Biomedical Wearable Technologies
for Healthcare and Wellbeing
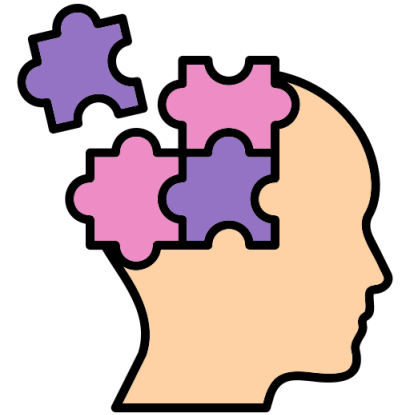
Health Design Thinking

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Health design thinking

➢ **Health design thinking**: approach to generate creative ideas and solutions that enhance human well-being in the context of medicine

➢ Health design thinking is an **open mindset** rather than a rigid methodology

➢ It aims at **improving** patient care

➢ **Any stakeholder** can participate in this process

Principles

➢ Health design thinking is based on **two core principles**

**Human-centered**　　　　　　**Creative mindset**
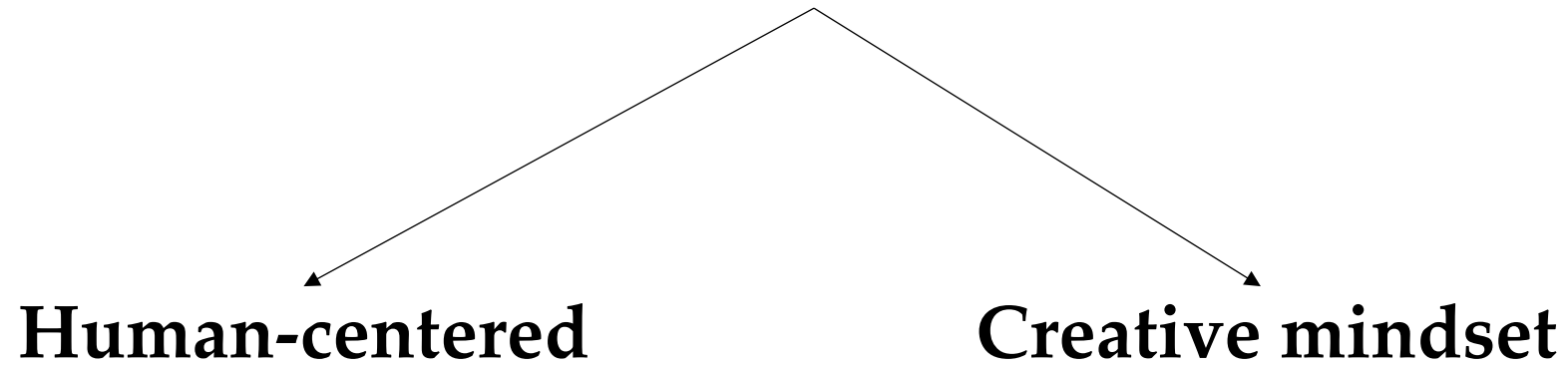
Principles: Human-centered

➢ **Human-centered** means that designing a new «thing» starts with the needs and desires of people rathen than with a business proposition or an artistic idea.

➢ Human-centered means inclusive and collaborative

➢ The final users must be active participants and creators of knowledge, not just passive subjects to be measured and manipulated

Example: Designing an hospital

➤ The London Hospital (1752) design maximized patient density and visibility at the expense of privacy and comfort

