

5 : Data Gathering

IT4106 – User Experience Design (UXD)

Level II - Semester 4

Overview

- The goal of this topic is to presents some techniques for data gathering that are commonly used in interaction design activities.

Intended Learning Outcomes

- At the end of this lesson, you will be able to;
 - Plan and run a successful data gathering program
 - Plan and run an interview
 - Design a simple questionnaire
 - Plan and carry out an observation

List of subtopics

- 1.1 Discovering Requirements
- 1.2 Data Gathering
 - 1.2.1 Issues in data gathering
 - 1.2.2 Recording data
 - 1. 2.3 Interviews
 - 1.2.4 Focus Groups
 - 1.2.5 Questionnaires
 - 1.2.6 Observations
- 1.3 Data Gathering for Requirements
 - 1.3.1 Different Kinds of Requirements
 - 1.3.2 Engaging Users with Probes
 - 1.3.3 Contextual Inquiry
 - 1.3.4 Brainstorming
- 1.4 Augmenting the requirements

1.1 Discovering Requirements

- Focuses on exploring the problem space and defining what to develop.
- This involves understanding ;
 - the target users and their capabilities
 - how a new product might support users in their daily lives
 - users' current tasks, goals, and contexts
 - constraints on the product's performance

Discovering Requirements

- The requirements activity sits in the first two phases of the double diamond of design
 - Describes what a product expected to do or how it will perform.
- Can capture via user stories

As a *<role>*, I want *<behavior>* so that *<benefit>*



As a *<traveler>*, I want *<to save my favorite airline for all my flights>* so that *<I will be able to collect air miles>*.

Types of requirements

- Functional Requirements : capture what the product will do
- Data Requirements: capture the type, volatility, size/amount, persistence, accuracy, and value of the required data
- Environment Requirements: refer to the circumstances in which the interactive product will operate
 - physical environment
 - E.g : how much lighting, noise, movement, and dust is expected in the operational environment
How crowded is the environment
 - social environment
 - E.g. will data need to be shared? If so, does the sharing have to be synchronous
 - organizational environment
 - E.g. how good is user support likely to be?
are there facilities or resources for training?
 - Technical environment
 - E.g. what technologies will the product run on or need to be compatible with,
- User characteristics: capture the key attributes of the intended user group, such as the users' abilities and skills, and their educational background, preferences, personal circumstances, physical or mental disabilities, etc
 - a user may be a novice, an expert, a casual user, or a frequent user
- Usability goals and user experience goals

Types of requirements - Example

A wearable interactive product to measure glucose levels for an individual with diabetes.

- **Functional** The product will be able to take small blood samples and measure glucose readings from them.
- **Data** The product will need to measure and display the glucose reading—but possibly not store it permanently—and it may not need other data about the individual.
- **Environmental** The physical environment could be anywhere the individual may be—at home, in hospital, visiting the park, and so on. The product needs to be able to cope with a wide range of conditions and situations and to be suitable for wearing
- **User Characteristics** Users could be of any age, nationality, ability, and so forth, and may be novice or expert, depending on how long they have had diabetes. Most users will move rapidly from being a novice to becoming a regular user.
- **Usability Goals** The product needs to exhibit all of the usability goals. You wouldn't want a medical product being anything other than effective, efficient, safe, easy to learn and remember how to use, and with good utility.
- **User Experience Goals** User experience goals that are relevant here include the device being comfortable, while being aesthetically pleasing or enjoyable may help encourage continued use of the product. Making the product surprising, provocative, or challenging is to be avoided, however.

1.2 Data Gathering

- Data gathering is a central part of discovering requirements and evaluation
- Data gathering is conducted to collect sufficient, accurate, and relevant data so that design can proceed
- Within evaluation, data gathering captures user reactions and their performance with a system or prototype.
- All of the techniques used in data gathering need little to no programming or technical skills
- Three main techniques for gathering data are can be introduced as: interviews, questionnaires, and observation

Issues in Data Gathering

- Five key issues require attention for any data gathering session to be successful:
 - Goal setting
 - Identifying participants
 - The relationship between the data collector and the data provider
 - Triangulation
 - Pilot studies.

Goal Setting

- The main reason for gathering data is to glean information about users, their behavior, or their reaction to technology.
- There are many different reasons for gathering data, and before beginning, it is important to set specific goals for the study.

