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Programų

# Data Gathering for requirements and evaluations

## Lecture 3

Slides adapted by

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# Overview

- Five key issues of data gathering

- Data recording

- Interviews

- Questionnaires

- Observation

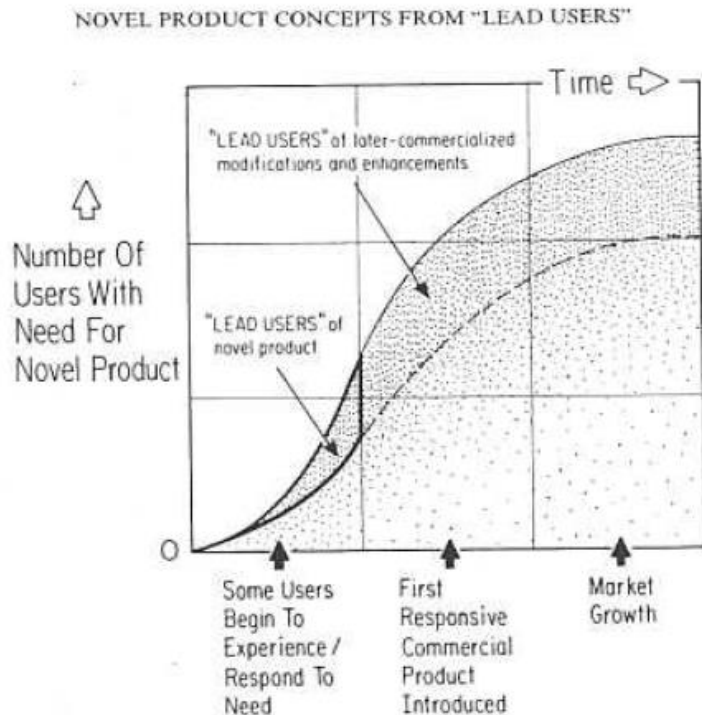- Choosing and combining techniques

# Participative design

- Requirements are gathered while communicating with project stakeholders
  - A result of communication: user stories
- Generalized similar user stories help:
  - to define conceptual scenario of the developed product
  - generate the requirements

# Prioritizing requirements

- Must have
  - fundamental requirements
- Should have
  - essential if more time were available,
- Could have
  - of lesser importance,
- Want to have
  - but Won't have this time round

# Sources of design ideas

NOVEL PRODUCT CONCEPTS FROM "LEAD USERS"

Time ⟹

"LEAD USERS" of later-commercialized modifications and enhancements

Number Of Users With Need For Novel Product

"LEAD USERS" of novel product

O

Some Users Begin To Experience / Respond To Need

First Responsive Commercial Product Introduced

Market Growth

- Lead users
  - Adapted current technologies to their needs
- Technophobes
  - why they do not use current systems

Von Hippel, E. (1986). Lead users: a source of novel product concepts. *Management science*, *32*(7), 791-805.

# Five key issues

1. Setting goals
   - Decide how to analyze data once collected

2. Identifying participants
   - Decide who to gather data from – the population
   - Probability sampling and non-probability sampling
   - Saturation sampling – access to all members

# Five key issues

3. Relationship with participants
   - Clear and professional
   - **Informed consent** when appropriate

4. Triangulation
   - Look at data from more than one perspective

5. Pilot studies
   - Small trial of main study

**Crowdsourcing Design for Citizen Science Organizations**

SHORT VERSION OF CONSENT FORM for participants at the University of Maryland – 18 YEARS AND OLDER

You are invited to participate in a research project being conducted by the researchers listed on the bottom of the page. In order for us to be allowed to use any data you wish to provide, we must have your consent.

In simplest terms, we hope you will use the mobile phone, tabletop, and project website at the University of Maryland to

- Take pictures
- Share observations about the sights you see on campus
- Share ideas that you have to improve the design of the phone or tabletop application or website
- Comment on pictures, observations, and design ideas of others

The researchers and others using CampusNet will be able to look at your comments and pictures on the tabletop and/or website, and we may ask if you are willing to answer a few more questions (either on paper, by phone, or face-to-face) about your whole experience. You may stop participating at any time.