➤ Not human-centered
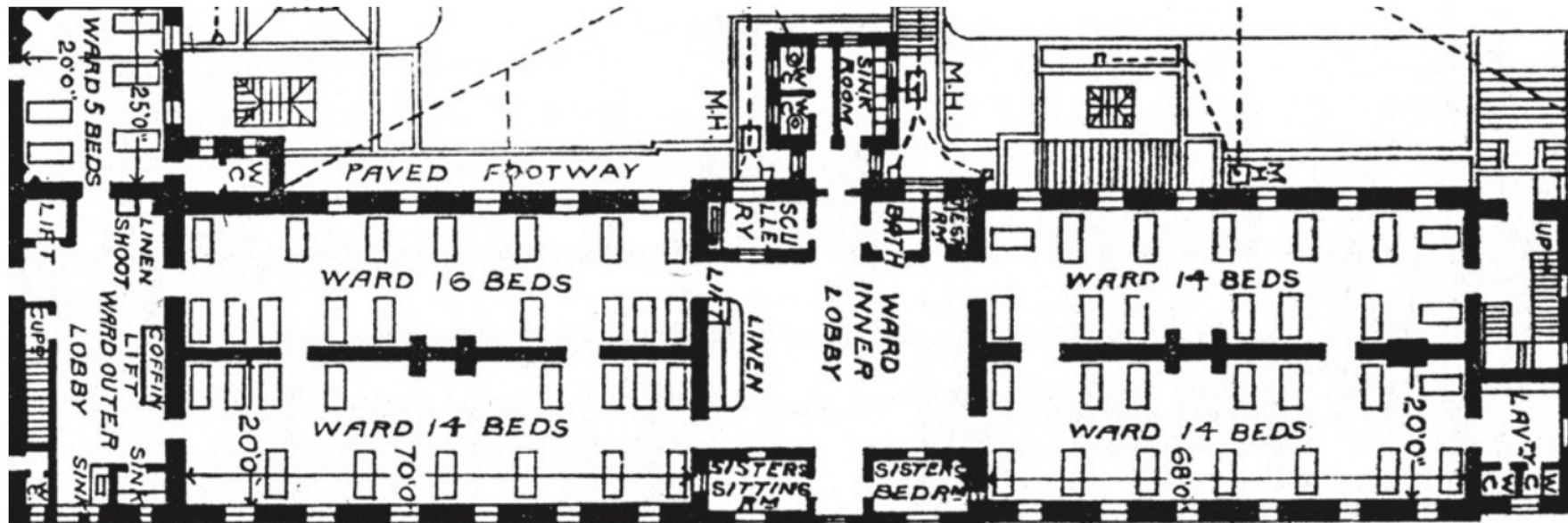
Example: Designing an hospital

➢ This sketch of a patient room, by architect Earl S. Swensson, considered the needs of many users, including the patients, family, members, nurses, and caregivers.

