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Human Centred Systems Design

Qualitative Research Methods

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“Not everything that can be counted counts,
and not everything that counts
can be counted.”

– *Einstein*

A classical example

What are the features of the ‘perfect’ latte?

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What are the features of the 'perfect' latte?	
Frothy with attractive pattern	Proportion milk/coffee
Powerful aroma	Temperature
Strong taste	Volume
Elegant cup	Cost

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Qualities Qualitative data	Quantities Quantitative data
Frothy with attractive pattern	Proportion milk/coffee (%)
Powerful aroma	Temperature (°C)
Strong taste	Volume (ml)
Elegant cup	Cost (£)

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Let's imagine the unimaginable…

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Possibility #1

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Possibility #2

Find the differences…

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In which of the two previous examples quantification is easier or more straightforward?

In general...
What is typically difficult
to count / quantify?

Which of the previous findings would you (in principle) trust more?

Qualitative research	vs.	Quantitative research
	Aim	
	Approach	
	Data collection	
	Researcher independence	
	Sample size	

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Qualitative research	vs.	Quantitative research
Discover ideas and gain insight and understanding	**Aim**	Test hypotheses and specific research questions
Observe, survey and interpret	**Approach**	Measure and test
Mixed	**Data collection**	Structured
Researcher involved and results subjective	**Researcher independence**	Researcher uninvolved observer, objective results
Small samples, naturalistic setting	**Sample size**	Larger samples for generalisable results

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What is qualitative research?

A definition...

Qualitative research is a strategy for systematic collection, organisation, and interpretation of phenomena that are difficult to measure quantitatively.

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What is qualitative research?

Qualitative research is a strategy for systematic collection, organisation, and interpretation of phenomena that are difficult to measure quantitatively.

Despite the difficulties, there are widely accepted procedures for study design, sampling, data collection, and data analysis.

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Qualitative Research Methods

- Traditionally, in Human-Computer Interaction:
  1. Surveys
  2. Interviews
  3. Focus groups
  4. Diaries
  5. Ethnographic research

Surveys

1

- Widely used and easy

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Surveys

1

Benefits	Limitations
Good for limited shallow data	Less good for deep detailed data
Low cost and easy to use	Subject to recall bias – ‘how were you feeling when you used this software application?’
Unobstructive and widely accepted	Difficult to obtain results that can be generalised to the wider population

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Who will you survey?

1

Two options involving a different complexity:

- **Probabilistic sampling**

  Survey everyone in the target population

  E.g. UK Census

  Random sampling (more common)

  E.g. randomly select 500 users from population of 10,000

  Or stratified random sample – e.g. equal numbers of respondents from each year of study in University

- **Non probabilistic sampling**

  Collecting data from those who agree to respond (self-selected)

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Survey questions

1

- **Open-ended questions**
  - Need careful thought
    E.g.'Why did you stop using software product X?'
    Respondent may not know
  - More specific questions could help
    E.g.'How did you feel about the usability of software product X?'
    E.g. 'Did software product X allow you to complete the tasks you wanted to complete?'

