CLEMSON
College of ENGINEERING, COMPUTING AND APPLIED SCIENCES

User Research: Data Analysis, Interpretation, and Presentation

10/2/18

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Data Analysis: Activity #1

- In assigned teams:

  - What is the ‘question’ you are trying to answer with your user research?
  - What type of data have you collected for the semester project?
  - What analysis have you/will you perform?
  - How have you/will you present your findings?

  - Each section should only be 1-2 sentences long, or (preferably) bullet points
  - 15 mins

Data Analysis: Chapter Overview

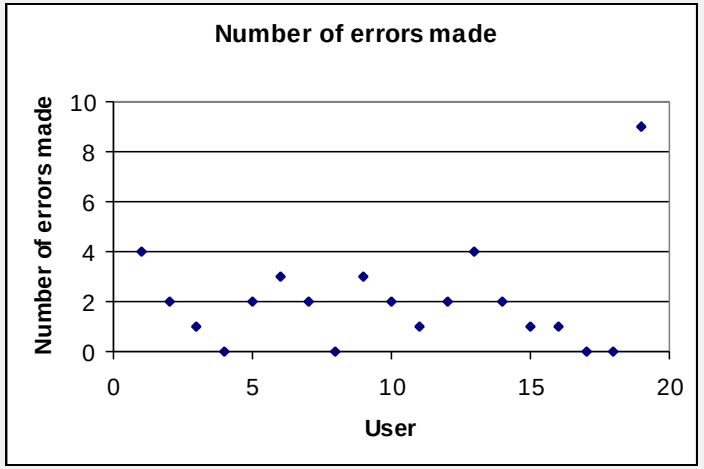
- Discuss the difference between qualitative and quantitative data and analysis.
- Enable you to analyze data gathered from:
  - Questionnaires
  - Interviews
  - Observation studies
- Make you aware of software packages that are available to help your analysis.
- Identify common pitfalls in data analysis, interpretation, and presentation.
- Enable you to interpret and present your findings in appropriate ways.

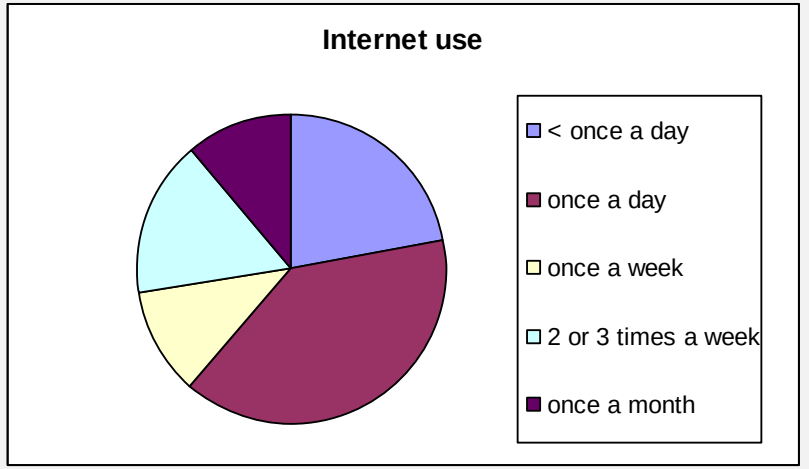
Data Analysis: Data Types

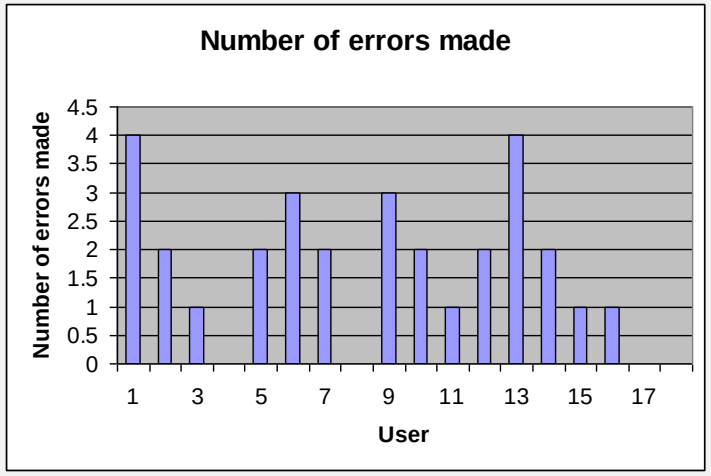
- Data Types
  - Quantitative
    - Can be expressed as numbers (e.g., how many, how much, how often)
    - Examples
      - Task performance: number of keystrokes, time in seconds
      - Biometric measurement: eye tracking, heart rate
  - Qualitative
    - Difficult to measure sensibly as numbers- for example, can we count the number of words used to measure dissatisfaction, or agreeableness?
    - Examples:
      - User experience: likability, frustration
      - Survey or questionnaire: open-ended questions, free text response

