Usability Engineering & User Experience
Christof van Nimwegen, 25 mei 2016

**Course book**
CHAPTER 7: DATA GATHERING

**Extra literature**
PERFORMANCE METRICS
Excursie Rabobank

Nu: 36, er kunnen er nog 4 bij!!

Excursie UX lab Rabobank

Datum: 1 Juni, 2016
Tijd: 09:00-11:00
Adres: Rabobank HQ Utrecht (achter station Utrecht CS)
DETAILS VOLGEN NOG
Data gathering: Five key issues first

1. Setting goals
2. Identifying participants
3. Relationship with participants
4. Triangulation
5. Pilot studies
Five key issues: Setting goals

The type of question, e.g.:

1. How would technology fit in a life?
2. Which menu is better?
3. Is our redesign going the right way?

Once the goal is set you can see which techniques & analyses to be used
Five key issues: Identifying participants

1. Once you know the goal, the next step is to know which kind of people you need (population)

2. All of them (saturated sample) is not possible, you need a sample

3. Sampling: choose which participants
   - Probability (statistically robust)
     - Random
     - Stratified
   - Non-probability (statistically less robust)
     - Convenience
     - User panels
Informed consent

You can stop at any moment you like

No one will be able to connect your responses and any other information that identifies you

Any personal information that could identify you will be removed or changed before files are shared

Your participation in the evaluation is voluntary. You do not have to answer any questions you do not want to and you can stop answering questions at any time just by saying you want to stop.

This is a test of the software. We are not testing you.

Five key issues: Relationship with participants
Five key issues: Triangulation
Five key issues: Triangulation

Look at data from more than one perspective

Collect more than one type of data, e.g. quantitative from experiments and qualitative from interviews
Pilot studies

• Never omit, but do it in time!!
• Also veterans should always do it
• It’s not expensive
• Most likely some fine tuning suggestions will pop up
• In case of user tests this is your final practice
• Hard/software can have surprises
• Test subjects are often costly, don’t waste ‘em
Data recording

- Notes, audio, video, photographs can be used individually or in combination:
  - Notes plus photographs
  - Audio plus photographs
  - Video
    - 😞 Intrusive, storage issues
    - 😊 Captures everything

- Different challenges and advantages with each combination
Interviews

• 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’. Closed questions are easier to analyze
- **open questions**: do not have a predetermined format

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
- Double negations
- Interruptions

And…

- Let there be silence
- Stay neutral
Interview: running it

- **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, e.g. switch recorder off.
Interview: How to ask a question?
Focus Groups

- Often used in marketing, political campaigning, social sciences
- 3-10 people, moderated
- Allows diverse / sensitive issues to be raised
- Individuals develop opinions within a social context (talking)
Questionnaires
Questionnaires

• 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
Questionnaires: 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.

• Strike a balance between using white space and keeping the questionnaire compact.

• Avoid very long questionnaires.

• Decide on whether phrases will all be positive, all negative or mixed.
Questionnaires: Question/response format

- ‘Yes’ and ‘No’ check/radio boxes
- Checkboxes that offer many options
- Rating scales
  - Likert scales
  - semantic differential scales
  - 3, 5, 7 or more points
- Open-ended responses
**Questionnaires: Likert scales**

**In general, how would you rate the quality of Fictionals chocolate ice cream?**

- Poor
- Fair
- Good
- Very Good
- Excellent

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1. It is the duty of doctors to keep people alive for as long as possible.

- Strongly Agree
- Agree
- Agree somewhat
- Undecided
- Disagree somewhat
- Disagree
- Strongly disagree

**Evaluate the following statements.**

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Questionnaires: Semantic differential

How would you describe Kmart, Walmart, and Target on the following scale:

- clean
- bright

Please tell us what you think about Anderson grocery stores.

<table>
<thead>
<tr>
<th>Clean</th>
<th>Dirty</th>
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<tbody>
<tr>
<td>Friendly employees</td>
<td>Unfriendly employees</td>
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Please put a check mark in the space on the line below to show your opinion about the school guidance counselor.

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Questionnaire: 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
Don’ts!