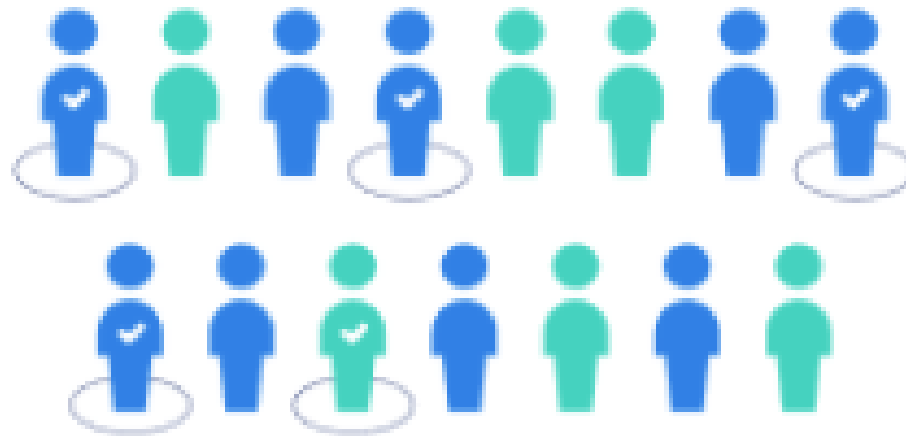
Identifying participants

- The goals developed for the data gathering session will indicate the types of people from whom data is to be gathered.
- Those people who fit this profile are called the *population* or *study population*.
- The participants to be included in data gathering need to be chosen, and this is called *sampling*.
- Probability sampling or nonprobability sampling.

Probability sampling

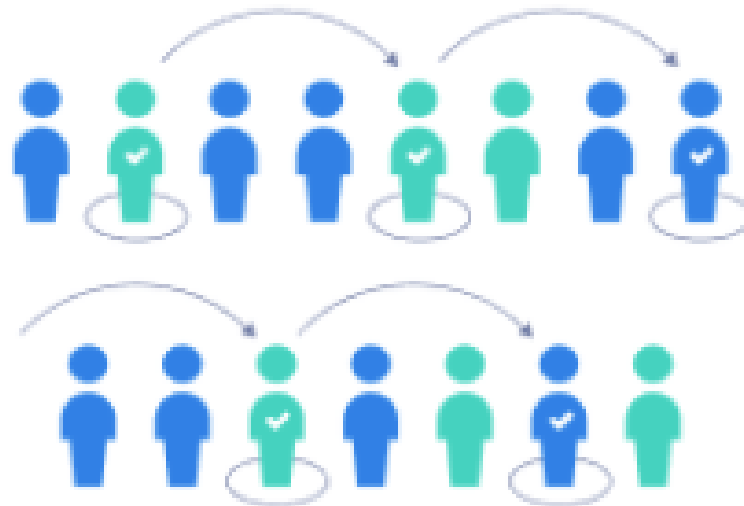
Random Sampling

- Random sampling can be achieved by using a random number generator or by choosing every n th person in a list.



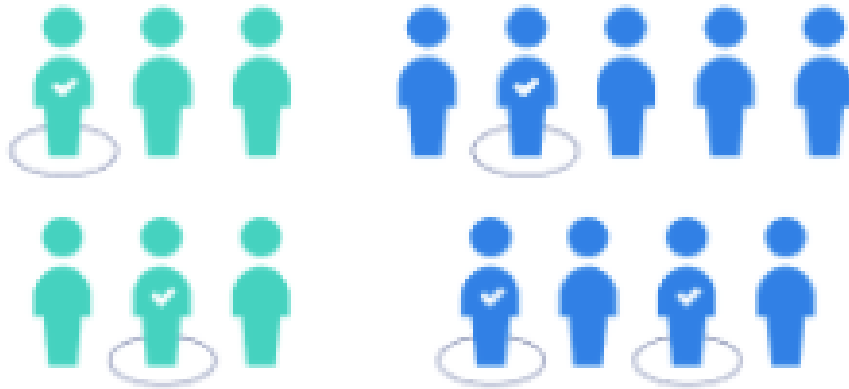
Systematic sampling

- similar to simple random sampling
- Every member of the population is listed with a number, but instead of randomly generating numbers, individuals are chosen at regular intervals