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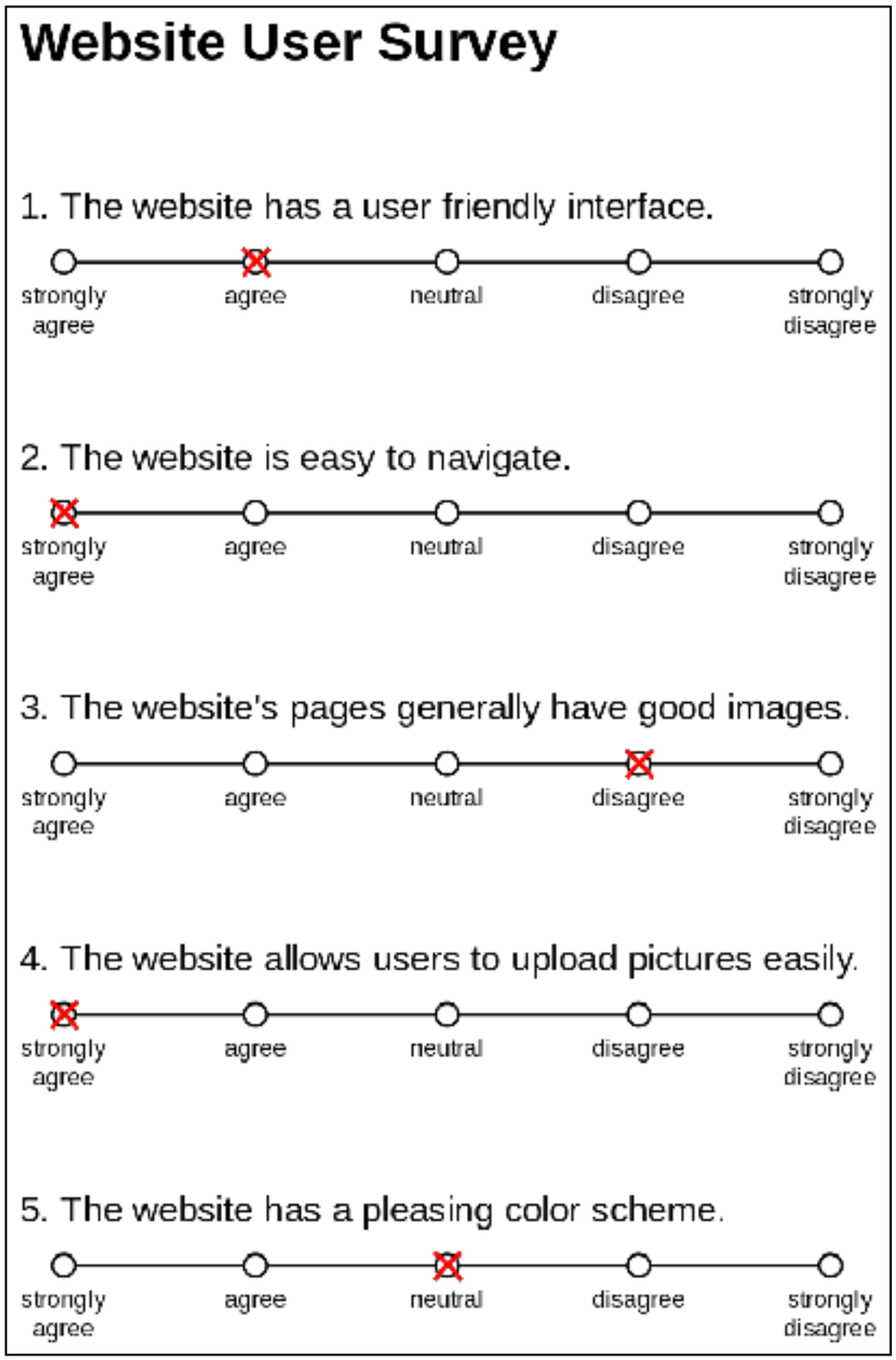
Survey questions

1

- **Closed-ended questions with ordered responses**

  E.g. Likert scale



Survey questions

- **Closed-ended unordered questions**

  E.g

  When using my computer, I use the following input devices (select as many as apply)

  - ☐ *Keyboard*
  - ☐ *Mouse*
  - ☐ *Trackball*
  - ☐ *Touch pad*
  - ☐ *Voice recognition*

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Survey questions

- **Closed-ended unordered questions**

  E.g.
  Which application do you use most often for text editing? (please select only one)

  - ☐ *MS-Word*
  - ☐ *WordPerfect*
  - ☐ *Notepad*
  - ☐ *TextEdit*
  - ☐ *Pages*

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Surveys - Common pitfalls

1

- Complicated and confusing

  E.g. Would you vote for or against a candidate who supports reducing government spending on education and welfare?

- Double-barrelled question that asks two separate questions

  E.g. Does it seem possible or does it seem impossible to you that the Nazi extermination of the Jews never happened?

  What would 'yes' mean?

- Use of negative words

  E.g. 'do you agree that the email software is <u>not</u> easy to use?'
  E.g. '<u>don't</u> you agree that parking in Sheffield is a problem?'

- Biased wording

  E.g: Is parking in Sheffield <u>a problem</u>?

