

Chapter 4

Data Gathering and Analysis

Overview

- Five key issues of data gathering
- Data recording
- Interviews
- Questionnaires
- Observation
- Choosing and combining techniques
- Quantitative and qualitative analysis

Five key issues

- **Setting goals**
 - Decide how to analyze data once collected
 - Reasons for gathering data?
 - Goals influence data gathering sessions, techniques and analysis of data.
- **Identifying participants**
 - Decide who to gather data from
 - Stems from goals
 - Done via *sampling of population* who fits profile.
 - Probability sampling (random sampling) and non-probability sampling (convenience sampling or volunteer panels)
- **Relationship with participants**
 - Clear and professional (between data gatherer and data provider)
 - Informed consent when appropriate
 - Sometimes incentives for participating may be needed.
 - Consent not needed when collecting data for requirements activity

Five key issues

- **Triangulation**

- Look at data from more than one perspective
- Triangulation of data – data drawn from different sources or people or places
- Investigator triangulation – different researchers
- Triangulation of theories or frameworks through which to view data or findings
- Methodological triangulation – looking at different data gathering techniques.

- **Pilot studies**

- Small trial of main study
- Ensure proposed method is viable before embarking on real study
- Plans should be tested and validated (e.g valid questionnaires)

Data, Information and Conclusions

- Raw Data
 - Data that is collected.
- Information
 - Data that is analyzed and interpreted
- Conclusions
 - Action to be taken based on information
- E.g. You want to know whether a particular design of screen layout has improved the user's understanding of the application. What raw data do you collect, what information and conclusions can you draw from data?

Data recording

- Some forms of data gathering such as questionnaires, diaries, interaction logging are self-documenting
- Other techniques require recording such as, notes, audio, video, photographs
- Notes plus photographs – least technical and most flexible (by hand or typing). What are the advantages/disadvantages?
- Audio plus photographs – less intrusive than video - advantages/disadvantages?
- Video – captures both visual and audio data. advantages/disadvantages?



Interviews

- Unstructured - are not directed by a script. Rich but not replicable. More like a conversation, questions are open. They generate rich data. E.g. What are the advantages of using a touch screen? (Advantages and disadvantages of Unstructured interviews?)
- Structured - are tightly scripted, often like a questionnaire. Replicable but may lack richness. Same questions are asked to each participant and should be short, clear and closed. Answer from a predetermined set of alternatives. E.g. Which of the following web sites do you visit: Amazon.com, google.com, etc?

Interviews

- Semi-structured - guided by a script but interesting issues can be explored in more depth. Can provide a good balance between richness and replicability. Interviewer has a basic script and ends with probing questions. No preemting of answer.
- Focus groups – Interviewing people in groups e.g marketing, political campaigning. In an evaluation of a university website, involve faculty, students, admin, etc. This approach is useful for investigating community issues.

Planning and conducting Interviews

- 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
- Sometimes users don't do what they say
- When collecting answers, list possible responses in boxes
- 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

Activity

- Several e-readers devices for reading e-books, surfing the internet, watching movies have appeared in the market. The developers of a new e-reader would like to know how appealing these devices to people of 65 years. To this end, they have asked you to conduct some interviews for them.
1. What is the goal of the data gathering session?
 2. Suggest ways of recording the interview data.
 3. Suggest a set of questions that are suitable for use in an interview?

Running the interview

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

Enriching the interview process

- Other forms of interview include telephone and online.
- Props - devices for prompting interviewee, e.g., a prototype, scenario. Help interviewees in answers



Questionnaires

- Questions can be closed or open
- Closed questions are easier to analyze, and may be done by computer
- Can be administered to large populations
- Paper, email and the web used for dissemination
- Sampling can be a problem when the size of a population is unknown as is common online

Questionnaire design

- The impact of a question can be influenced by question order.
- Do you need different versions of the questionnaire for different populations?
- Provide clear instructions on how to complete the questionnaire.
- Strike a balance between using white space and keeping the questionnaire compact.
- 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 high, 20% is often acceptable

