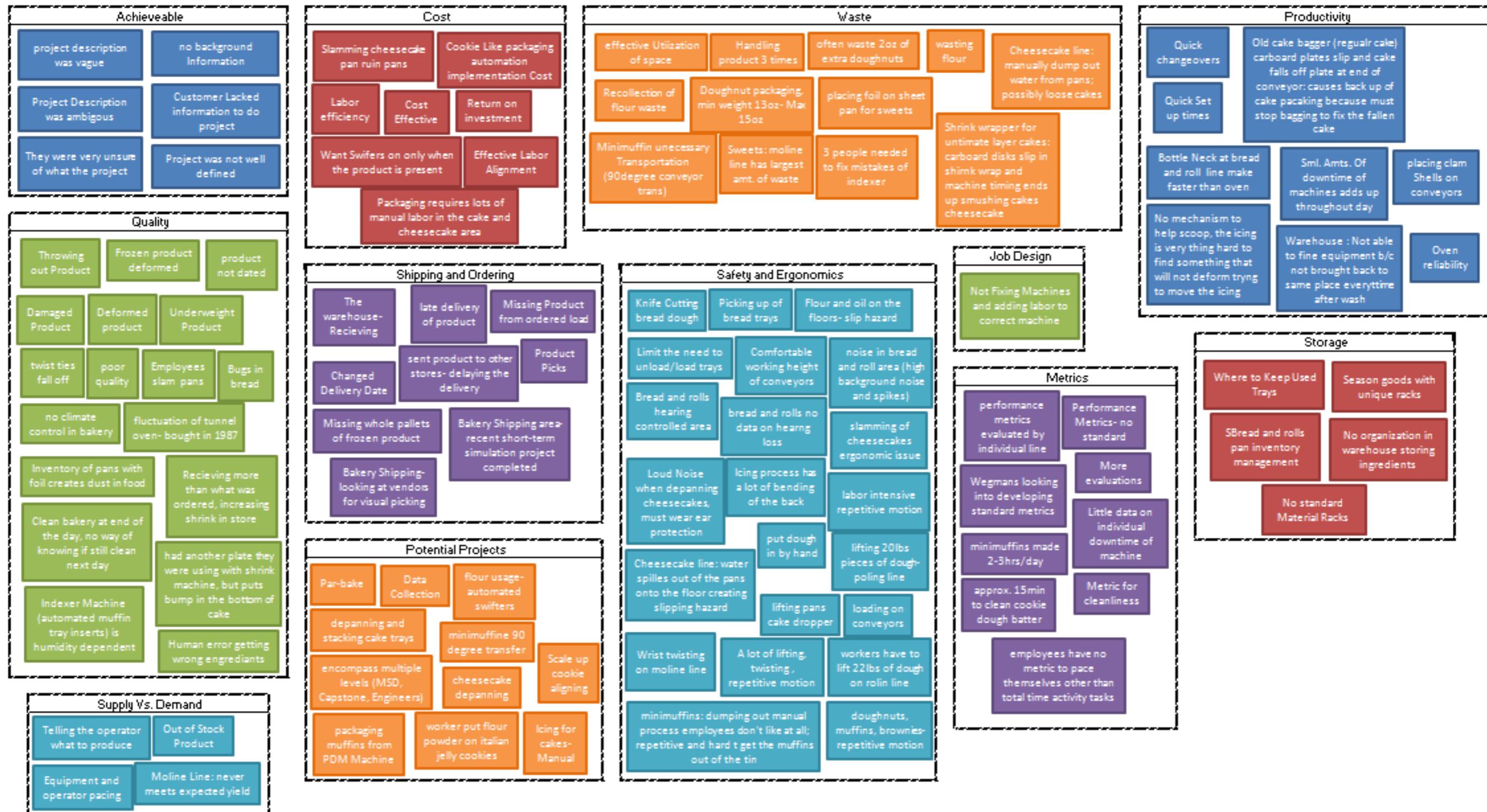


# Simple Qualitative Analysis

- ❖ Recurring patterns or themes
    - ❖ Emergent from data, dependent on observation framework if used
  - ❖ Categorizing data
    - ❖ Categorization scheme may be emergent or pre-specified
  - ❖ Looking for critical incidents
    - ❖ Helps to focus in on key events



# Simple Qualitative Analysis



# **our** criteria for bad incident

1. The user articulated a goal and does not succeed in attaining that goal within 3 minutes (then the experimenter steps in and shows him or her what to do--the next step).
2. The user articulates a goal, tries several things or the same thing over again (and then explicitly gives up).
3. The user articulates a goal and has to try three or more things to find the solution.
4. The user accomplishes the task, but in a suboptimal way
5. The user does not succeed in a task. That is, when there is a difference between the task the user was given and the solution the user produced.
6. The user expresses hesitation, surprise.
7. The user expresses some negative affect or says something is a problem.
8. The user makes a design suggestion (don't ask them to do this, but sometimes they do this spontaneously as they think-aloud).