- Hot-button words

  E.g.: conservative, abortion, terrorism…

  Their use can lead to biased responses

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Survey questions

1

- **Existing surveys**

  Sometimes there will be an appropriate existing survey tool, e.g. for usability testing and evaluation

Table 5.1 Survey Tools in HCI

Tool	Citations
Computer System Usability Questionnaire (CSUQ)	Lewis (1995)
Interface Consistency Testing Questionnaire (ICTQ)	Ozok and Salvendy (2001)
Perdue Usability Testing Questionnaire (PUTQ)	Lin et al. (1997)
Questionnaire for User Interaction Satisfaction (QUIS)	Chin et al. (1988) Slaughter et al. (1994) http://www.lap.umd.edu/quis/
Software Usability Measurement Inventory (SUMI)	http://sumi.uxp.ie/
Website Analysis and MeasureMent Inventory (WAMMI)	http://wammi.uxp.ie/

For more information about existing surveys for usability evaluation, the reader is encouraged to visit http://garyperlman.com/quest/.

Lazar, Feng, Hochheiser (2017), Research Methods in HCI, 2nd edition

Surveys - Prior to release

1

- **Testing the survey tool**
  - Testing the questions
  - Testing the interface

- **Consulting with knowledgeable colleagues**
  - Getting feedback on the questions

- **Pilot study**
  - Questions that were not answered
  - Questions where multiple answers were given when 1 was expected
  - Questions where ‘other’ response was chosen

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Surveys - Reliability

1

- **Reliability of survey?**

  When survey has been used to collect data multiple times

- **Methods for measuring internal reliability**

  Asking the same question in different ways

  Exploratory factor analysis

  Some questions may all be getting at the same underlying idea

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Surveys - Data analysis

1

Separate quantitative and qualitative data

Use quantitative data to develop ‘descriptive statistics’

May be possible to use ‘inferential statistics’
to understand relationships between variables.

More details when we talk about
Quantitative Research Methods
(last lecture of this series)

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Surveys - Concluding thoughts

1

- Powerful tool for collecting data from many individuals
- Wording is critical
- Need to be easy to understand and use
- Need appropriate sampling for a representative response

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Interviews *vs* Surveys *vs* Focus groups

1 Surveys	2 Interviews	3 Focus groups
Broad but not deep	Deep but not broad	Multiple users
Respondents only answer questions that are asked	Direct conversations with fewer people	At one time

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Interviews

2

Benefits	Limitations
Can obtain detailed information that might not otherwise be available	Require practice, good planning and hard work
Can be flexible – e.g. varying the order of questions, or exploring an interesting idea that comes up	Time-consuming, e.g. 1 hour/person, limiting the amount of people
	Analysis and interpretation can be tricky and time-consuming
	Suffer from recall (like surveys)

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Interviews - Applications

2

Can be used at any phase of project including:

- initial exploration,
- requirements gathering,
- evaluation of prototypes and
- summative evaluation of products.

Interviews - Initial exploration

E.g. if investigating new ways for helping people to manage digital artifacts of their lives (pictures and videos).

- Possible questions to be asked in interviews or focus groups
  - *What sort of recordings do you make of personal events? Pictures? Videos? Audio recordings?*
  - *How do you view these recordings?*
  - *Who do you show them to? On what sort of recordings?*
  - *Do you share them with friends and family, and if so how?*
  - *Have you ever lost track of a valuable photo or video?*
  - *Have you found yourself interested in doing something with your recordings that your tools did not support?*
- All these questions are quite general and attempt to gain insights into the needs and challenges before moving onto specific details.

Interviews - Requirements

2

E.g. if investigating new ways for helping people to manage digital artifacts of their lives (pictures and videos).

- Potential questions could be:
  - *How do you create traditional scrapbooks?*
    Can you show me a scrapbook you've made?
  - *How do you want to arrange things?*
    Do you want to have individual pages like a traditional scrapbook, or something more like a large canvas?
  - *Do you want to give users tools to make comments and notes on your scrapbook?*
- Note: questions have little to do with the actual tools use

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Interviews - Requirements

2

- Or if gathering requirements to improve existing tools, could ask more low level questions
  - *What tools do you use for scrapbook creation?*
  - *What do your tools not do that you would like to be able to do?*

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Interviews - Requirements

2

- When capturing requirements, they typically need to be broad and open-ended
  - *E.g. broad questions about current practices, goals, frustrations, concerns*
  - *E.g. "If you could describe the perfect system for solving your problem, what would it look like?"*

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Interviews - Evaluation

2

- Interviews can be very useful during development – capturing reactions as prototypes are developed.
- *E.g. for the scrapbook interface*
  - *Do you find this interface easy to use?*
  - *Do you understand the menus, icons and language?*

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Interviews - When to use them? 2

- Good to combine a broad-based survey with small number of in-depth interviews

- Allowing a deep understanding of user needs and challenges (from interviews) with an appreciation of how well these generalise to larger set of potential users.