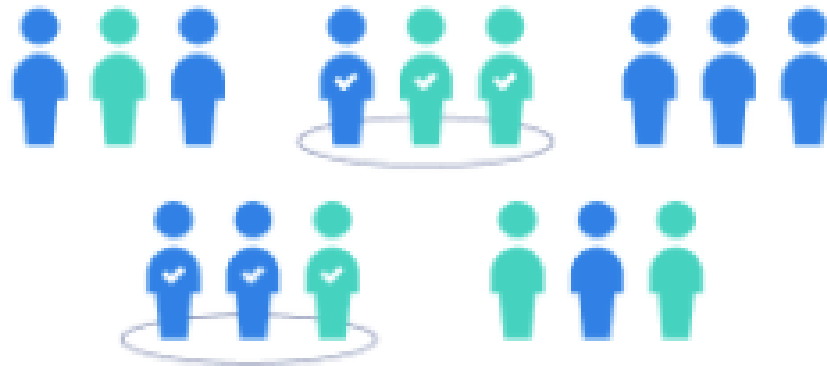
Stratified Sampling

- Stratified sampling relies on being able to divide the population into groups and then applying random sampling.



Cluster sampling

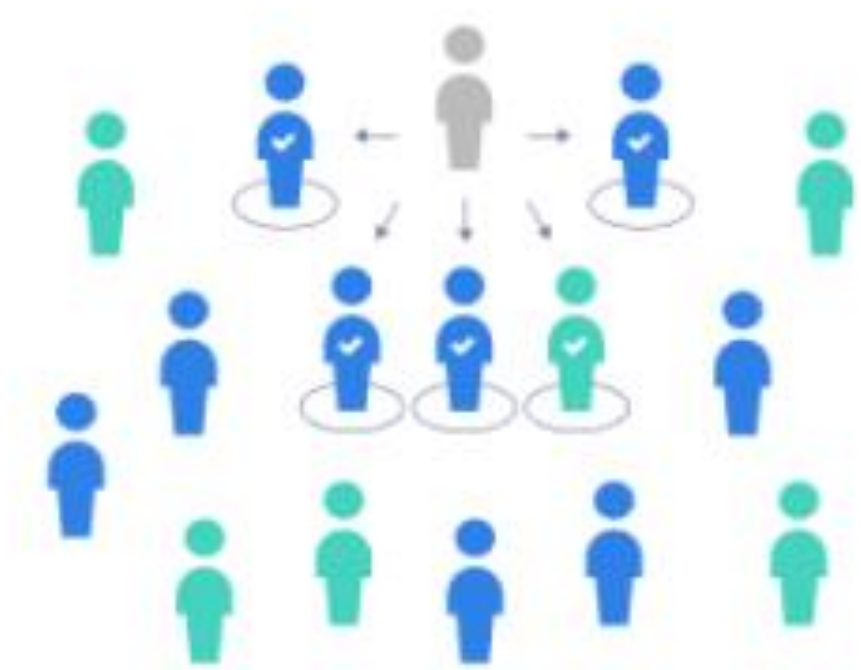
- Involves dividing the population into subgroups
- but each subgroup should have similar characteristics to the whole sample
- randomly select entire subgroups