Data Analysis: Quantitative Data

- Statistical methods to ascertain size, magnitude, amount
- Simple analysis
  - Averages (mean, median, mode)
  - Percentage
- Graphical representations are used to provide an overview of the data

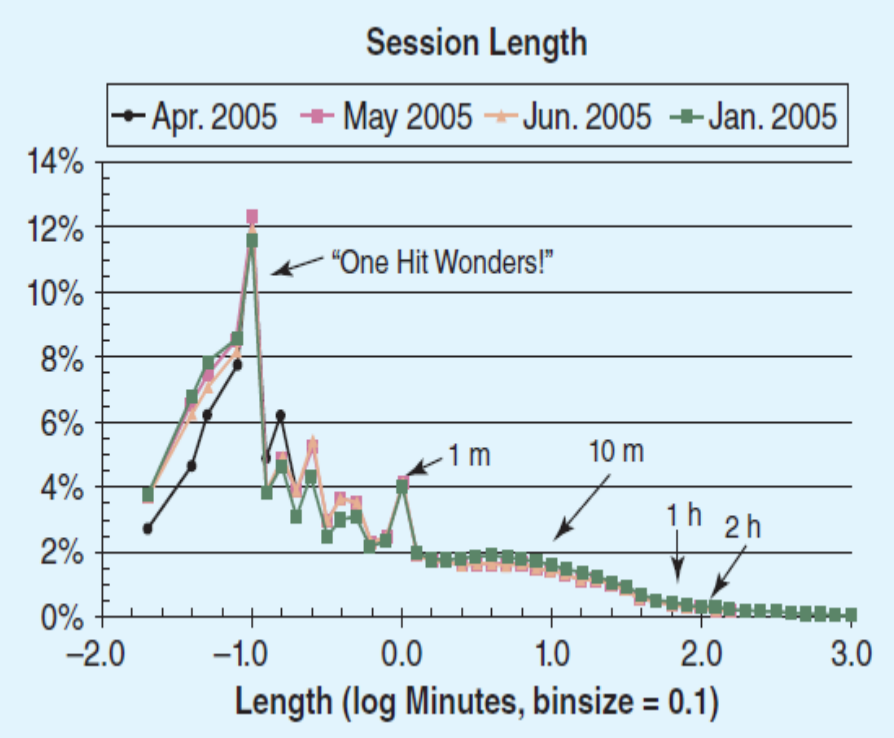


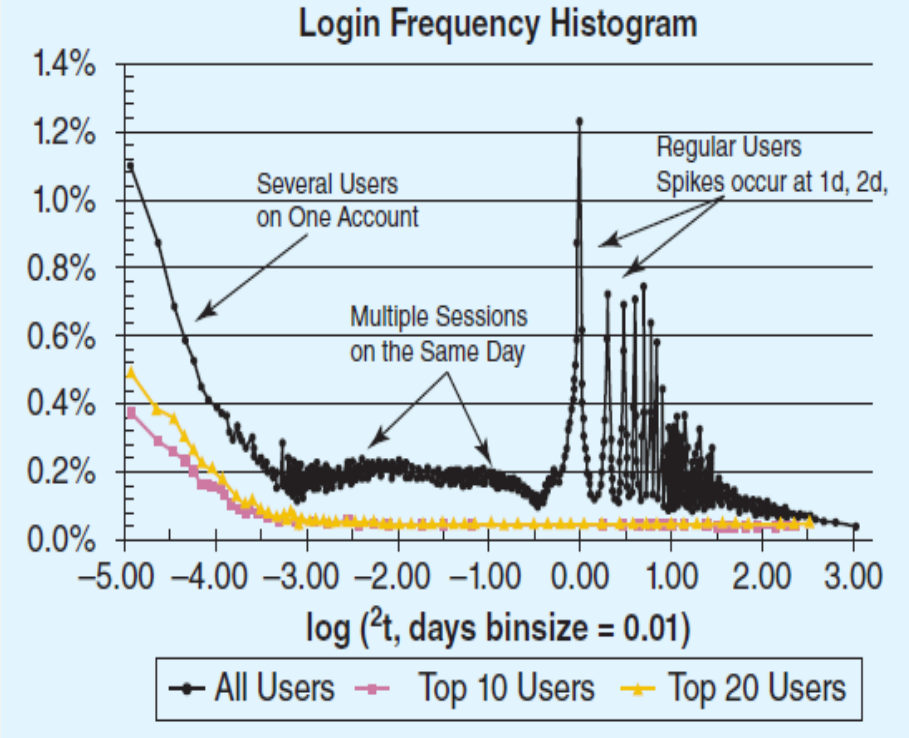




Data Analysis: Quantitative Data, cont

- Web Analytics





session length data of four different months from Teachers' Domain (NSDL)

Source: Khoo, M., Pagano, J., Washington, A. L., Recker, M., Palmer, B., and Donahue, R. A. (2008) Using web metrics to analyze digital libraries. *Proceedings of Joint Conference on Digital Libraries,* Pittsburgh, June 16–20. ©2008 Association for Computing Machinery, Inc. Reprinted by permission.

Data Analysis: Qualitative Data

- Expresses the nature of elements and is represented as themes, patterns, stories

- Simple analysis
  - Recurring patterns or themes
    - Emergent from the data, dependent on the observation framework (if used)
  - Categorizing data
    - Categorization may be emergent from the data or pre-specified
    - ‘Coding’ versus quantifying