# Theoretical Frameworks for Qualitative analysis

- ❖ Basing data analysis around theoretical frameworks provides further insight
- ❖ Three such frameworks are:
  - ❖ Grounded Theory
  - ❖ Distributed Cognition
  - ❖ Activity Theory

# Grounded Theory

- ❖ Aims to derive theory from systematic analysis of data
- ❖ Based on categorization approach (called here ‘coding’)
- ❖ Three levels of ‘coding’
  - ❖ Open: identify categories
  - ❖ Axial: flesh out and link to subcategories
  - ❖ Selective: form theoretical scheme
- ❖ Researchers are encouraged to draw on own theoretical backgrounds to inform analysis

# Workflow of Grounded Theory

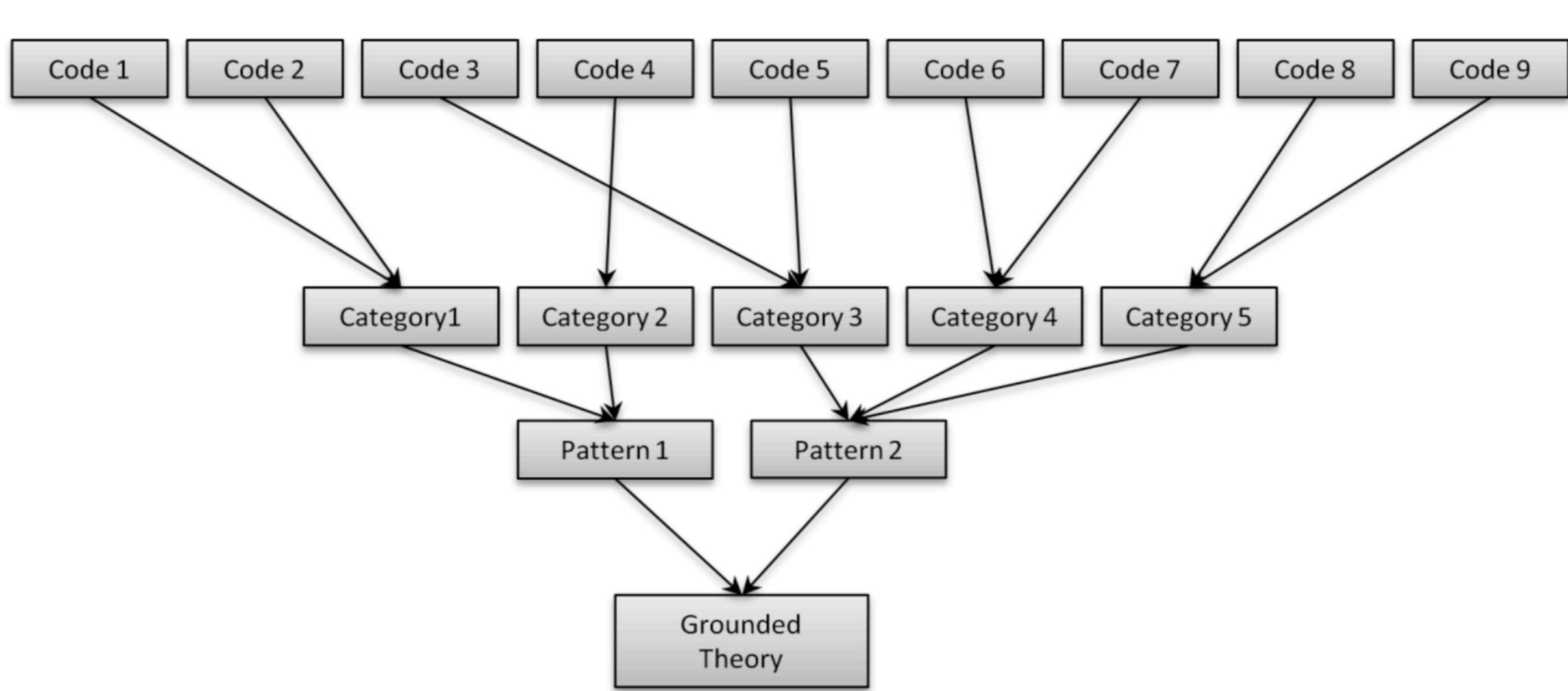


Figure 3: Workflow of Grounded Theory methodology

# Grounded Theory: Overview

- ❖ Read through field notes
  - ❖ Produce analytic categories—potential themes that arise
- ❖ As categories emerge
  - ❖ Pull data from categories together and compare them
- ❖ Think about how categories
  - ❖ Fit together into an explanation, or model
- ❖ Take models developed
  - ❖ Check them against the data—particularly negative cases
  - ❖ Present results using examples from the data

# Grounded Theory: Getting Started

- ❖ Before you commence analysis
  - ❖ Theoretical sensitivity is about developing insight into data
    - ❖ Being able to give the data meaning, understand it, and separate pertinent from not
  - ❖ Theoretical sensitivity
    - ❖ Use literature: readings on theory, research, and supporting evidence
      - ❖ Ground yourself in the multiple contexts that surround the data your analyzing
    - ❖ Professional experience
      - ❖ Use background knowledge of practitioners in the field (including yourself)

# Open Coding

- ❖ Open coding
  - ❖ Process of breaking down, examining, comparing, conceptualizing and categorizing data
    - ❖ Data reduction (although it doesn't feel like "reduction" when you're doing it)
    - ❖ Inductive
  - ❖ Open coding consists of
    - ❖ Labelling phenomena
    - ❖ Discovering categories
    - ❖ Developing categories: properties and dimension

# Open Coding: Labelling Phenomena

- ❖ Break down raw full descriptive field notes
  - ❖ By asking questions about notes
    - ❖ What is this?
    - ❖ What does it represent?
  - ❖ For each phenomenon (incident, idea or event)
- ❖ Give each discrete phenomenon a name
  - ❖ Give it a name that captures its essence in a more general way: concept
- ❖ Compare it to others already discovered
  - ❖ Could it be labelled in a way that others are labelled preserving integrity