A long version of this consent form is available for your review and signature, or you may opt to sign this shorter one by *checking off all the boxes that reflect your wishes and signing and dating the form below.*

___I agree that any photos I take using the CampusNet application may be uploaded to the tabletop at the University of Maryland and/or a website now under development.

___I agree to allow any comments, observations, and profile information that I choose to share with others via the online application to be visible to others who use the application at the same time or after me.
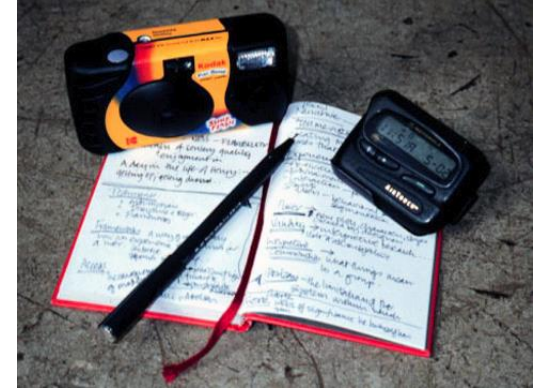
___I agree to be videotaped/audiotaped during my participation in this study.

___I agree to complete a short questionnaire during or after my participation in this study.

| NAME [Please print] | |
|---|---|
| SIGNATURE | |
| DATE | |

[Contact information of Senior Researcher responsible for the project]

# Data recording



- Notes, audio, video, photographs
  - Choice depends on the context, time available and the sensitivity of the situation.

- Notes plus photographs
  - Handwritten notes – flexible and less intrusive than typing,
  - Can be tiring to write, observe and listen at the same time

- Audio plus photographs
  - Audio – less intrusive than video
  - Attention to the interviewee rather than to taking notes

- Video
  - Requires additional planning

# What to choose?

- Imagine you are employed to develop a new computerized garden system planning tool to be used by garden designers.

- Goal: to find out
  - how garden designer use an early prototype as they walk around their clients' gardens
  - sketching design ideas, taking notes and asking the clients about
  - what they like and how they use the gardens

- What are the advantages and disadvantages of the 3 approaches to data recording in this environment?

| Criterion | Notes plus camera | Audio plus camera | Video |
|---|---|---|---|
| Equipment | Paper, pencil, and camera are easily available | Inexpensive, hand-held recorder with a good microphone | More expensive. Editing, mixing, and analysis equipmemnt needed |
| Flexibility of use | Very flexible. Unobtrusive. | Flexible. Relatively unobtrusive. | Needs positioning and focusing camera lens. Obtrusive. |
| Completeness of data | To get what note taker thinks is important and can record in the time available. Problem with unexperienced evaluators. | Complete audio recording but visual data is missing. Notes, photographs, sketches augment recording but need coordinating | Most complete data, especially if more than one camera is used, but coordination of video material is needed. |
| Disturbance of users | Very low | Low, but microphone needs to be positioned. | Medium. Camera needs to be positioned. Care needed to avoid Hawthorne effect. |
| Reliability of data | May be low. Relies on making a good record and knowing what to record. | High but ecternal moise, e.g. Fans in computers, can mffle what is sad | Can be high but depends on what camera is focused on |
| | Rich descriptions can be produced | Critical discussions can be identified | Critical incidents can be identified and tagged |

# Interviews

- Conversation with a purpose
- Unstructured
  - are not directed by a script. Rich but not replicable.
- Structured
  - 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.
- Group interviews

# 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

# Focus groups

- Frequently used in marketing and political campaigning.
- 3-10 people involved and discussion is led by trained facilitator
  - Participants are selected to provide a representative sample of the target population
- Benefit: diverse or sensitive issues can be raised investigating community issues
- Drawback: what they say is not always what they do

# Focus group: problems

- Whar they say is not always what they do
  - People sometimes give the answers that they think show them in the best light
  - They may forget how long they spend on a particular activity
- So, can we believe all the responses we get?