  - Looking for critical incidents
    - Helps to focus in on key events

Data Analysis: Qualitative Frameworks

- Basing analysis around theoretical frameworks provides further insight

- Three frameworks
  - Grounded Theory
  - Distributed Cognition
  - Activity Theory

Data Analysis: Qualitative Frameworks

- Grounded Theory
  - Aims to derive theory from systematic analysis of data
  - Based on categorization technique (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 their own theoretical backgrounds to inform analysis

Data Analysis: Qualitative Frameworks

- Grounded Theory

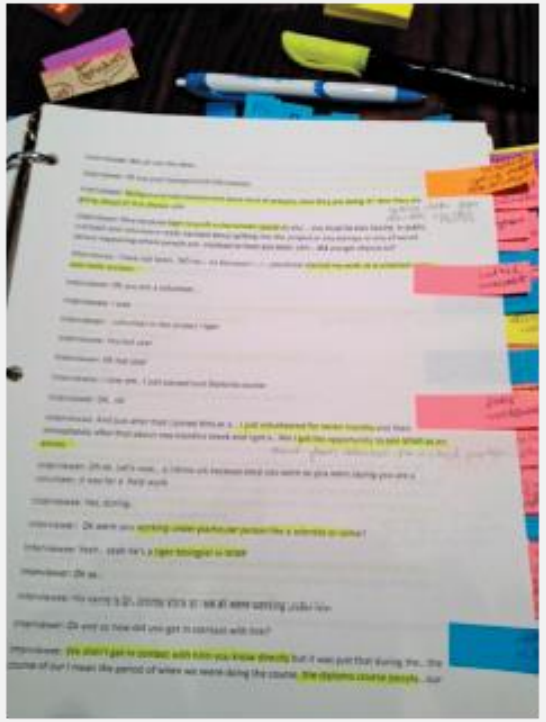


Figure 8.13 Code book used in a grounded theory analysis of citizens' motivations to contribute to citizen science

Source: Rotman, D. *et al* (2014). Does motivation in citizen science change with time and culture? In *Proceedings of the companion publication of the 17th ACM conference on Computer supported cooperative work & social computing (CSCW Companion '14)*. ACM, New York, NY, USA, 229–232. ©2014 Association for Computing Machinery, Inc. Reprinted by permission.