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Interviews - Who to interview?

2

- It depends…
- **For usability tests** – current and future users of system

- **For broader concerns** – pool of interviewees from all categories of stakeholders.
  - Stakeholder – anyone one who is affected by the use of the system
  - There are often multiple stakeholders
    - e.g. for university course registration, multiple types from administrators, to lecturers, to students.

- Other considerations…
  Some people may function as key informants, e.g. those with a pivotal role in organisation, or someone who is particularly forthcoming.
  - how representative?: disgruntled employee?

Interviews - Conducting them

2

- Need to respect the participants.
- For some populations with special needs or challenges this may require extra care
- E.g. Dantec and Edwards (2008) study of information practices of homeless people
  - worked with outreach groups to find homeless interviewees
  - offered choice of store gift cards or public transportation cards as compensation

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Interviews - Design

2

Need to decide in advance how formal and how much structure

- **Fully structured interviews**:
  Rigid script and questions in well-defined order

  \+ easier to analyse

  \- can't follow up interesting issues, or explain enough
- **Semi-structured interviews**:
  A set of questions, but with flexibility to ask further questions
- **Unstructured interviews:**
  Using a list of topics, or
  an interview guide.

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Interviews - Design

2

- When are these appropriate?

  Better to use fully structured form when you plan to compare responses across individuals

  Better to use unstructured and semi-structured when you are unfamiliar with the problem domain, and don't know what questions to ask

The more unstructured the interview, the more skilful and experienced the interviewer will need to be.

Interviews - Design

2

- Focused and contextual interviews might require more in depth explorations involving:
  - *Asking interviewees to show how they solve a problem*

    e.g. technology tours and asking people how they use technology in a home.
  - *Using external aids*

    e.g. asking interviewees to arrange a set of photos on a table top.
  - *For software tools*

    e.g. asking users to complete sample tasks.

Interviews *vs* Focus groups

2 Interviews	3 Focus groups
Very intensive	Less intensive
E.g. for input from 20 individuals interviewer must meet with each individually	Ideal size for focus groups 8-12, or Krueger (1994) suggests 5-7 participants
Powerful as can go in full depth	More than one focus group is desirable to increase chances of success
Interviewers need to be skilled and experienced	Moderators role is key to manage group dynamics (e.g. opinion leaders or talkative individuals monopolising)
Range from structured to fully unstructured	Typically semi-structured
More adequate to deal with sensitive issues	Group discussions encourage interactivity
	Unsuitable for delicate/sensitive issues

Focus groups - Participants

3

- Selection of focus group members –
  - Familiar to interviewer

    friends and colleagues ⇨ bias
  - Multiple backgrounds

    might be too diverse
  - Shared backgrounds

    could promote discussion and exchange

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Diaries

4

- Regular recordings of events in life, at the time those events occur.
  - E.g. Currently, tweets and Facebook status updates are a form of diary keeping
- In HCI research diaries are often used with other methods
- Diaries – research method often used in sociology
- Useful when goal is to learn more about situations and behaviours that are not well understood – not to test an experimental hypothesis