# Planning and conducting an interview

- Developing interview questions
  - Open – for exploratory sessions
  - Closed – when the possible answers are known in advance
  - structured interview usually consists of open questions,
  - while a structured – closed
  - Semistructured – a combination of both

# Example

- How appealing are reading devices to people over 65?
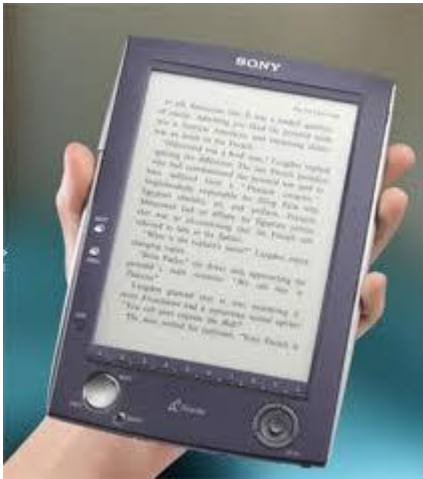
Sony e-reader

Amazon Kindle

Apple iPad

# Data gathering session

- The goal: to seek opinions whether e-readers would appealing to people over 65

- Suggest ways od recording the interview data.

- Suggest set of questions.

# Questions

1. Have you used an e-reader before? (Explore previous knowledge)
   Interviewer checks box    ☐ Yes    ☐ No    ☐ Don't remember/know
2. Would you like to read a book using an e-reader? (Explore initial reaction, then explore the response)
   Interviewer checks box    ☐ Yes    ☐ No    ☐ Don't know
3. Why?
   If response is 'Yes' or 'No,' interviewer says, 'Which of the following statements represents your feelings best?'
   For 'Yes,' interviewer checks the box
   ☐ I don't like carrying heavy books
   ☐ This is fun/cool
   ☐ It's going to be the way of the future
   ☐ Another reason (interviewer notes the reason)
   For 'No,' interviewer checks the box
   ☐ I don't like using gadgets if I can avoid it
   ☐ I can't read the screen clearly
   ☐ I prefer the feel of paper
   ☐ Another reason (interviewer notes the reason)
4. In your opinion, is an e-reader easy to handle or cumbersome?
   Interviewer checks box
   ☐ Easy to handle
   ☐ Cumbersome
   ☐ Neither

# Data gathering session

- Based on results of unstructures interview developers have found that two important acceptance factors are:
  - whether the device can be handled easily;
  - whether the typeface and appearance can be altered.

# Running the interviu

## An introduction

- Interviewer introduces hweself, explains why the interview is being done, reassures interviewees regading any ethical issues, asks if they mind being recorded

## A warm-up session

- Non-threatening questions, i.e. Demographic information

## A main session

- Questions presented in logical sequence

## A cool-off period

- Qa few easy questions to defuse  tension if it has arisen

## A closing session

- The interviewer than ks for the interviewee;
- Switches off the recorder or puts the notes away signaling that the interview has ended

# Other forms of interview

- Telephone interviews
  - Much in common with face-to-face but it is not possible to see the interviewee's body language or facial expressons

- Online interviews
  - Emails, chats, video conferencing

- Retrospective interviews
  - Reflects on an activity or a data gathering session in the recent past
  - May be conducted to check that the interviewer has correctly understood what was happenning

# Enriching the interview process

- Neutral meeting room
- Props - devices for prompting interviewee,
  - e.g., a prototype, scenario

# 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 structure

1. Many start by asking for basic demographic information
   – Gender, age, place

**PART 1**

Name: _____ Contact #: _____

Email: _____ Mailstop: _____

Your current position: _____
Number of years in this position: ___

If you are a manager of people, how many people are in your group: ___

# Questionnaire structure

- 2. Relevant experience

How much experience have you had with the following types of computers and computer devices?

| | | | |
|---|---|---|---|
| Mac | ___ Years | ___ Months | |
| PC or Compatible | ___ Years | ___ Months | |
| Laptop | ___ Years | ___ Months | |
| Mainframe | ___ Years | ___ Months | Type: _____ |
| Mouse | ___ Years | ___ Months | Manufacturer: _____ |
| Trackball | ___ Years | ___ Months | Manufacturer: _____ |

About how many hours a week do you use a computer?

At home: _____          At work: _____

What type of computer do you use?