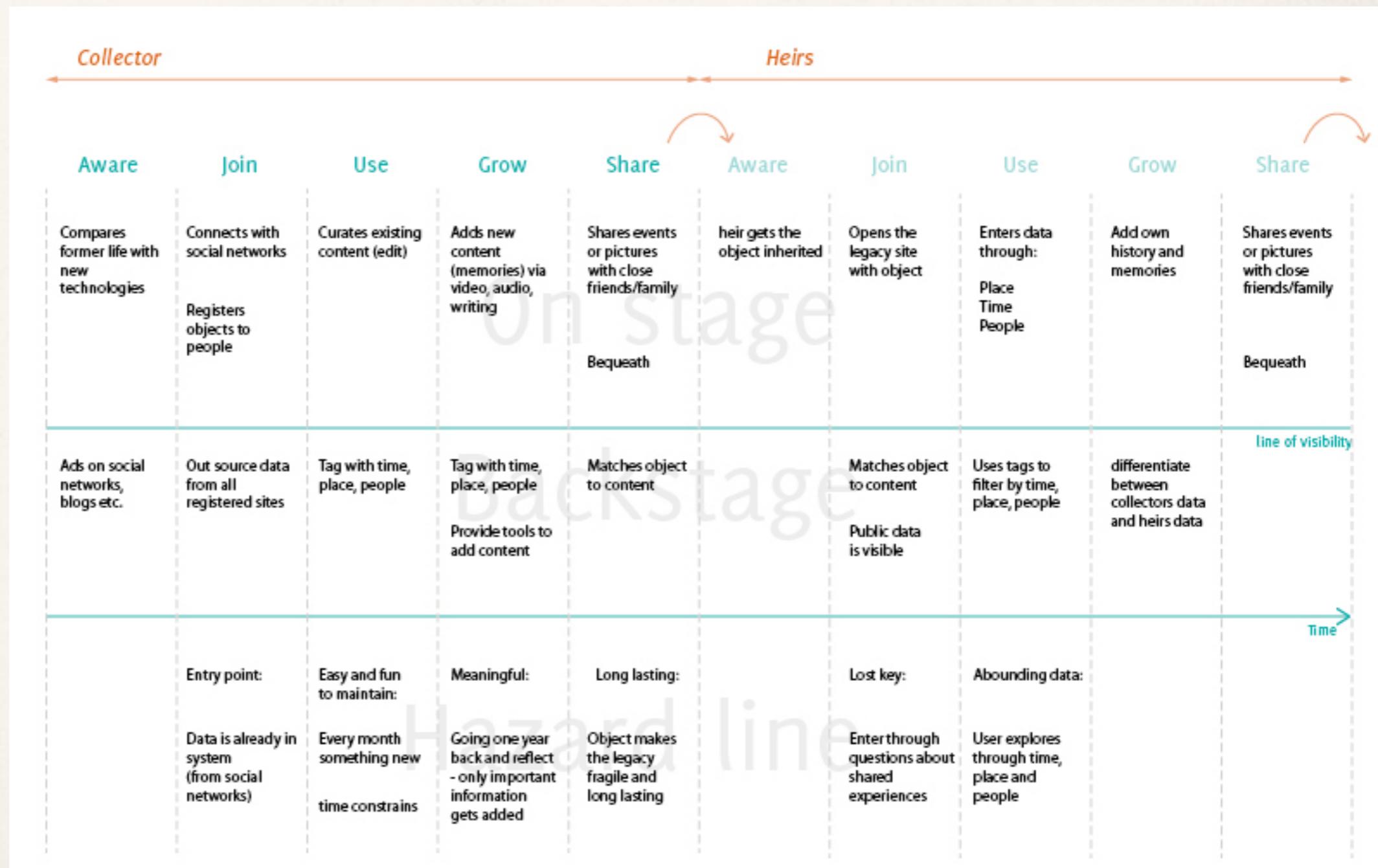
# Open Coding: Discovering Categories

- ❖ At the end of even a small piece of field notes
  - ❖ Lots of concepts
    - ❖ It is quite normal to feel overwhelmed and concerned at this point
- ❖ Next, group concepts into *categories*
  - ❖ Category: classification of concepts, discovered when concepts compared
    - ❖ What's similar (may want to note why you think it's similar)
  - ❖ This started when you labelled
    - ❖ Now you're asking questions about the concepts and the category
      - ❖ What are the phenomena in this category about, what are they instances of
    - ❖ Use answer to label category

# Open Coding: Properties and Dimensions

- ❖ Properties
  - ❖ Characteristics or attributes of a category
    - ❖ Eg: color has the properties of intensity and hue
- ❖ Dimensions
  - ❖ Locations of a property along a continuum
    - ❖ Eg: intensity varies from high to low, hue from darker to lighter
- ❖ These will help us develop broader relations later