➢ Human-centered
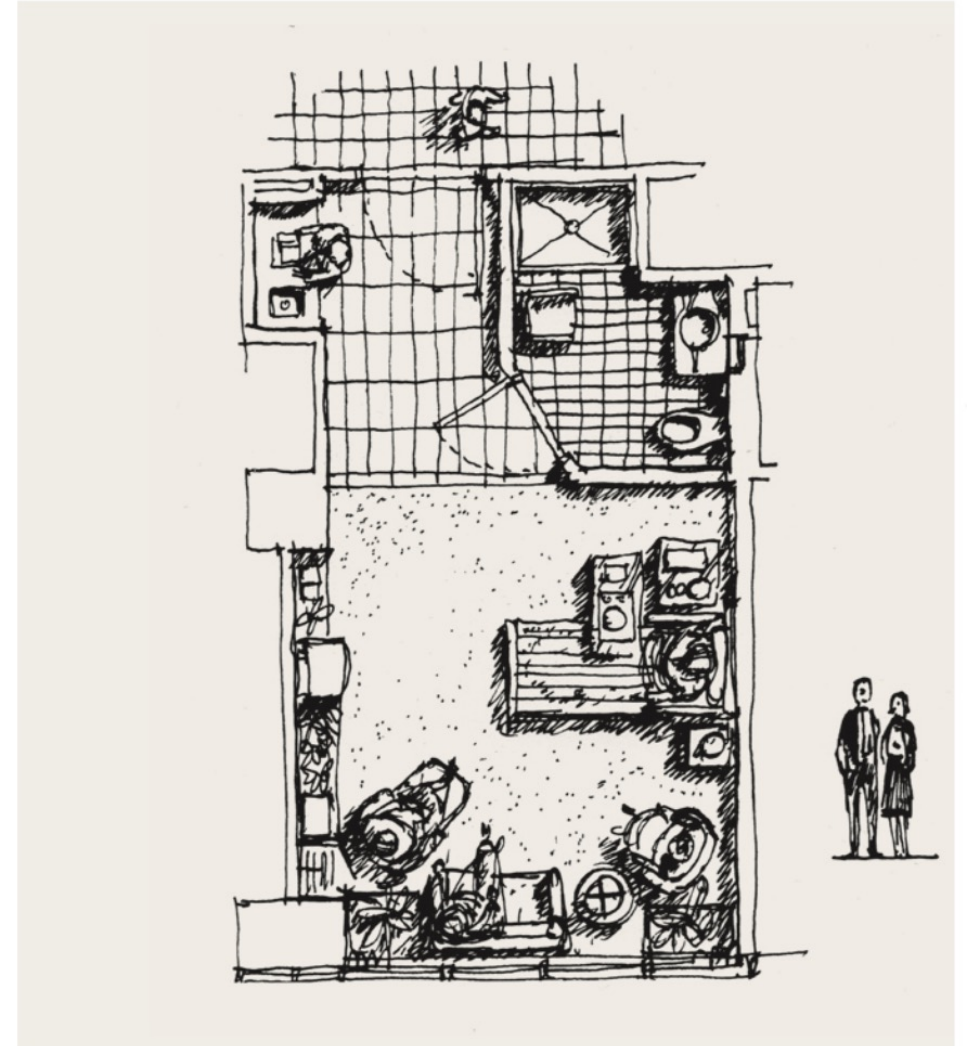
Human-centered approaches/concepts

➤ Human-centered design can be applied leveraging three core approaches/concepts:

- Empathy

- Codesign

- Social determinants

Empathy

➢ **Empathy** is the ability to share in the experience of another creature and communicate that understanding

➢ The **designer** must adopt the final user/patient point-of-view and **become the user**

➢ A good way to do that could be try out a task that the user have to do, e.g.:
  ▪ Find your way through an hospital without asking questions
  ▪ Stay overnight in an inpatient bed and get your vitals checked every 4 hours
  ▪ Test your blood sugar three times a day
  ▪ …
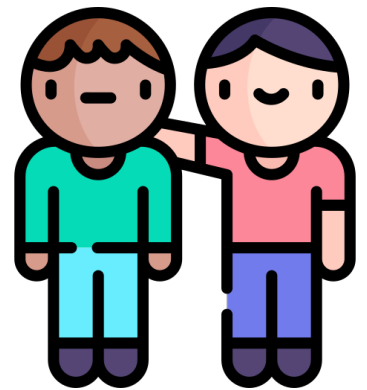
Codesign

➢ **Codesign** is a collaborative process that actively seeks knowledge and ideas from end-users