At home: _____          At work: _____

Do you use Microsoft Windows?          Yes ___          No ___

What Windows applications have you used?:
Product name:

| | | |
|---|---|---|
| 1. | ___ Years | ___ Months |
| 2. | ___ Years | ___ Months |
| 3. | ___ Years | ___ Months |

What do you typically use your computer for?

| | | |
|---|---|---|
| ___ | Games and Pleasure | ___ Graphics |
| ___ | Accounting/Finance | ___ Data storage (i.e., data bases) |
| ___ | Word Processing | ___ Other _____ |
| ___ | Decision Support | ___ Other _____ |

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# 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?

| strongly agree | agree | OK | disagree | strongly disagree |
|:---:|:---:|:---:|:---:|:---:|
| ☐ | ☐ | ☐ | ☐ | ☐ |

- Open-ended responses

# Semantic differential scales

| Attractive | | | | | | | | Ugly |
|---|---|---|---|---|---|---|---|---|
| Clear | | | | | | | | Confusing |
| Dull | | | | | | | | Colorful |
| Exciting | | | | | | | | Boring |
| Annoying | | | | | | | | Pleasing |
| Helpful | | | | | | | | Unhelpful |
| Poor | | | | | | | | Well designed |

# 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

# Quality of a good question

1. Evokes the truth

   Non-threatining questions

   For sensitive questions clearly state policy of confidentiality

2. Asks for an answer on only one dimension.

   Do you like the texture and flavor of the snack?

# Quality of a good question (2)

## 3. Accommodate all possible answers

What brand of computer do you own?
- ☐ Apple
- ☐ IBM PC

Do you own IBM PC?
○ Yes
○ No

*What brand of computer do you own?* (Check all that apply)
☐ Do not own computer
☐ IBM PC
☐ Apple
☐ Other

# Quality of a good question (3)

## 4. Has mutually exclusive options

Where did you grow up?
- ☐ Country
- ☐ Farm
- ☐ City

## 5. Produces variability of responses

*What do you think about this report?*
*A. It's the worst report I've read*
*B. It's somewhere between the worst and best*
*C. It's the best report I've read*

# Quality of a good question (4)

6. Follows comfortably from the previous question

7. Does not presuppose a certain state of affairs.

*Are you satisfied with your current auto insurance? (Yes or No)*

http://www.statpac.com/surveys/question-qualities.htm

# Quality of a good question (5)

8. Does not imply a desired answer.

9. Does not use emotionally loaded or vaguely defined words

> e.g. most, least, majority

10. Does not use unfamiliar words or abbreviations.

> *What was your AGI last year? _____*

# Quality of a good question (5)

11. Is not dependent on responses to previous questions.

1. *Do you currently have a life insurance policy? (Yes or No) If no, go to question 3*
2. *How much is your annual life insurance premium?___*

12. Does not ask the respondent to order or rank a series of more than five items

# Find poorly designed features



2. State your age in years ☐

3. How long have you used the Internet? ☐ <1 year
   (*check one only*) ☐ 1–3 years
   ☐ 3–5 years
   ☐ >5 years

4. Do you use the Web to:

   purchase goods ☐
   send e-mail ☐
   visit chatrooms ☐
   use bulletin boards ☐
   find information ☐
   read the news ☐

5. How useful is the Internet to you?

   _____

   _____

# Administering questionnaires

- Issues
  - Reaching a respresentative sample
  - Ensuring a resonable response rate
- For large surveys
  - Respondents are selected using sampling techniques
- Interaction designers commonly use small samples, less that 20 users
- 40% response rate is good
  - Much lower rates are common

# 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

# 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

# Probes



- collections of artefacts designed to elicit requirements, ideas or opinions in specific contexts
  - Cultural probes developed to uderstand way of life of elderly people in different countries
  - Technology probes were used to gather requirements for home technologies

Postcard used as a 'cultural probe'.