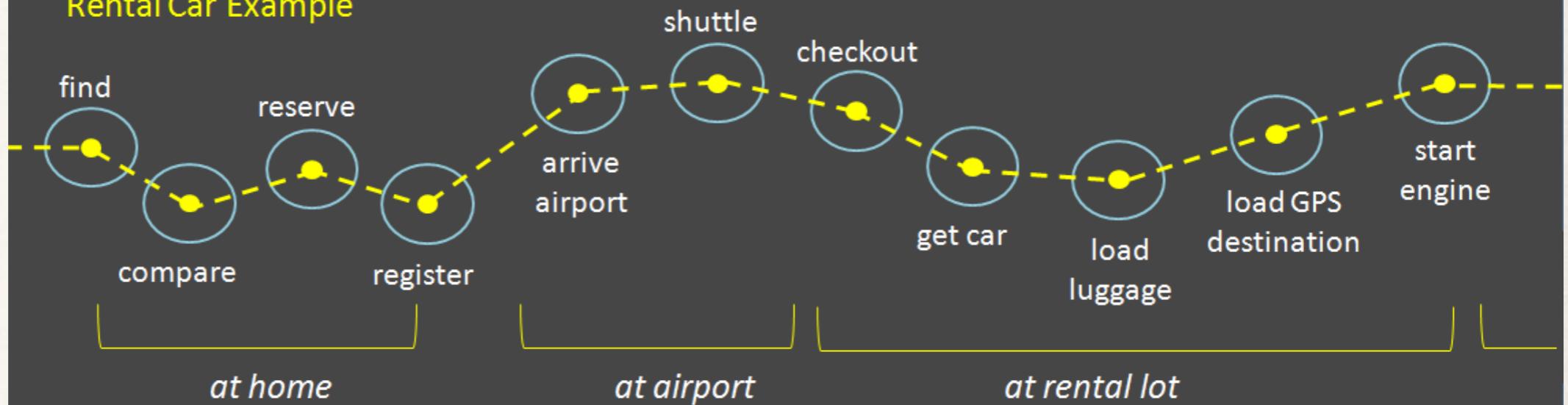
# Customer Journey Map



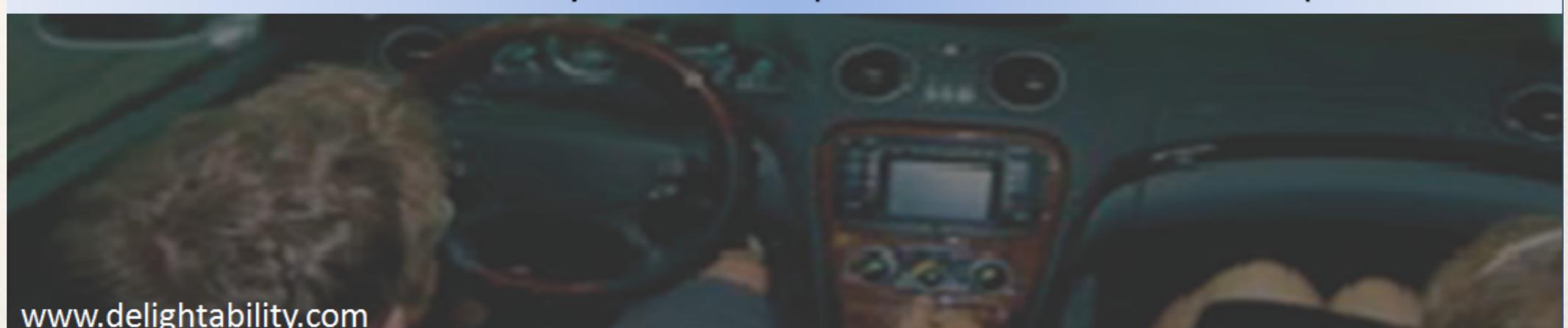
# Customer Journey Map

## Document the