Advantages of online questionnaires

- 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

The screenshot shows a web application interface with a sidebar on the left containing navigation links: Careers, Plan the Change, Thrive in Transition, Start the New Career, Services Center (Seminars, etc., Schools, Assoc's & Non-Profits, Counselors, etc., Financial Services, Public Sector, Recruiters), Colleague Center (Register Now!, Colleague Directory, Local Chapters, My Notebook, E-news Letter, My Homepage, Discussions), and Shopping Center (Publications, Health & Fitness). The main content area has a header with a disclaimer about privacy and anonymity, followed by a registration prompt: 'Not registered? [Register Now](#). It's free and secure!'. Below this is a form to 'Please enter your Colleague ID:'. The form includes three options: Option 1 (By Profile) with a 'Match My Profile' dropdown, Option 2 (By Criteria) with a 'Career Change Process Step' dropdown (showing 'None', 'Assess and Test', 'Break into the New Career', 'Investigate Careers', 'Plan the Change'), and Option 3 (By Geography) with a 'State' dropdown. A 'Find Colleagues' button is at the bottom of the form. On the right side of the main content area, there is a 'Share Your Experience' section with links to 'Add to the website a(n):' (Personal experience, Article or article review, Book review, Test tool or tip) and a 'Recommend a:' section (Service Center Provider, Career Showcase, Success Story Candidate). Below this is a 'Rate this website!' link and an 'Ask Others' button. At the bottom right, there is a section for 'Use our directory email service or our online discussion groups to make contacts, solve problems and find someone who listens' with a link to 'Ask us a question'.

Problems with online questionnaires

- Sampling is problematic if population size is unknown
- Preventing individuals from responding more than once
- 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



Structuring frameworks to guide observation

- - *The person*. Who?
 - *The place*. Where?
 - *The thing*. What?
- The Goetz and LeCompte (1984) framework:
 - *Who* is present?
 - What is their role?
 - *What* is happening?
 - *When* does the activity occur?
 - *Where* is it happening?
 - *Why* is it happening?
 - *How* is the activity organized?

Ethnography (1)

- Ethnography is a philosophy with a set of techniques that include participant observation and interviews
- Debate about differences between participant observation and ethnography
- 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

Ethnography (2)

- 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



Direct observation in a controlled environment

- Think-aloud technique

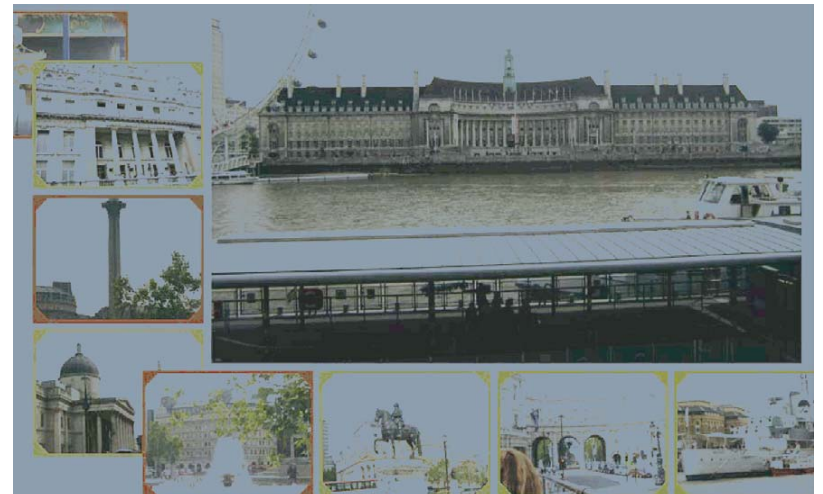
Indirect observation



- Diaries
- Interaction logs
- Web analytics

Choosing and combining techniques

- Depends on
 - The focus of the study
 - The participants involved
 - The nature of the technique
 - The resources available



Data analysis

- 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!

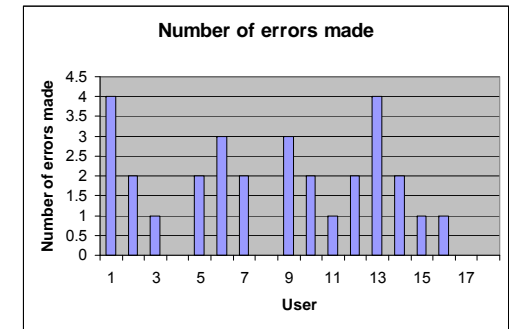
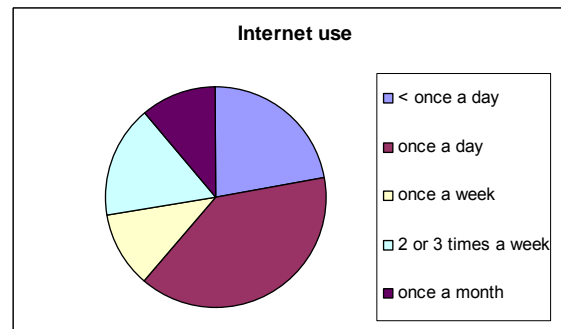
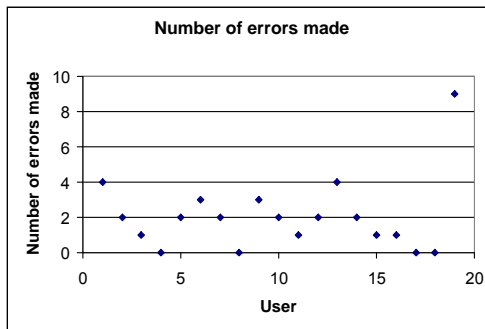
Simple quantitative analysis