➢ It allows to inject user expertise into the design process

➢ Tools for codesign include:
- User interviews
- Journey maps
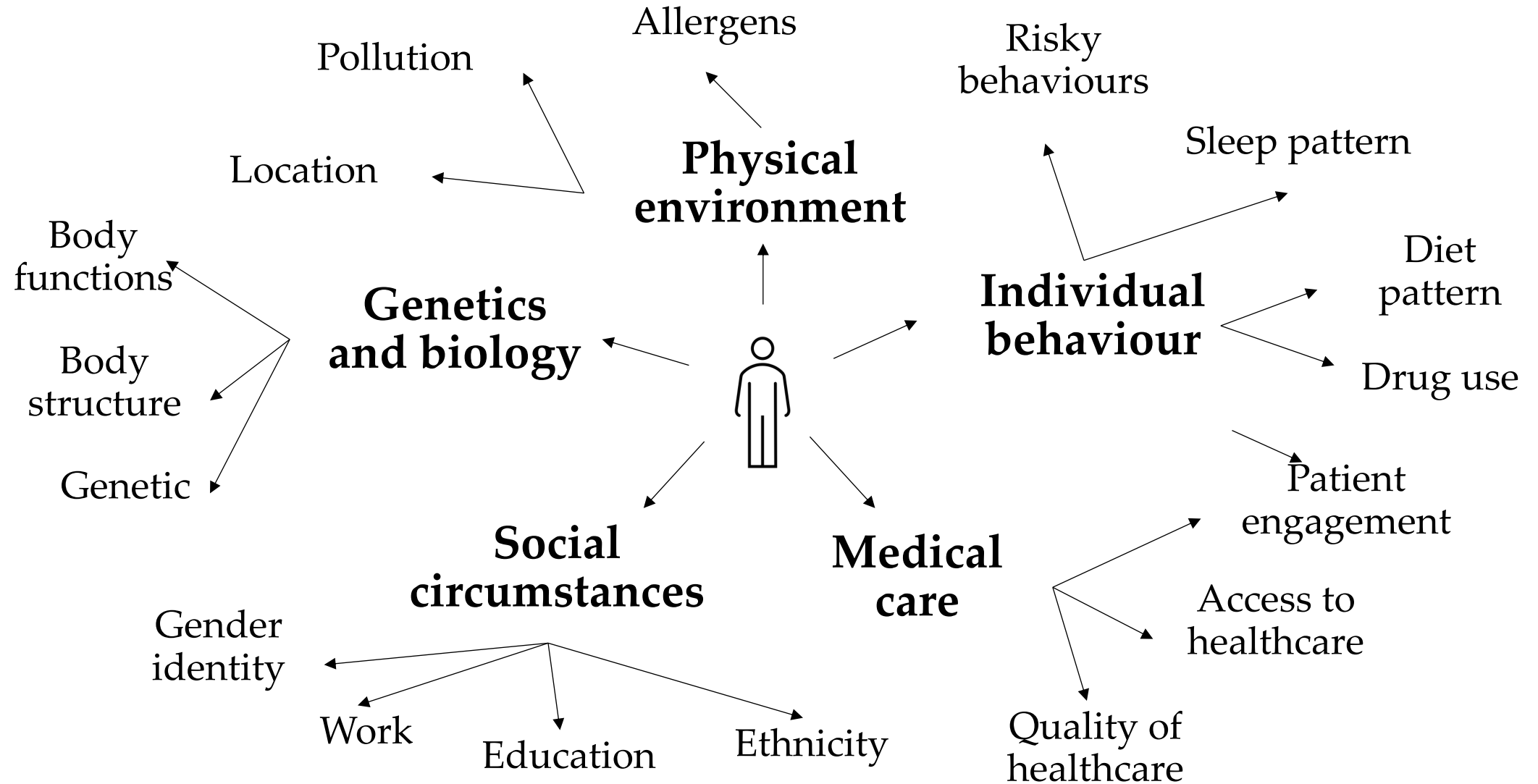- Questionnaires
- Brainstorming sessions

Social determinants

➤ Society places a tremendous burden on individuals to safeguard their health:

  ▪ Having an healthy lifestyle is not easy

➤ Health, like wealth, is distributed unevenly and depends on social determinants like food, housing, education…

➤ Many social determinants are connected to design of our environment:

  ▪ Cars and elevators over sidewalks and stairways promote sedentism
  ▪ Cigarettes and processed foods contribute to chronic diseases
  ▪ Rural areas lack clinical facilities

Social determinants: Health Factors mapping

Pollution

Allergens

Risky behaviours

Physical environment

Location

Sleep pattern

Body functions

Diet pattern

Genetics and biology

Individual behaviour

Body structure

Drug use

Genetic

Patient engagement

Social circumstances

Medical care

Access to healthcare

Gender identity

Work

Education

Ethnicity

Quality of healthcare

Principles: Creative mindset

➢ **Creative mindset** means that designing a new «thing» should favor open-ended exploration over a straight path headed toward a given outcome