Non-Probability sampling

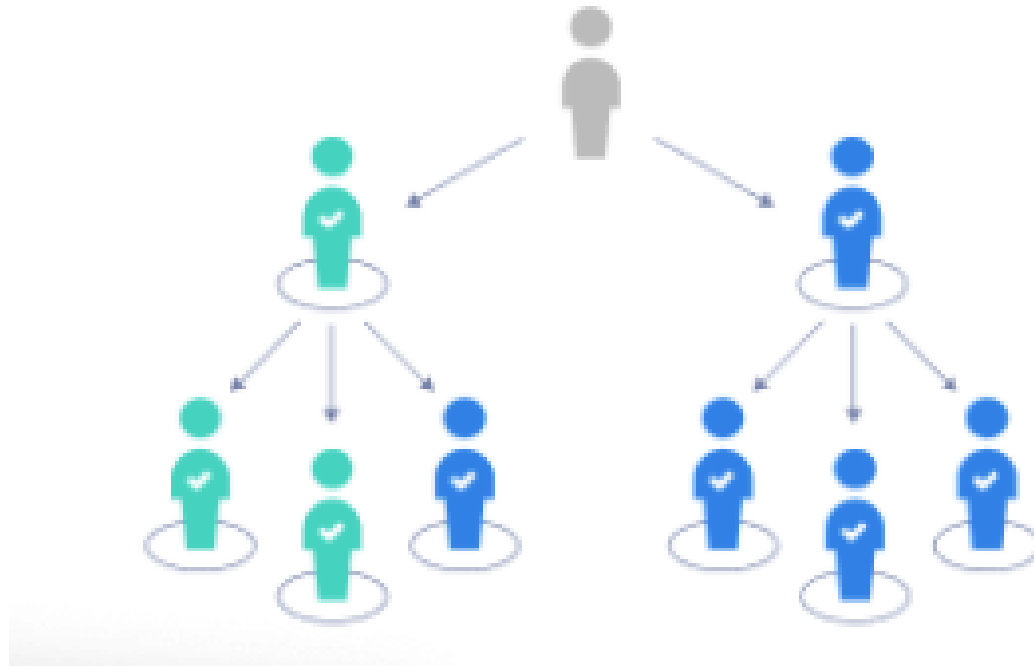
Convenience Sampling

- Convenience sampling is used to describe a situation where the sample includes those who were available rather than those specifically selected.



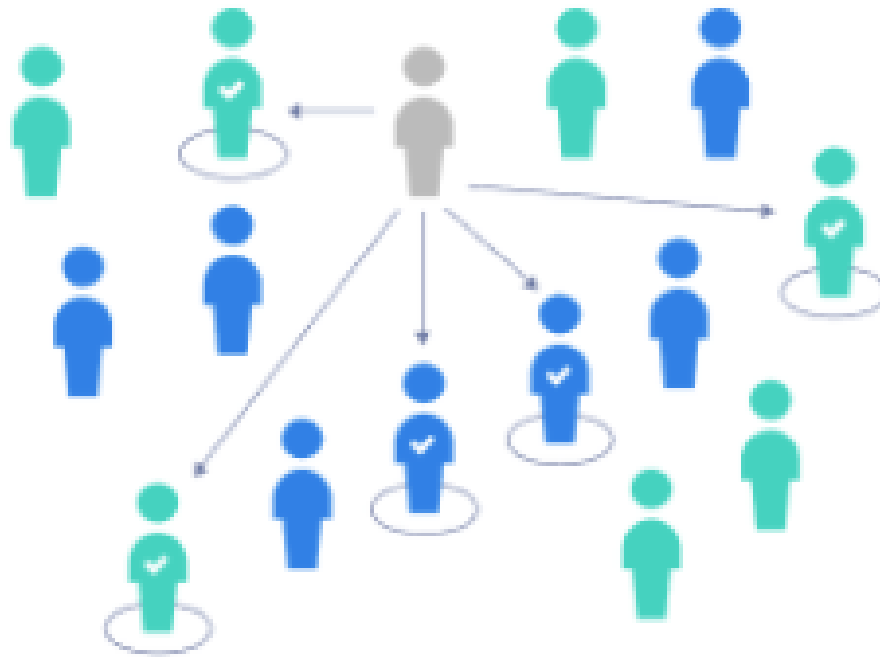
Snowball Sampling

- Snowball sampling, in which a current participant finds another participant and that participant finds another, and so on.



Purposive sampling

- also known as judgement sampling,
- Involves the researcher using their expertise to select a sample



The relationship between the data collector and the data provider

- One significant aspect of any data gathering is the relationship between the person (people) doing the gathering and the person (people) providing the data.
- Can be achieved by asking participants to sign an informed consent.

Consent Form

QUALITATIVE RESEARCH CONSENT FORM:

participant serial number:

Consent to be interviewed by PI: Please initial boxes below

I confirm that I have read / had read to me the leaflet, about this research project and I understand the content.

☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.

☐

I understand that the interview will be recorded and written out word-for-word later. The recording will be securely stored in accordance with the Data Protection Act.

☐

I understand that anything I say will be treated confidentially and only used for research purposes, in accordance with the Data Protection Act.

☐

I agree to take part in the **TITLE OF RESEARCH** research study

☐

Name of participant

Date

Signature

Name of researcher

Date

Signature

Triangulation

- Triangulation of data means that data is drawn from different sources at different times, in different places, or from different people possibly by using a different sampling technique.
- Investigator triangulation means that different researchers, observers, interviewers, and so on have been involved in collecting and interpreting the data.
- Triangulation of theories means the use of different theoretical frameworks through which to view the data or findings.
- Methodological triangulation means to employ different data gathering techniques.