Don’t write leading questions

- **Bad**: How short was Napoleon?
- **Good**: How would you describe Napoleon’s height?

People are quite influenceable by the way questions are formulated:
How fast did the red car drive when it
- Hit the grey car
- Crashed against the grey car

Yields different estimations!!

Stay away from double-barreled questions

- **Bad**: How satisfied or dissatisfied are you with the pay and work benefits of your current job?
- **Good**: How satisfied or dissatisfied are you with the pay of your current job?
Don’ts!

Be clear by speaking your respondent’s language
• **Bad:** Do you own a tablet PC?
• **Good:** Do you own a tablet PC? (e.g. iPad, Android tablet)

Avoid Ambiguous questions
• **Bad:** Would you be willing to relocate for a better job?
• **Good:** Would you be willing to relocate to another country for a better job? *(depending on what you want to know)*

Do not use absolutes in questions
• **Bad:** Do you always eat breakfast? (Yes/No)
• **Good:** How many days a week do you usually eat breakfast? *(Every day/ 5-6 days/ 3-4 days/ 1-2 days/ I usually don’t eat breakfast)*
Observation

- Direct observation in the field
  - Degree of participation (insider or outsider)
  - Ethnography

- Direct observation in controlled environments
  - E.e. laboratory, userlab

- Indirect observation: tracking users’ activities
  - Diaries
  - Interaction logging
  - Video and photographs collected remotely by drones or other equipment
Direct observation in the field
Structuring frameworks to guide field observation

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

• 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?
Direct observation in the field: Planning and conducting

- Decide on how involved you will be: passive observer to active participant
- How to gain acceptance
- How to handle sensitive topics, e.g. culture, private spaces, etc.
- How to collect the data:
  - What data to collect
  - What equipment to use
  - When to stop observing
Direct observation in the field: Ethnography
Direct observation in the field: Etnography

- 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.
Direct observation in the field: Ettnography
Direct observation in the field: Etnography
Direct observation in the field: Etnography
Direct observation in the field: Ethnography
Observation: Etnography in requirements

Figure 7.9 Mars Exploration Rover

Source: Reproduced by permission of NASA Jet Propulsion Laboratory (NASA-JPL).
Online Ethnography

- Virtual, Online, Netnography
- Online and offline activity
- Interaction online differs from face-to-face
- Virtual worlds have a persistence that physical worlds do not have
- Ethical considerations and presentation of results are different
Etnography: 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.
- 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
Observation in a controlled environment: direct
Observation in a controlled environment: direct

- Behavior, Utterances, Biofeedback.....
Observation in a controlled environment: direct

Thinkaloud

Please don't interrupt me while I'm talking to myself.

Retrospective thinkaloud

I noticed that you looked at ____ several times...

What were your impressions of that task?

When you were looking for ____ you didn’t seem to notice ____ ?
Observation in a controlled environment: INdirect

Cultural Probes: (Gaver, 1999)
- Focus on someone’s life
- Distribute artefacts
- Follow up interview/debriefing
Web analytics

• A system of tools and techniques for optimizing web usage by:
  • Measuring,
  • Collecting,
  • Analyzing, and
  • Reporting web data

• Typically focus on the number of web visitors and page views.
Observation in a controlled environment: INDIRECT

Web analytics

Figure 7.14 Segments of the Google Analytics dashboard for id-book.com in September 2014. (a) Audience overview, (b) Screen resolution of mobile devices used to view the website.
Observation in a controlled environment: INdirect

Web analytics: Opdracht 3, jun 3rd!!
Choosing and combining techniques

• Depends on the:
  • Focus of the study
  • Participants involved
  • Nature of the technique(s)
  • Resources available
  • Time available
Pauze
Measuring it
How sacred is it 😊?

There are 3 kinds of lies: Lies, damn lies, and statistics.
How sacred is it 😊?
Performance metrics

- A bit farther from UX, a bit closer to UE
- Adequate size needed
- They tell what, not why

1. Task success
2. Time on task
3. Errors
4. Efficiency
5. Learnability
Performance metrics: Confidence intervals

95% confidence interval: 11.2 - 18.7

90% confidence interval: 11.9 - 18.1
Performance metrics: Task success

- Binary: yes or no, 0 or 1
  - Confidence intervals?