Data Analysis: Qualitative Frameworks

- Grounded Theory

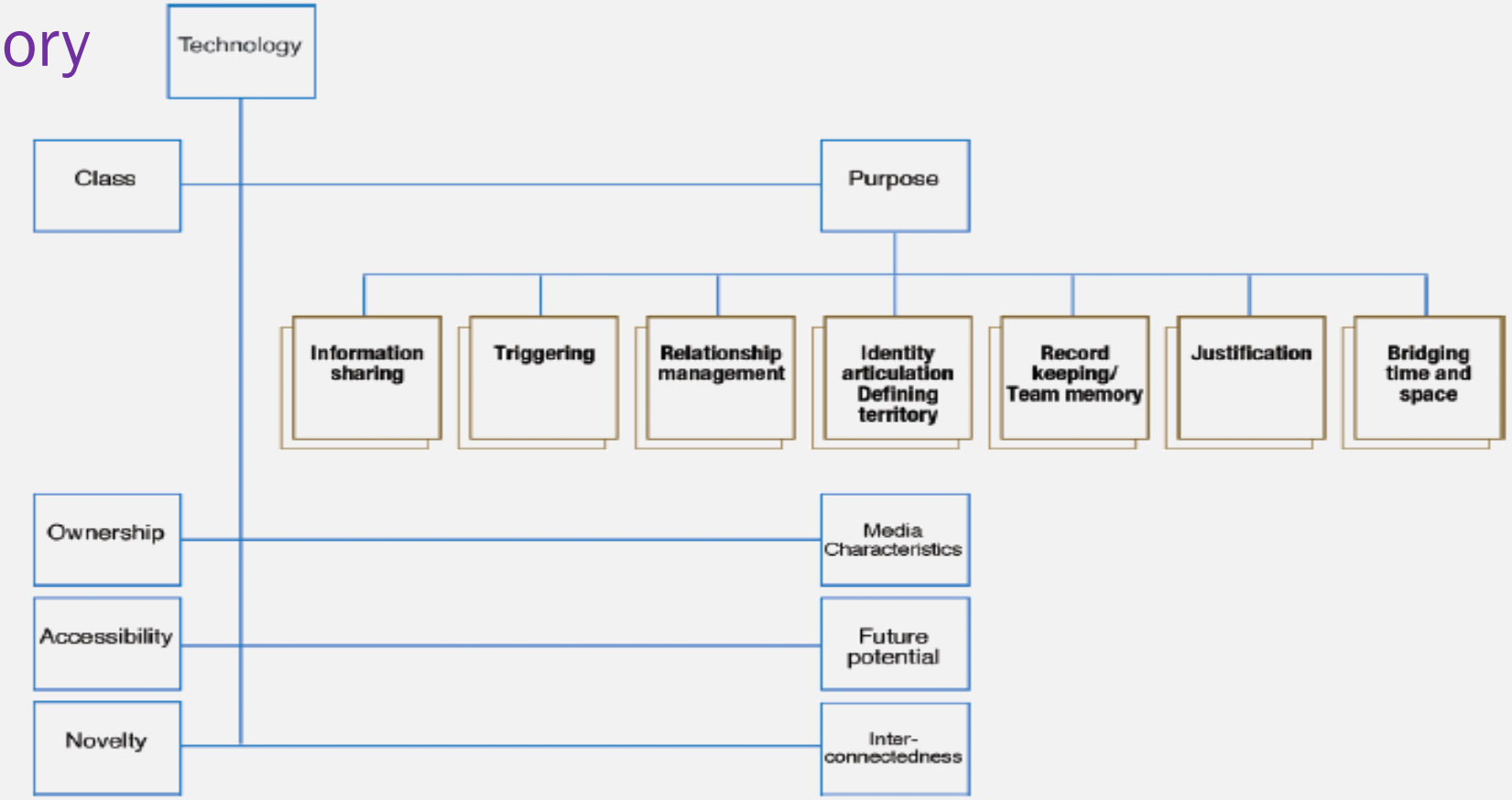


Figure 8.14 Axial coding for the technology category

Source: S. Sarker, F. Lau and S. Sahay (2001): "Using an adapted grounded theory approach for inductivetheory building about virtual team development". *The Data Base for Advances in Information Systems*, 32(1), pp. 38–56 ©2001 Association for Computing Machinery, Inc. Reprinted by permission.