Pilot studies

- A pilot study is a small trial run of the main study.
- The aim is to make sure that the proposed method is viable before embarking on the real study.
- The equipment and instructions can be checked, the questions for an interview or in a questionnaire can be tested for clarity, and an experimental procedure can be confirmed as viable.

Recording Data

- Data recording approaches are used will depend on,
 - the goal of the study
 - how the data will be used
 - the context
 - the time
 - resources available
 - the sensitivity of the situation
- Taking notes, taking photographs, taking video or audio can be identified as the most common data recording approaches.

Interviews

- Conversation with a purpose
- There are four main types of interviews: open-ended or unstructured, structured, semi-structured, and group interviews.
- The most appropriate approach to interviewing depends on the purpose of the interview, the questions to be addressed, and the interaction design activity.

Interviews

- **Unstructured Interviews** are exploratory and are similar to conversations around a particular topic
 - The interviewee is free to answer as fully or as briefly as they want, and both the interviewer and interviewee can steer the interview.
 - E.g. "What are the pros and cons of having a wearable?"
- **Structured Interviews** focus on predetermined questions similar to those in a questionnaire
 - the same questions are used with each participant so that the study is standardized
 - questions need to be short and clearly worded, and they are typically closed questions
- **Semi-structured Interviews** combine features of structured and unstructured interviews and use both closed and open questions.
 - has a basic script for guidance so that the same topics are covered with each interviewee
 - starts with preplanned questions and then probes the interviewee to say more until no new relevant information is forthcoming.

Focus Groups

- Interview people in groups
- Participants are selected to provide a representative sample of the target population.
- Held in order to identify conflicts in expectations or terminology from different stakeholders.
- Allows diverse or sensitive issues to be raised that might otherwise be missed.

Questionnaires

- Questionnaires are a well-established technique for collecting demographic data and users' opinions.
- Can have closed or open-ended questions.
- Effort and skills are needed to ensure that questions are clearly worded and the data collected can be analyzed efficiently.
- Can be done in online mode if the participants are located in remote areas.

Observations

- Users may be observed directly by the investigator as they perform their activities or indirectly through records of the activity that are studied afterward.
- Helps designers understand the users' context, tasks, and goals.
- Individuals are observed as they go about their day-to-day tasks in the natural setting or individuals are observed performing specified tasks within a controlled environment.

Degree of participation

- Depending on the type of study, the degree of participation within the study environment varies.
- An observer who adopts an approach right at the outsider end of the spectrum is called a passive observer.
- An observer who adopts an approach at the insider end of this spectrum is called a participant observer.

Planning and conducting an observation in the field

- Use a framework to help keep goals and questions in sight.
- Following is an example of a simple framework
 - **The person:** Who is using the technology at any particular time?
 - **The place:** Where are they using it?
 - **The thing:** What are they doing with it?

Planning and conducting an observation in the field

- Some may use a complex framework to get more details
 - **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?

(Robson and McCarten, 2016, p. 328)

Planning and conducting an observation in the field

- In addition to using a framework, the following needs to be focused on;
 - What decisions that need to be made, including the level of participation to adopt,
 - how to make a record of the data
 - how to gain acceptance in the group being studied,
 - how to handle sensitive issues such as cultural differences or access to private spaces,
 - how to ensure that the study uses different perspectives

Ethnography

- Ethnography has traditionally been used in the social sciences to uncover the organization of societies and their activities.
- Aim to understand what people do and how they organize action and interaction within a particular context of interest to designers.
- A large part of most ethnographic studies is direct observation.
 - The observer in an ethnographic study adopts a participant observer (insider) role as much as possible

Direct Observation in Controlled Environments

- Observing users in a controlled environment may occur within a purposely built usability lab
- more formal than observation in the field
- As with interviews, it is a good idea to prepare a script to guide how the participants will be greeted, be told about the goals of the study and how long it will last, and have their rights explained
- Use of a script ensures that each participant will be treated in the same way, which brings more credibility to the results obtained from the study

Direct Observation in Controlled Environments

- The think aloud technique
 - The think-aloud technique is a useful way of understanding what is going on in a person's head.
 - The technique requires people to say out loud everything that they are thinking and trying to do so that their thought processes are externalized.