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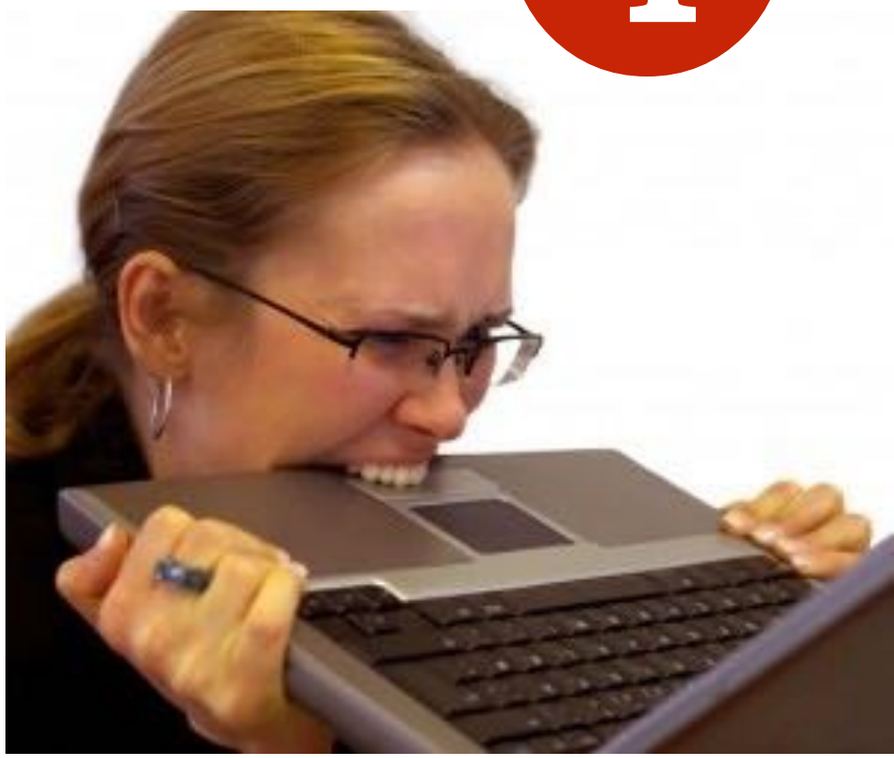
Diaries - Case study

4



- Purpose: Study user frustration when using computers
  - What frustrates computer users?
  - How do they respond to frustration?
  - What is the impact on users' time?
- Participants:
  - 111 university users
  - 50 work place users
  - 100 blind users on the web
- Research methodology:
  - Users asked to keep a time diary of computer usage over a few hours
  - Questionnaire about their mood at the beginning and end of the session
  - Filled out a 'frustration experience form' every time they felt frustrated during session
  - Time of the day was always recorded
- Findings (expressed in % of time spent on frustrating situations):
  - Student users: 38-43%
  - Work place users: 43%
  - Blind users: 30.5%

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Lazar et al (2007)

Diaries

4

Strengths	Weaknesses
Good for understanding how individuals use technology in non-workplace, non-controlled, or on the go settings	Participants may not be aware of what they are doing and have trouble recording it
More accurate time recording than in a survey	Participants may not record enough entries
Good for data that is fluid and changes over time (e.g. mood, perception)	Time recordings less accurate than in controlled lab setting
Limited gap between event and recording can limit personal interpretation	More intrusive – can be harder to recruit participants
Can collect information about actions planned but not carried out	Data qualitative and quantitative, harder to analyse
	Hard to find balance between frequent entries and interference with daily activities

Diaries - Participants

4

- They need to :
  - match the requirements (age and experience)
  - understand the purposes of keeping a diary
  - be motivated to keep regular and accurate records
  - be competent in using the technology being investigated and in the method for keeping the diary

- They might need additional incentives to participate:
  - reward or payment

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Diaries - Types

4

Two types: feedback and elicitation

- Feedback diary
  - Focus on events that interest the researcher
  - Entries can be:
    - structured (e.g. using Likert scales and multiple choice questions)
    - open ended (e.g. 'how do you feel right now about your computer?')
    - blog-like recording of thoughts about a topic or a technology

- Users instructed to create an entry when certain events occur, or at certain times

  E.g. when a task is completed, or when frustration is felt, or when beeper is heard

Diaries - Types

4

- Elicitation diary
  - Focus on events that interest the user
  - Entries made on events that are meaningful to the user
  - Used as prompts for explanation at later interview
    - *E.g. photos, audio clips, short snippets of text*
    - *E.g. study of information-seeking demands of mobile device users*
      - *Send short text whenever they had an information need*
      - *At end of day, asked to go to project website and answer more questions about each text, e.g. where were you? What was your information need?*

Diaries - Design

4

- Data collection
  - How will diary be recorded?
  - Portable electronic devices often used
  - Should be a recording method that is natural to the user.