# Card sorting

- Refers to a number of techniques concerned with understanding how people classify and categorize things.
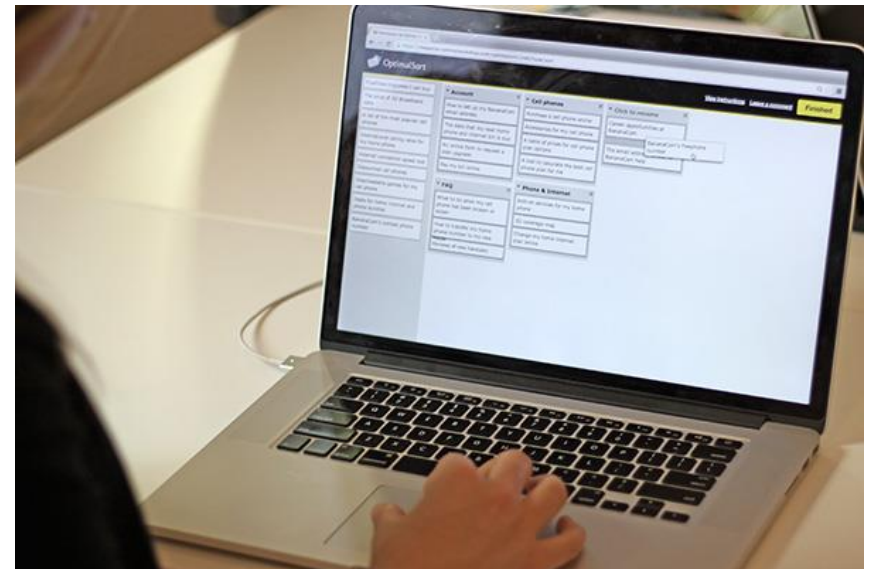
# Card sorting

- Open card sorting
  - starts with blank cards, participants are asked to write down the objects or actions they think are important in some domain.
  - These are then gathered together into categories

- Closed card sorting
  - starts with predefined categories and asks participants to place objects into the categories
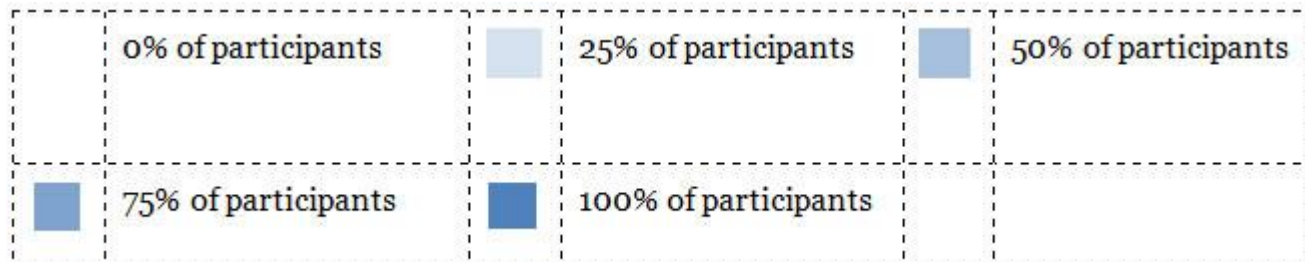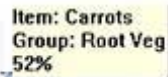
# Card sorting

## Moderuojamas





## Nuotolinis

# Example of card sorting

| | Citrus Fruit |
|---|---|
| Broccoli / Calabrese | |
| Carrots | |
| Chillies | |
| Courgettes / Zucchini | |
| Fennel (bulb) | |
| Garlic | |
| Ginger | |
| Grapefruit | x |
| Grapes | |
| Kiwi Fruit | |
| Leeks | |
| Lemons | x |
| Lychees | |
| Mushrooms | |
| Onions | |
| Oranges | x |
| Parsnips | |
| Potatoes | |
| Pumpkin | |
| Squash / Marrows | |
| Swede / Rutabaga | |
| Turnips | |

# Example of card sorting



| | 0% of participants | | 25% of participants | | 50% of participants |
|---|---|---|---|---|---|
| | 75% of participants | | 100% of participants | | |