- Levels of success
  - Vary e.g. user’s experience in a task
  - Vary level of optimality

- Issues
  - How to define success
  - Strikes and out?
  - “Call” it at a certain point?
Performance metrics: Time on task

- Informs on efficiency
- Often: the faster the better (not always)
- What about...engagement?
Performance metrics: Errors

- When to measure them?
- What is an error
- Collecting and measuring them
- Analyzing – presenting errors
- Issues to consider
Performance metrics: Efficiency

- Steps: path measures
Casus: Destination Feedback

Hypothese
Destination feedback leidt tot een minder plan-gebaseerde aanpak en slechtere prestatie dan wanneer dit achterwegen gelaten wordt.

Als bepaalde informatie geëxternaliseerd is, wordt de gebruiker verleid om GEEN plannen te maken maar om op de interface te vertrouwen. Als informatie geïnternaliseerd moet worden, wordt de gebruiker getriggerd meer na te denken voor hij iets doet.
Casus: Performance metrics - Destination feedback

- **Destination feedback**
  - Slots in roster (that are possible AND available) turn green onclick
  - Not the best/smartest slots, simply the one that are possible

- **NO destination feedback**
  - User must look at the limitations and think for him/herself and plan ahead

(casus = geen tentamenstof)
Casus: Methode experiment

Procedure

- 43 deelnemers, 17 (40%) mannen, 26 (60%) vrouwen
- Leeftijd 19 tot 32 jaar
- Volgt, of heeft onlangs HBO of hoger gevolgd.
- Experiment duurde maximaal een uur, 5 euro beloning

Gekeken naar:

- Diverse prestatie maten (tijd, zetten)
- Strategie
- Kennis
- Meningen
Casus: Time on task

No difference in average time needed

NO FEEDBACK waits longer than DESTINATION FEEDBACK (p<.05)

NO FEEDBACK: M=19.8
DESTINATION FEEDBACK: M=15.3

NO FEEDBACK takes longer between moves than DESTINATION FEEDBACK (p<.05)

NO FEEDBACK: M=4.8
DESTINATION FEEDBACK: M=3.9
Casus: Wait a minute….

- No difference in average time needed between the NO FEEDBACK and DESTINATION FEEDBACK
- NO FEEDBACK takes more time before first move
- NO FEEDBACK takes more time between moves
Casus: Efficiency (path)

Geen verschil in gemiddelde totale tijdsduur!!

Superfluous moves

DESTINATION FEEDBACK make more superfluous moves than NO FEEDBACK (p<.05)

DESTINATION FEEDBACK: M=2.5
NO FEEDBACK: M=4.3
Casus: Efficiency - Strategy

Use of "smartest strategy" (per 5 trials)

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<th>DESTINATION FEEDBACK</th>
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<tbody>
<tr>
<td>M=2.4</td>
<td>M=1.5</td>
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NO FEEDBACK uses smart strategy MORE than DESTINATION FEEDBACK (p<.05)

NO FEEDBACK: M=2.4
DESTINATION FEEDBACK: M=1.5
Casus: At last: data!!

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Casus: At last: data!!

- Meestal kwantitatieve data (anders kun je niet vergelijken): tijd, aantal, ...

- Statistische data
  - Alleen bij (voldoende) grote getallen
  - Nulhypothese (H0): wat je hoopt te verwerpen
  - Alternatieve hypothese (H1): wat de conclusie is als H0 verworpen wordt
  - Gemiddelden en standaard deviatie
  - Statistische significantie
Performance metrics: Learnability

- More “self-service” for all of us (travel, banking products, tax, e-government, e-health, insurances, ……)
- In casus?
Performance metrics: Learnability in Casus

Vertical: Superfluous moves (from ideal path)

Interface style
- NO FEEDBACK
- DESTINATION FEEDBACK

(casus = geen tentamenstof)
Performance metrics: Learnability, bv. transfer?

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[Diagram of P&O Ferries ship with sections labeled Dek A, Dek B, and Dek C]
Vragen?