- Reminders:
  - could send text message to remind about diary entries

- Analysis:
  - easier if quantitative

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Diaries - Case study

4

- Target: Study of task switching
  - How do interruptions impact on task switching?
- Participants:
  - 11 users, all professionals multi-tasking between 3 major projects
- Methodology:
  - Diary used to keep track of:
    - switches between projects
    - what users defined as tasks
    - difficulty of switching tasks
    - amount of time spent not tasks
- Findings:
  - Users reported an average of 50 tasks shifts a week
  - Long-term projects with multiple documents were hard to return to, once interrupted.

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Czerwinski et al (2004)

Ethnography

5

- In the context of HCI
  - ‘the art and science of describing a human group – its institutions, interpersonal behaviours, material productions and beliefs’ (Angrosino, 2007)
- Ethnography has roots in anthropological studies of non-Western cultures
- Anthropologists spent years living and working in traditional villages to gain a deeply embedded perspective
- The purpose is ‘to gain an understanding of a world that you know little about, you must encounter it firsthand’ (Blomberg and Burrell, 2007)
- Ethnography involves participation and observation
- Time intensive and personal

Ethnography

5

- Ethnography and HCI
- Computing and communication with groups
- Understanding how a technology is used, and how the features of the design affect how people use the system.
- Lucy Suchman (1987): famous study of users of an electronic help system on a photocopier
  - Detailed study using videos, developed detailed understanding of how the differences between the human model of the copier, and the expert system's model, led to communication breakdown and task failures

Ethnography - Case study

5

- **Design of innovative new health care information management system to be used in hospital intensive care units in country you have never visited.**
- Little shared cultural background
- Could use survey or interviews – but what questions should you ask?
- Observing workers in the environment
  - Shadowing healthcare workers
  - Talking to clients
  - Observing workplace practices and cultural background
  - Develop designs and ask for feedback
  - Visit a second hospital in a different city to check suitability

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Ethnography

5

- Human, social and organisational aspects of information systems development is often critical in ensuring success of project
- Ethnography can help provide an understanding of the context in which interfaces are developed and used.
- Challenging and time consuming
    - Conducted ‘in the wild’
    - Extended periods of interaction and observation

Participatory design

5

- Ethnography is related to the design philosophy of participatory design
- **Participatory design** aims to involve users in every stage of design
    - Early discussions of problems, concerns and needs
    - Brain storming about design possibilities
    - Evaluation of paper and low quality prototypes
    - Continued refinement of working systems
- Participatory design: using ethnographic methods to understand problem, and then intensely involving participants building solutions

Ethnography

5

- How to participate? Choosing a role
  - Complete participants, joining the group.
    - E.g. anthropologists living in traditional villages.
      - Risks losing objectivity
  - Covert research? Or identifying as a researcher
  - Complete observer
    - Observing without interacting
  - Intermediate approach more common
    - Combining some participation with observation – e.g. shadowing

Ethnography

5

- Building relationships
    - Trust?
    - Understanding cultural factors
        - Slang, jargon, offence
- Making contact
    - Initial contacts?
        - Stranger-handlers
        - Deviants
- Informants
    - Trustworthy?
    - Their perspective

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Ethnography

5

- Multiple data collection methods
  - Interviews
    - Initial open ended and informal
    - More structured e.g. Life Histories and time diaries
  - Observation and note-taking
    - Observation vs interpretation
    - What is interesting?
    - Timing?
  - Documents and archives
    - Records of past activities, emails, deliverable documents