Indirect Observation: Tracking Users' Activities

- Sometimes direct observation is not possible
 - because it is too intrusive or observers cannot be present over the duration of the study,
 - Diaries and interaction logs are two techniques for doing this.
- Diaries
 - Participants are asked to write a diary of their activities on a regular basis, including things like what they did, when they did it, what they found hard or easy, and what their reactions were to the situation
 - Diaries are useful: when participants are scattered and unreachable in person; when the activity is private
 - diary studies rely on participants being reliable and remembering to complete them at the assigned time and as instructed, so incentives may be needed, and the process has to be straightforward
 - participants' memories of events may be exaggerated or detail is forgotten
 - Determining how long to run a diary study can be tricky

Indirect Observation: Tracking Users' Activities

- Interaction Logs, Web Analytics, and Data Scraping
 - uses software to record users' activity in a log that can be examined later.
 - A variety of actions may be recorded
 - key presses and mouse or other device movements
 - time spent searching a web page
 - time spent looking at help systems
 - task flow through software module
 - large volumes of data can be logged automatically
 - ethical concerns might arise

| Technique | Good for | Kind of data | Advantages | Disadvantages |
|--|--|--|--|--|
| Interviews | Exploring issues | Some quantitative but mostly qualitative | Interviewer can guide interviewee if necessary. Encourages contact between developers and users. | Artificial environment may intimidate interviewee. It also removes them from the environment where work is typically being done. |
| Focus groups | Collecting multiple viewpoints | Some quantitative but mostly qualitative | Highlights areas of consensus and conflict. Encourages contact between developers and users. | Possibility of dominant characters. |
| Questionnaires | Answering specific questions | Quantitative and qualitative | Can reach many people with low resource requirements. | The design is key. Response rates may be low. Unless carefully designed, the responses may not provide suitable data. |
| Direct observation in the field | Understanding context of user activity | Mostly qualitative | Observing gives insights that other techniques don't provide. | Very time-consuming. Huge amounts of data are produced. |
| Direct observation in a controlled environment | Capturing the detail of what individuals do | Quantitative and qualitative | Can focus on the details of a task without interruption. | Results may have limited use in the normal environment because the conditions were artificial. |
| Indirect observation | Observing users without disturbing their activity; data captured automatically | Quantitative (logging) and qualitative (diary) | User doesn't get distracted by the data gathering; automatic recording means that it can extend over long periods of time. | A large amount of quantitative data needs tool support to analyze (logging); participants' memories may exaggerate (diary). |

Engaging Users with Probes

- They are designed to prompt participants into action, specifically by interacting with the probe in some way, so that the researchers can learn more about users and their contexts.
- Probes rely on some form of logging to gather the data either automatically in the case of technology probes or manually in the case of diaries or design probes.

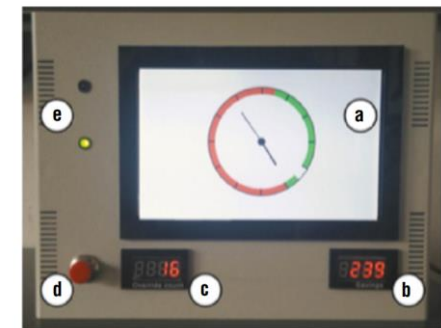
Engaging Users with Probes

- Cultural Probes(Gaver et al., 1999)
 - A variation of diary study
 - Emerged as a novel alternative to traditional approaches, such as questionnaires, interviews, or ethnographic studies.
 - Consisted of a wallet containing eight to ten postcards, about seven maps, a disposable camera, a photo album and a media diary.
 - Recipients were asked to answer questions associated with certain items in the wallet and then return them directly to the researchers.



Engaging Users with Probes

- Different forms of probes have been adapted and adopted for a range of purpose
 - **design probes**
 - objects whose form relates specifically to a particular question and context. E.g Top Trumps probe
 - **technology probes**
 - toolkits, such as the SenseBoard for developing IoT applications
 - M-Kulinda, a device that uses sensors to monitor movement
 - **provocative probes-**
 - Technology probes designed to challenge existing norms and attitudes in order to provoke discussion.
 - "The Box" to challenge domestic laundry practices. Dimitros Raptis et al. (2017)
 - The intention was to learn about users' laundry practices



a) electricity status – 12 hour forecast,
b) savings account, c) override button presses,
d) override button, and e) electricity status at the moment

Contextual Inquiry

- Contextual inquiry is the core field research process for Contextual Design (Holtzblatt and Beyer, 2017)
- Involves one-on-one field interviews often called contextual interviews
 - These interviews focus on matters of daily life (work and home) that are relevant for the project scope.
 - Shifts the perceived “power” relationship that can exist in a more traditional interviewer–interviewee relationship
 - User acts as a “Master” and they “do” the work while talking.
 - The interviewer act as an “apprentice” and learns what is been done instead of asking questions

Brainstorming

- Brainstorming is a generic technique used to generate, refine, and develop ideas.
- It is widely used in interaction design specifically for generating alternative designs or for suggesting new and better ideas to support users.