➢ Few basic concepts guide the process of generating ideas and making them concrete:

- **Questioning**: the act of looking at any problem from a new angle. It is the process of asking questions and reframing assumptions: "How this could be different?"
- **Visualizing**: the ability of perceiving objects, spaces, and patterns.
- **Prototyping**: the act of making ideas concrete in a provisional, speculative way.
- **Storytelling**: the art of recounting a significant action that rake place over time.

Methods

➤ How to put health design principles in practice? What are the tools in our belt?

➤ Many methods can help us, including:

- Design workshop
- Brainstorming
- Interview
- Storyboard
- Questionnaires
- Persona
- Journey map
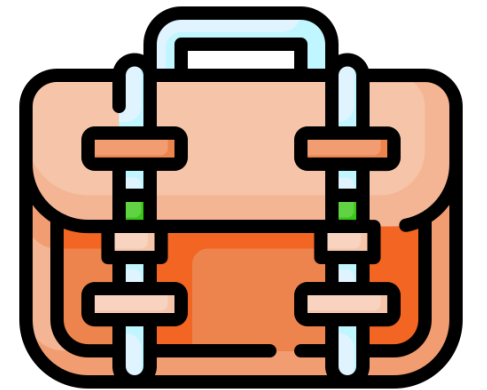
Design workshop

➢ A **design workshop** is a structured series of activities that primes people and stakeholders to think creatively, share ideas and make those ideas concrete through project boards and prototypes

➢ Planning a design workshop:
1. Set the workshop challenge
2. Create an agenda
3. Set a time constraint
4. Decide who to invite (including real users)
5. Interview stakeholders to gain insights from their expertise
6. Identify a user whose experience you hope to improve
7. Develop a prototype
8. Share what you learnt and what is your solution

Brainstorming

➢ Brainstorming can be fundamental to think out-of-the-box

➢ Typically, a moderator asks ideas to a group and writes them down on sticky notes or whiteboards

➢ Everything should be written down

➢ It is important that each participant shares some ideas

➢ At the end, ideas are collected, sorted, discarded and combined.
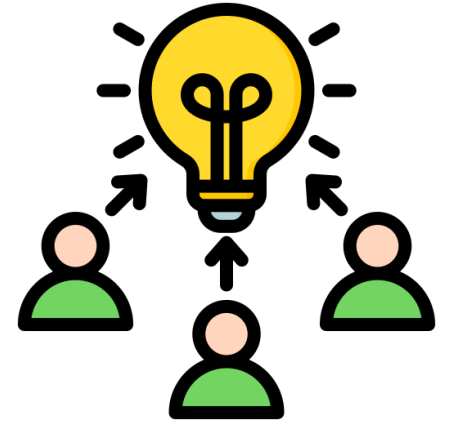
Interviews

➢ Interviewing patients and other users is one of the most powerful tool of health design

➢ **Remember**: Patients might have very different, **divergent perspectives**, e.g.: a patient can be super compliant to the therapy, the other not.

➢ In an interview, **power imbalance** can make participants less forthright, e.g., a patient will not tell a doctor that he/she did not follow the therapy and/or that the proposed designed solution is not good.

➢ Different users might mean very different needs

Take me to the place where...