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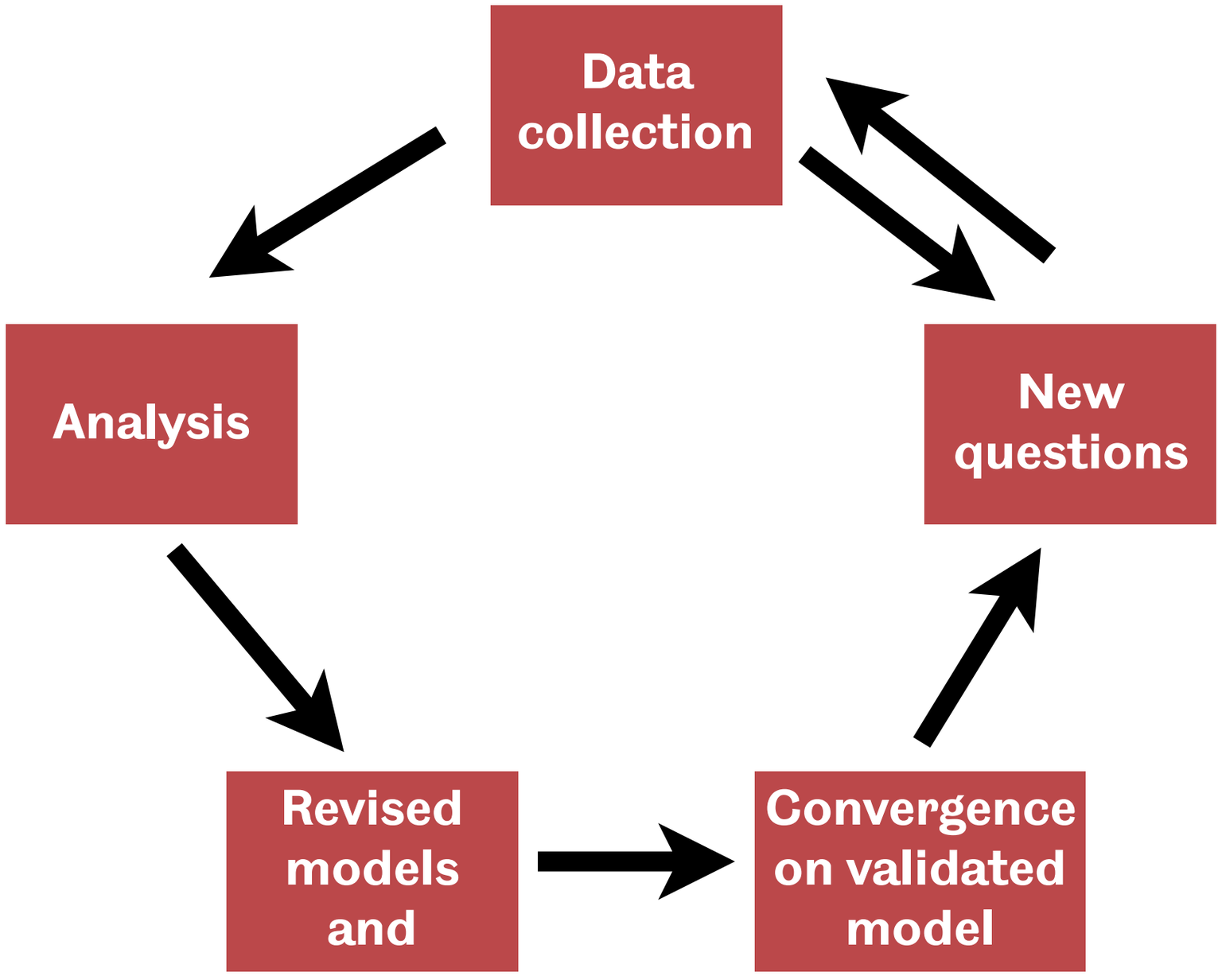
Ethnography - Iterative process

5



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Ethnography - Reporting

5

- Describing goals and methods and justification of choice of groups
- Methods for data collection and analysis
- E.g. matrices, charts, figures
- Sharing of draft reports with participants

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Example ethnographic studies

5

- Karapano et al (2009)

  Study of iPhone users to see how perceptions of the device changed over several weeks

    6 participants

    Before purchasing phone, each wrote a narrative describing their expectations, and completed survey about importance of each expectation

    After purchasing phone, listed activities related to phone, estimated time spent, picked important experiences, rated product for each situation

    Used to build model describing use of iPhone as sequence

      from anticipation,

      to orientation to features,

      to incorporation into everyday life,

      to identification as important part of their lives.

Summary

- Qualitative vs Quantitative Data
- Qualitative Research Methods
- Traditionally, in Human-Computer Interaction:
  1. Surveys
  2. Interviews
  3. Focus groups
  4. Diaries
  5. Ethnographic research

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