Peppers & Tomatoes

Apples

Grapes & Citrus

Bananas & Nuts

Exotic Fruit

Potatoes & Onions

Root Vegetables

Mushrooms & Squash

Green Vegetables

Cabbages

Pears

Exotic Vegetables

# Observation

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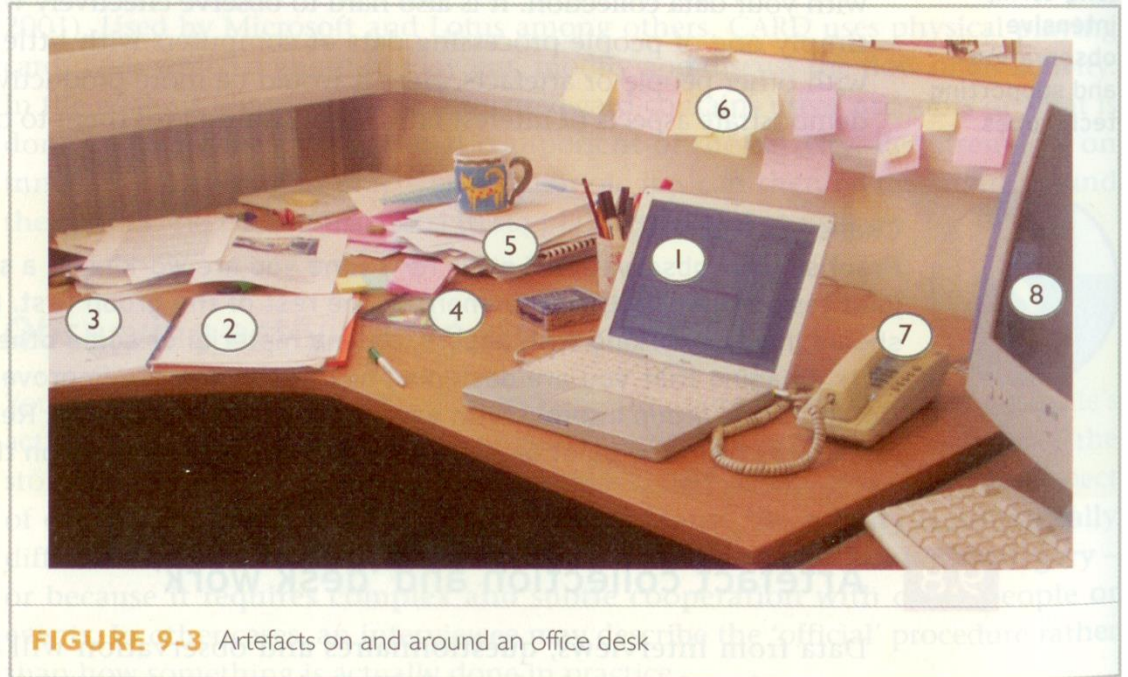  - Degree of participation (insider or outsider)
  - Ethnography