Suggestions for conducting a successful brainstorming session

1. Include participants from a wide range of disciplines with a broad range of experience
2. Don't ban silly stuff
3. Use catalysts for further inspiration
4. Keep records
5. Sharpen the focus
6. Use warm-up exercises and make the session fun



Augmenting Requirements

- While user stories capture the essence of a requirement, it often fails to communicate the product's purpose and vision sufficiently
 - can be augmented with prototypes, working systems, screenshots, conversations, acceptance criteria and diagrams
 - Similar to UML diagrams, two commonly used techniques to augment the basic requirements in UXD are;
 - Personas
 - Scenarios

Augmenting Requirements- Personas

- Personas (Cooper, 1999) are rich descriptions of typical users of the product under development on which the designers can focus and for which they can design products
 - Create based upon user research in order to represent the different user types that might use your service, product, site, or brand in a similar way.
 - Creating personas helps the designer to understand users' needs, experiences, behaviors and goals


“Personas are the single most powerful design tool that we use. They are the foundation for all subsequent goal-directed design. Personas allow us to see the scope and nature of the design problem... [They] are the bright light under which we do surgery.” – Alan Cooper

Guideline for creating effective personas

1. Collect extensive data on target users.
2. Determine the qualities of and differences between users.
3. Develop a hypothesis from the research, determining the qualities of and differences between users.
4. Ensure stakeholders agree on the hypothesis about the users.
5. Determine a number of personas – more than one per project, but focus especially on one.
6. Name and describe each persona in 1-2 pages, including:
 1. A picture.
 2. User's values, interests, education, lifestyle, needs, attitudes, desires, limitations, goals and behavior patterns.
 3. Extra details about the persona (e.g., interests) – anything to make him/her more real and relevant and help build empathy. A written story is better than bullet points.
7. Describe several situations/scenarios prompting the persona to use your product – put him/her in contexts with problems to overcome.
8. Include everyone involved in the project so they'll accept the persona or advise revisions.
9. Send them the persona to use in their work.
10. Ensure everyone develops scenarios – these should expose the persona optimally to potential use cases.
11. Make continuous adjustments – revisit the persona; add new features; add required new personas; discard outdated personas.

<https://www.interaction-design.org/literature/topics/personas>

Example personas



Rebecca

Casual audiophile

Age 26
Occupation Frontend developer
Education Bachelor degree
Marital status Single
Location Mountain View

Online locations Work and mobile
Computer(s) iPhone and MacBook Pro
Internet usage 8-9 hours

TECHPHOBIC ————— TECH WIZ
 CASUAL LISTENER ————— MUSIC STREAMING
 CASUAL LISTENER ————— MUSIC CHARTS

Music is essential to Rebecca's life. She is listening to tunes almost every second of her life, particularly while working.

Obstacles Rebecca faces:

- Too busy to explore new music artists she might like
- Streaming music consumes a lot of data

How will Rebecca interact with Spotify?

Questions Rebecca will ask:

- How do I keep updated on new releases by artists I follow?
- How do I learn of new artists I haven't heard of?
- Can I listen to music in a data-efficient manner?
- How can I listen on both my MacBook and my iPhone?

Who influences Rebecca?

Ads, Friends, Co-workers, Her own tastes, Music charts

Rebecca's situation

Goals, motivations:

- Listen to great music to keep her productive at work
- Relax and unwind at the end of the day
- Superior music quality for full enjoyment of tracks
- Expand the circle of music artists she listens to

Key words
 music, jazz, r&b, pop, artists, new releases, top charts, background music


Rebecca's story

Music is a big part of my life. I like to think that I always have a "background music" running in each scene of my life. I love working while listening to music; somehow, it gives me a lot of focus on my task.