I remember how it felt when...
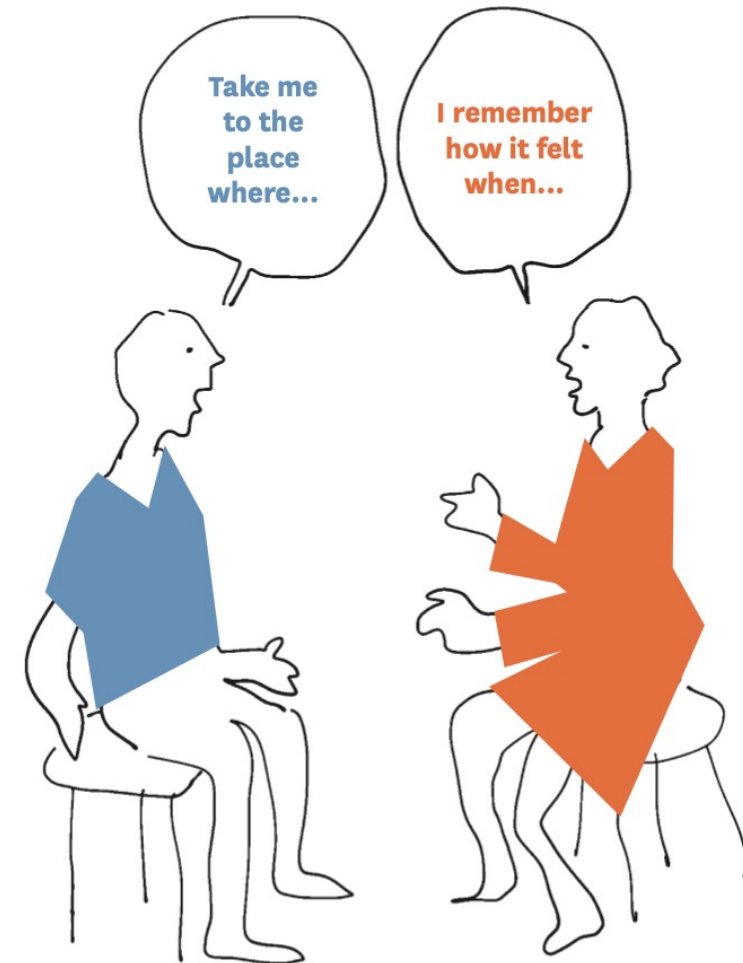
Interviews: Limits

➢ Users can misunderstand a question and/or the problem

➢ People overemphasize daily annoyance over systemic problems

➢ In health care, people have incomplete pictures of their own situation, e.g., seeing a doctor while in hospital might be hard because of personnel shortage rather than his/her disinterest

➢ Prior experiences might heavily bias answers
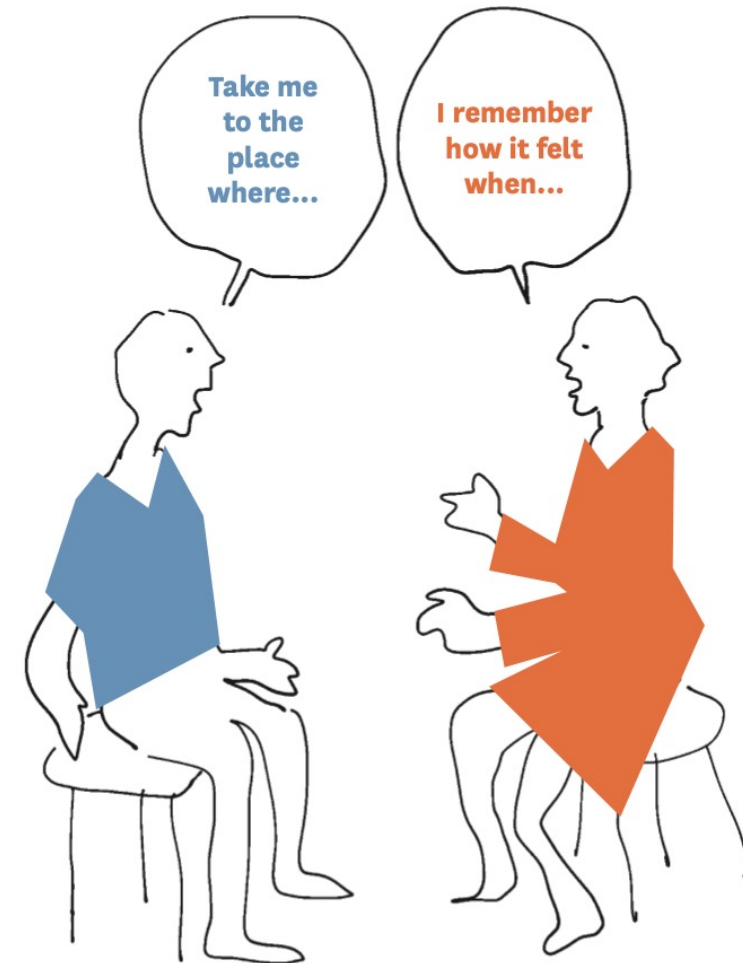
Interviews: Asking better questions