- Averages

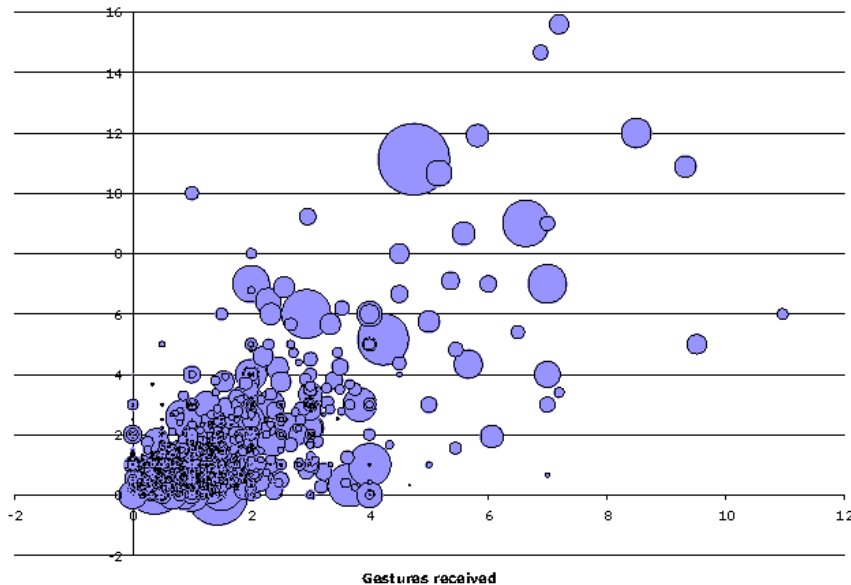
- Mean: add up values and divide by number of data points
- Median: middle value of data when ranked
- Mode: figure that appears most often in the data