Data Analysis: Qualitative Frameworks

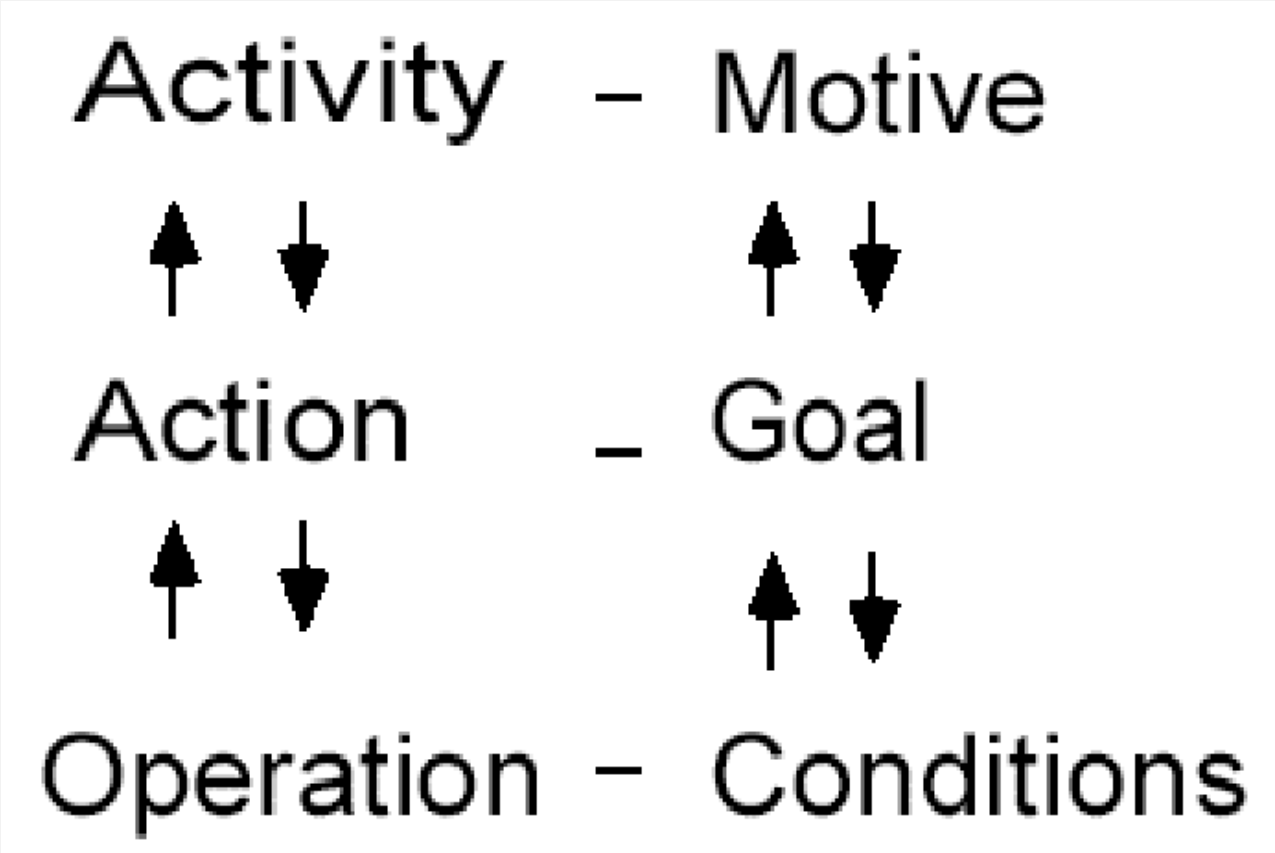
- Distributed Cognition
  - The people, environment, and artifacts are considered one cognitive system
  - Used for analyzing collaborative work
  - Focuses on information propagation and transformation

Data Analysis: Qualitative Frameworks

- Activity Theory
  - Explains human behavior in terms of our practical activity in the world
  - Provides a framework that focuses analysis around the concept of an ‘activity’ and helps to identify tensions between the different elements of the system
  - Two key models: one outlines what constitutes an activity, one models the mediating role of artifacts