Customer Journey

Rental Car Example



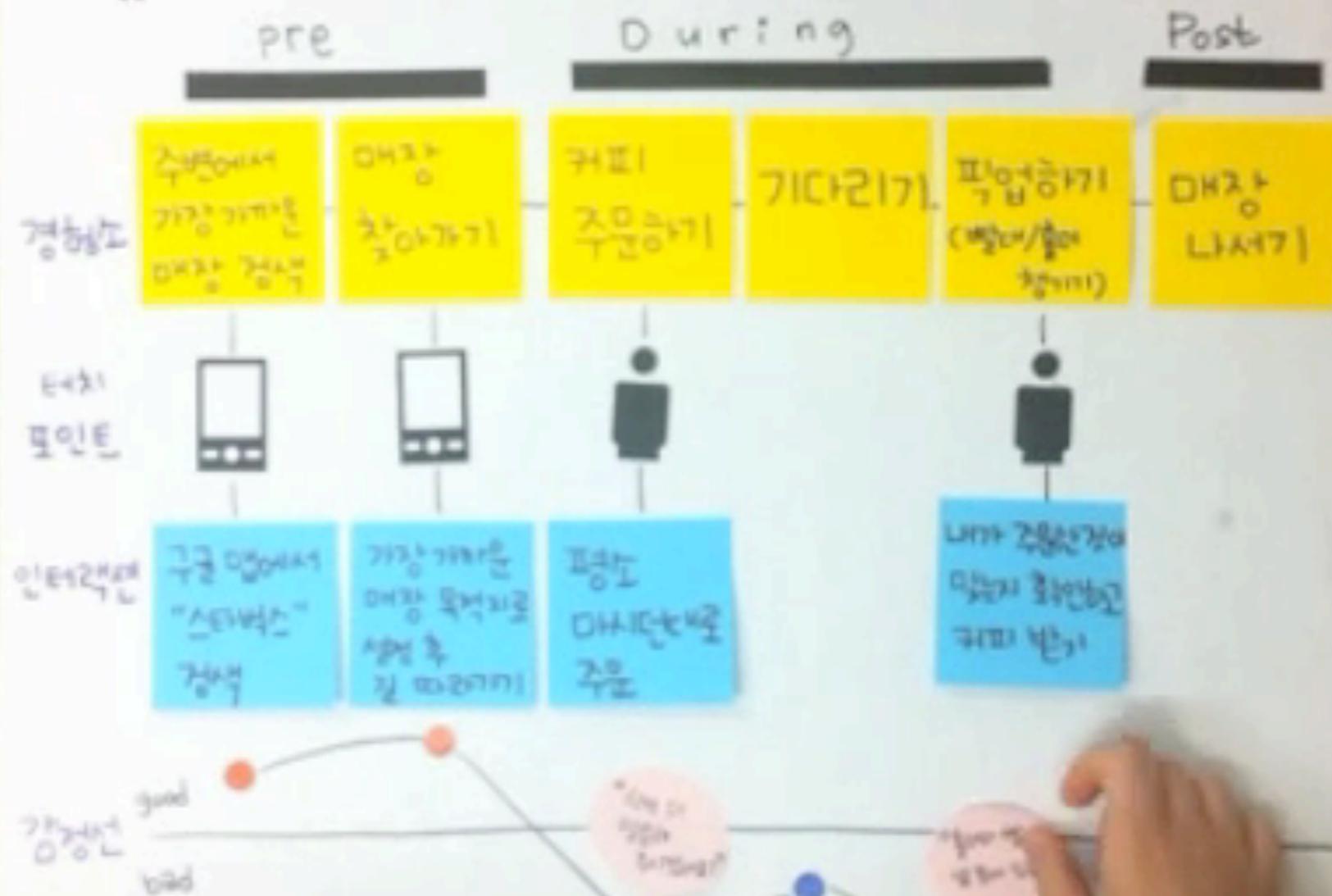
Customer Service is only one small part of the Customer Experience