- Percentages

- Graphical representations give overview of data

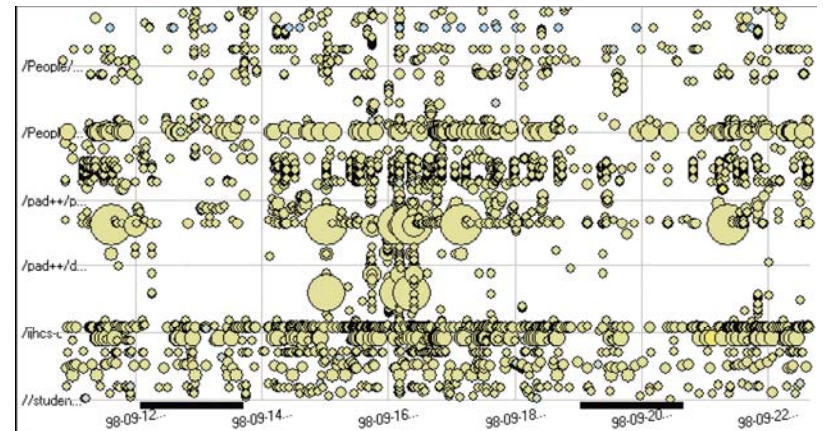


Visualizing log data

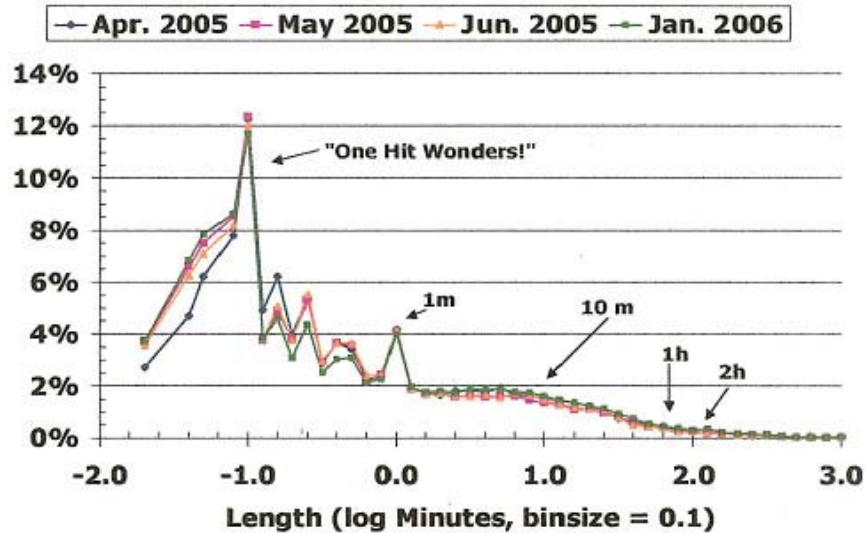


Interaction
profiles of players
in online game

Log of web page
activity

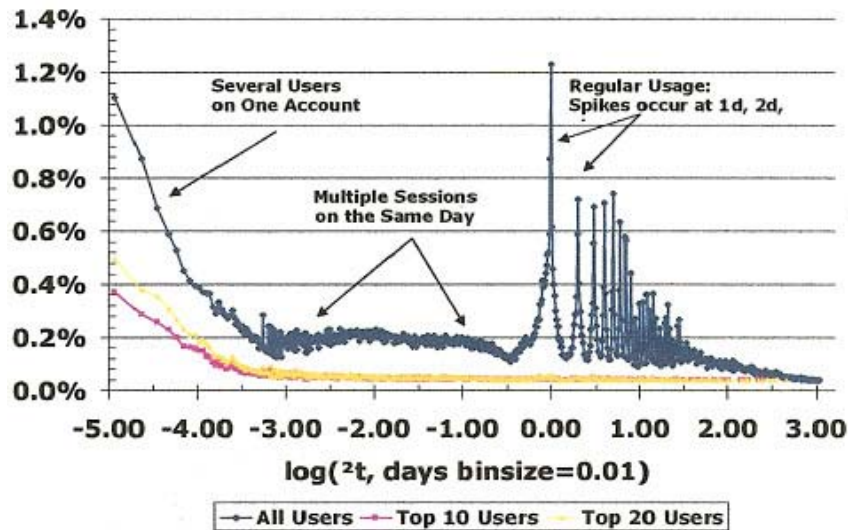


Session Length



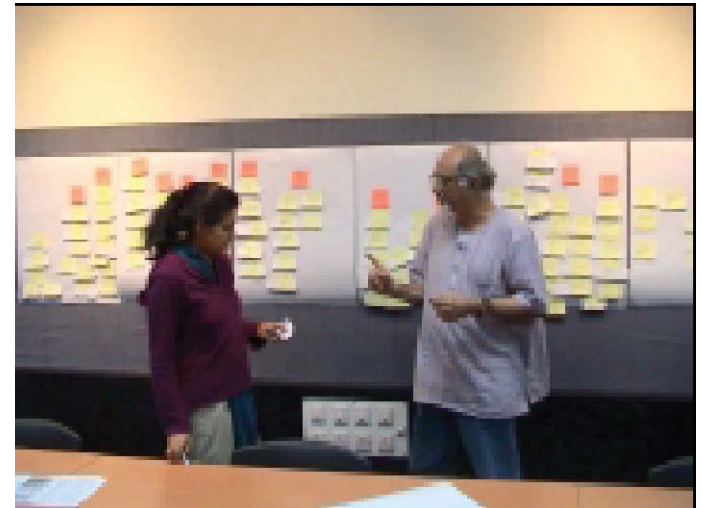
Web analytics

Login Frequency Histogram



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



Tools to support data analysis

- Spreadsheet – simple to use, basic graphs
- Statistical packages, e.g. SPSS
- Qualitative data analysis tools
 - Categorization and theme-based analysis, e.g. N6
 - Quantitative analysis of text-based data

Summary

- Three main data gathering methods: interviews, questionnaires, observation
- Five key issues of data gathering: goals, choosing participants, triangulation, participant relationship, pilot
- Interviews may be structured, semi-structured or unstructured
- Questionnaires may be on paper, online or telephone
- Observation may be direct or indirect, in the field or in controlled setting
- Both quantitative and qualitative analysis methods
- Techniques can be combined depending on study focus, participants, nature of technique and available resources

THANK YOU

ΕΥΧΑΡΙΣΤΩ

谢谢

Merci

ขอบคุณ

Vielen
Dank

DMnvwd

Gracias

شكراً

Grazie

Hvala

Bedankt

Dankie

شكريا go raibh maith agaibh

Obrigado!

Dikey

Köszönettel

ありがとう



СПАСИБО

감사합니다

Tesekkürler

WAD MAHAD
SAN TAHAY

Dziękuję

متشكرم

GADDA GUEY

Asante Urakoze