FIGURE 9-3 Artefacts on and around an office desk

# 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?

# Direct observation
# in usability testing
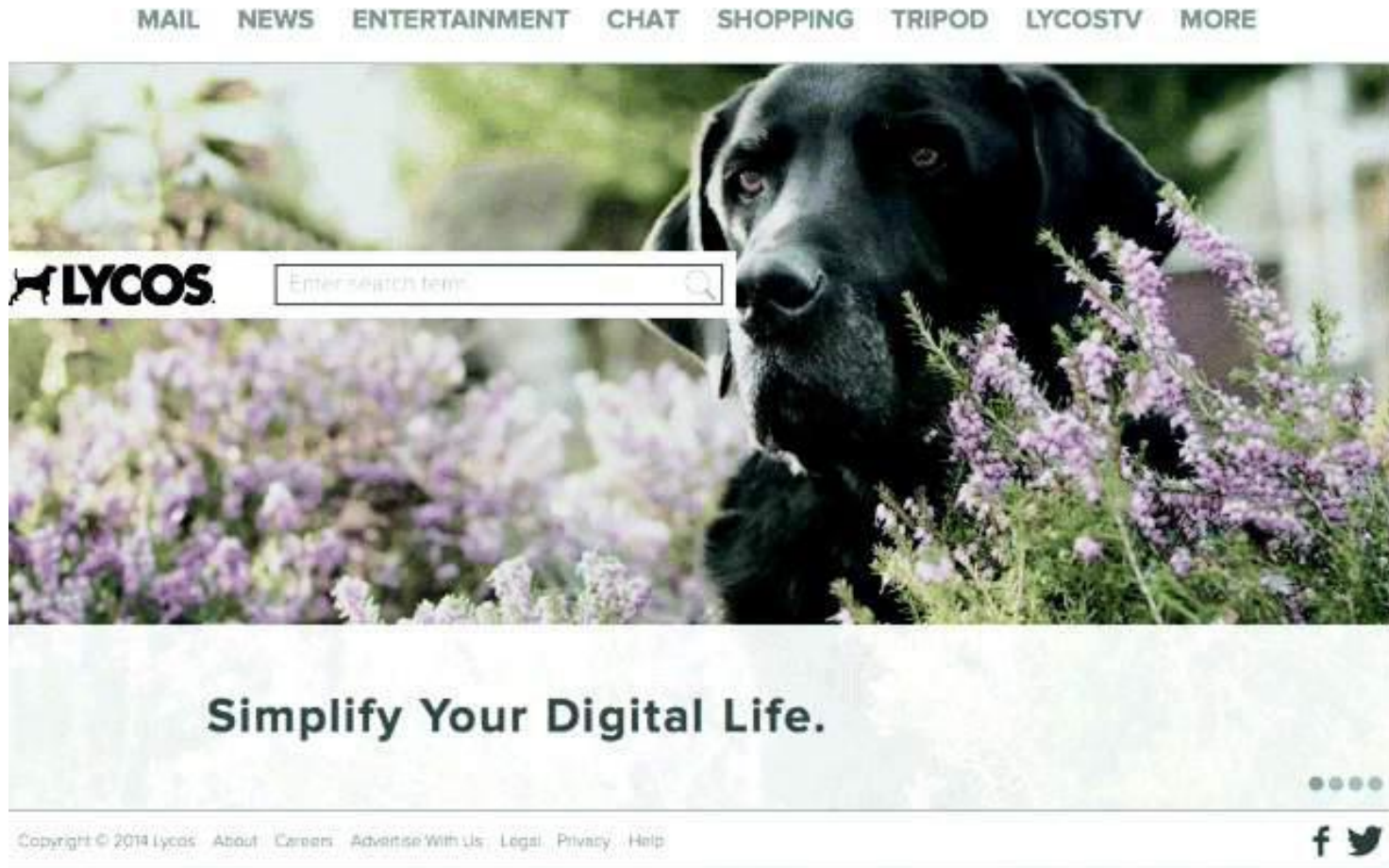
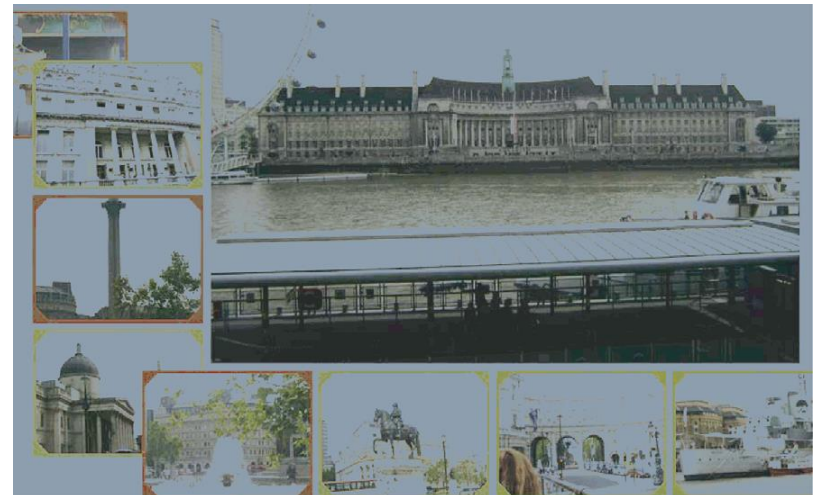# Indirect observation

- Web analytics



(a)

# Choosing and combining techniques

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

# 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
- Techniques can be
  - combined depending on study focus, participants, nature of technique and available resources

# References

- David Benyon, Phil Turner, Susan Turner. **Designing Interactive Systems: People, Activities, Contexts, Technologies.** Addison Wesley, 2005, 2014.
chapter 7: Understanding

- Qualities of a good question