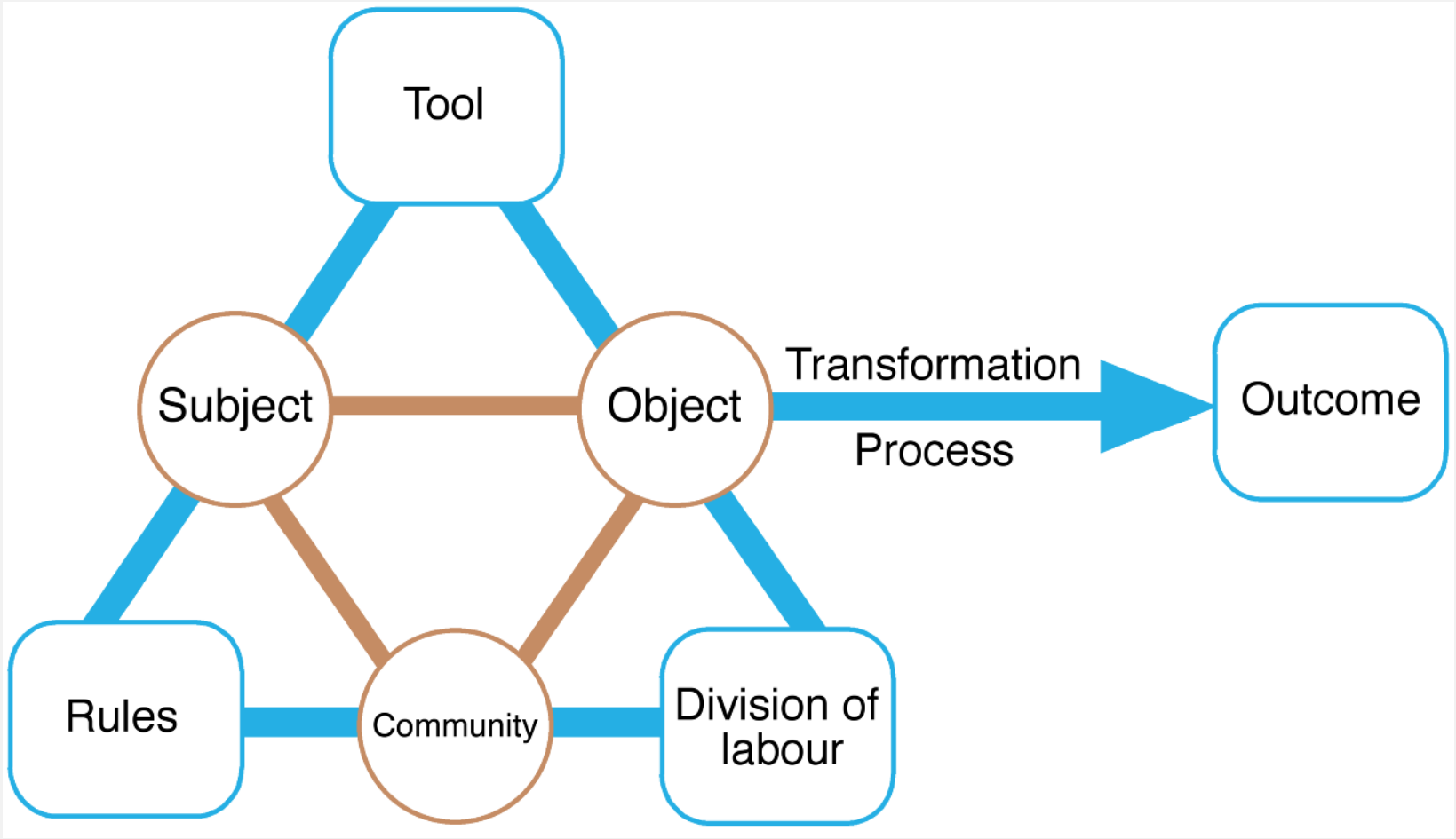
Data Analysis: Qualitative Frameworks

- Activity Theory: Individual model



Data Analysis: Qualitative Frameworks

- Activity Theory: Engestrom's (1999) Activity System Model



Data Analysis: Tools for Analysis

- Spreadsheets – simple to use, basic graphs
- Statistical packages – SPSS, R
- Qualitative data analysis tools
  - Categorization and theme-based analysis
  - Quantitative analysis of text-based data
- Nvivo and Atlas.ti support qualitative data analysis
- CAQDAS Networking Project – based at University of Surrey (http://caqdas.soc.surrey.ac.uk/)

Data Analysis: Presenting Findings

- Only make claims that your data can support
- The best way to present findings will depend on the audience (technical, stakeholder, consumer, etc), the purpose, and the data gathering/analysis used
- Graphical representations may be appropriate
- Other techniques
  - Rigorous notations, e.g. UML
  - Using stories, e.g. to create scenarios
  - Summarizing the findings

Data Analysis: Activity #2

- In small groups (2-3), answer the following question and provide one example to support your opinion.
  - 10 mins

- Does it matter how data is represented, if it is factually true?

  - For example: the same data can be reported as a percentage (%) of the whole, or (x number) of (total number), is one better than the other? Why or why not?

Reading for next class...

350-368