[www.delightability.com](http://www.delightability.com)

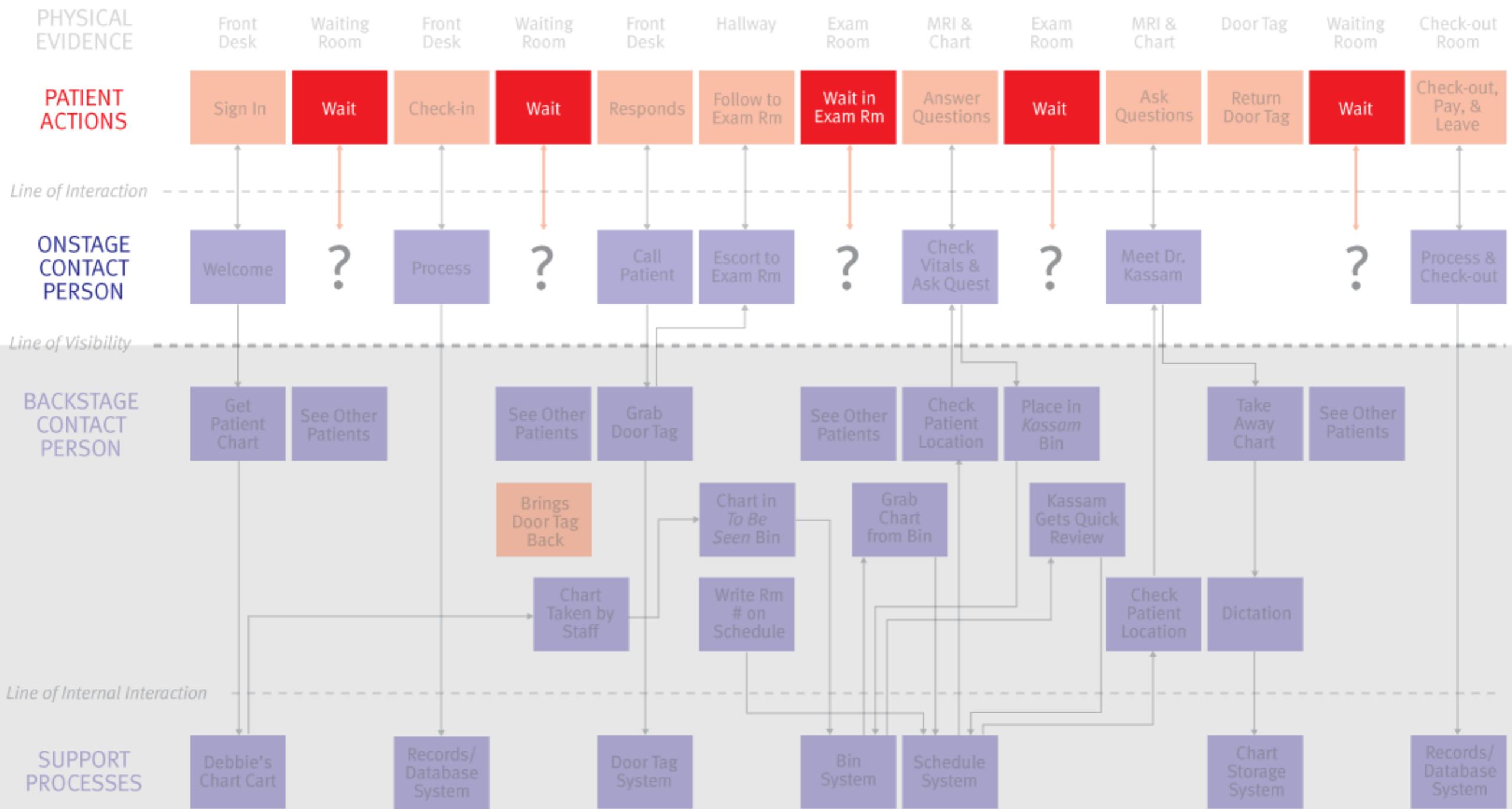


## ‘호비진’이의 커피사토기 EJM



# Service Blueprint

## Service Blueprint of Presby Neuro Clinic



# **Workshop: Data Gathering & Analysis**

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# Workshop: Data Gathering & Analysis

- ◆ 주제: 자유 선택
  - ◆ e.g., smart shopping, future news, smart traveling, AI Speakers..
- ◆ 인터뷰, 관찰 방법 등을 통해 서비스 사용 행태 분석
- ◆ 데이터 분석
  - ◆ Ground Theory 에 기반하여 데이터 코딩
  - ◆ 패턴 등 분석하고 범주화
  - ◆ 발견된 insight 정리
- ◆ 제출: 4/15에 슬라이드 형태로 보고서 제출
  - ◆ Field note
  - ◆ Affinity Diagram
  - ◆ Ground Theory 분석 결과

# Example



“집에 갈때쯤엔 배터리  
가 없어서 폰을 못써서 심  
심해요.”

“밤에 받아놓은 무한도  
전을 폰으로 옮기는게 귀  
찮을때가 많아요.”

“아침마다 시끄러운 알  
람으로 일어나는게 싫어  
요. 알람이 좀 조용했으  
면 좋겠어요.”

“집에 갈때쯤엔 배터리가 없어서 폰을 못써서 심심해요.”

“배터리가 조금 남았을 때는 카메라가 작동이 안되어 재밌는 장면을 많이 놓쳤어요.”

배터리 상태를 실시간으로 보여주고 아끼는 방법을 제안하는 서비스

“밤에 받아놓은 무한도전을 폰으로 옮기는게 귀찮을때가 많아요.”

“아이폰을 쓸때는 음악이 자동으로 들어왔는데 안드로이드는 안되요.”