I regularly talk to my co-workers about music and singers – that's what we like to talk about over lunch. We're constantly looking for new artists to inspire us and to expand our music library, but lately it seems a little tough to do that. Everything seems to have a "filter bubble" effect, and we keep listening to the same genres and artists.

I really enjoy finding new artists that match my subjective taste, and most of the times I get those from my close friends. I wish there were a way to find more music and artists without having to rely on the serendipity of life!

Family traveler



Organised **Practical** **Expects high standards**

Goals

- To book comprehensive travel quickly
- To find a trip that meets the needs of the whole family
- To feel supported and guided from the beginning of the booking experience right to the end.

Frustrations

- Wasting time filling in forms
- Too much irrelevant information
- Existing systems tend to be too diverse and complicated

Bio

Will loves to take his family on adventure holidays to explore new challenges. His children, Sky (8) and Eamonn (15) are old enough to take part in several sporting activities and he wants to make the most of this before they no longer want to go on trips with him and his wife, Claire. He likes the fact that choosing travel options is so much easier than it used to be, but is frustrated by the many different sources and disjointed options that this can result in. He wants a travel organizer that can provide clear support for family holidays while offering as wide a choice as possible.


Personality

Introvert ————— Extrovert
 Thinking ————— Feeling
 Sensing ————— Intuition


Motivation

Price —————
 Comfort —————
 Choice —————

Favourite destinations



Young traveler



Energetic **Inquisitive** **Loves reading**

Goals

- To find a good vacation without any fuss
- To find a destination with other children her age
- To make sure that the travel time is short

Frustrations

- Sitting around discussing things for too long
- Not getting clear answers to her questions
- Feeling that everything is organised for adults and not children her age

Bio

Sky likes having adventures. She is very energetic and takes part in lots of sporting activities at school, such as gymnastics and swimming. She enjoys playing games with her older brother, Eamonn. Sky is keen to make new friends, but is also happy sitting reading a book, painting or making a model. She likes going to visit new places but expects to see something familiar, such as playground or food that she recognises!

The most important thing for her is that she can go on vacation with her family where there will be something for everyone to do - but especially for her and Eamonn.



Personality

Introvert ————— Extrovert
 Thinking ————— Feeling
 Sensing ————— Intuition

Motivation

Fun —————
 Comfort —————
 Choice —————

Favourite destinations

Two personas for a group travel organizer

Augmenting Requirements- Scenarios

- A *scenario* is an “informal narrative description” (Carroll, 2000)
- It describes human activities or tasks in a story that allows exploration and discussion of contexts, needs, and requirements.
- It does not necessarily describe the use of software or other technological support used to achieve a goal
- Using the vocabulary and phrasing of users means that scenarios can be understood by stakeholders, and they are able to participate fully in development.

• The following scenario for the group travel organize. This also incorporates information about the two persona example given above

The Thomson family enjoys outdoor activities and wants to try their hand at sailing this year. There are four family members: Sky (8 years old), Eamonn (15), Claire (32), and Will (35).

One evening after dinner, they decide to start exploring the possibilities. They want to discuss the options together, but Claire has to visit her elderly mother so she will be joining the conversation from her mother's house down the road. As a starting point, Will raises an idea they had been discussing over dinner—a sailing trip for four novices in the Mediterranean.

The system allows users to log in from different locations using different devices so that all members of the family can interact easily and comfortably with it wherever they are. The system's initial suggestion is a flotilla, where several crews (with various levels of experience) sail together on separate boats.

Sky and Eamonn aren't very happy at the idea of going on vacation with a group of other people, even though the Thomsons would have their own boat. The travel organizer shows them descriptions of flotilla experiences from other children their ages, and they are all very positive, so eventually, everyone agrees to explore flotilla opportunities.

Will confirms this recommendation and asks for detailed options. As it's getting late, he asks for the details to be saved so that everyone can consider them tomorrow. The travel organizer emails them a summary of the different options available.

These in turn translate into requirements

As a *<group traveler>*, I want *<to be able to share vacation discussions when I am not co-located>* so that *<the whole group can discuss their choices together under a wide range of circumstances>*.

Augmenting Requirements- Scenarios

- Scenarios may be constructed as textual descriptions. It can also be constructed as audio , video or even animations.



Screen captures of the animated scenarios used to explore early user research insights regarding emergency alarm technology for elderly people: I forgot, Dress Code, and Cow Bell Source: Keirnan et al. (2015)