폰에서 무선으로 파일관리를 할 수 있는 서비스

“아침마다 시끄러운 알람으로 일어나는게 싫어요. 알람이 좀 조용했으면 좋겠어요.”

“일어나자마자 폰으로 오늘 일정을 확인해요.”

아침에 일정을 읽어주는 나만의 알람 서비스

# Affinity diagram

The image displays two examples of Affinity diagrams. The left example, titled 'Affinity Teasales', shows numerous sticky notes on a brown board, grouped into several clusters. The right example shows sticky notes on a white wall, also grouped into clusters. Below these diagrams is a grid of 10 yellow sticky notes, each containing a Korean text summary of a user need, organized into five main categories:

부엌	배달	인력관리	새로운 제안	커센터
빠른 조리를 위해 부엌 구조 변경	오토바이 적절한 유지보수	최적 경로 찾기 훈련 실시	접기 쉬운 포장박스 구입	고객 주소, 주문 확인
미리 구워진 피자 유지	배달 위치에 따라 경로 최적화	더 많은 배달원 채용	내비게이션 시스템 도입	
미리 접어둔 포장지 유지	빠른 결제를 위해 잔돈 챙기기			

# Reading Assignment

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- Chapter 9: The Process of Interaction Design
- Chapter 10: Establishing User Requirements

# Questions...?

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