➢ Open-ended questions rather than yes-no questions

➢ Once an area of interest is found, ask follow-up questions that probe other details

➢ Uncover unmet needs with a hypothetical questions: "If I had a magic wand that fixes everything, which one would you choose first?"

➢ Saying "I'm curious about…" or "Help me understand why…" rather than just "Why?" is less judgemental and confrontational
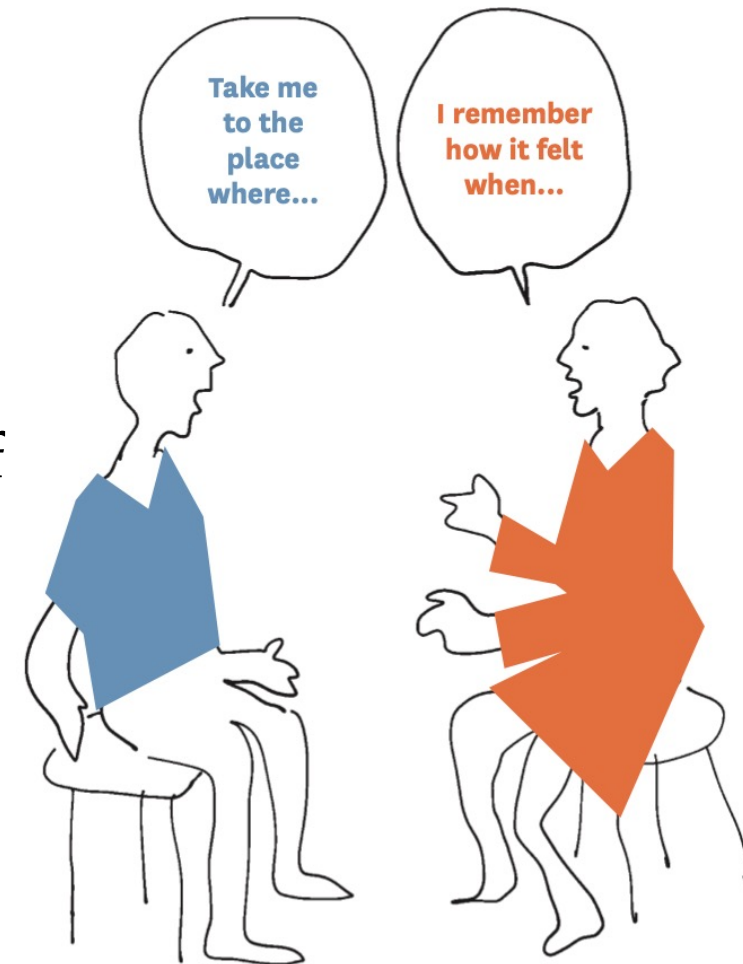
Interviews: Conducting a user interview

➢ Find a place that will feel comfortable and familiar

➢ Create a psychological space that is welcoming and safe. To do this frame the interview as a favor to the interviewer and never judge.

➢ As the interviewer, listen more than you talk. Do not rush to fill pauses. Do not complete answers. Give time to answer.

➢ Use a recording device so that you can give full attention to the user

➢ Have people outside your field of expertise review your questions so that the lexicon is clear for everybody
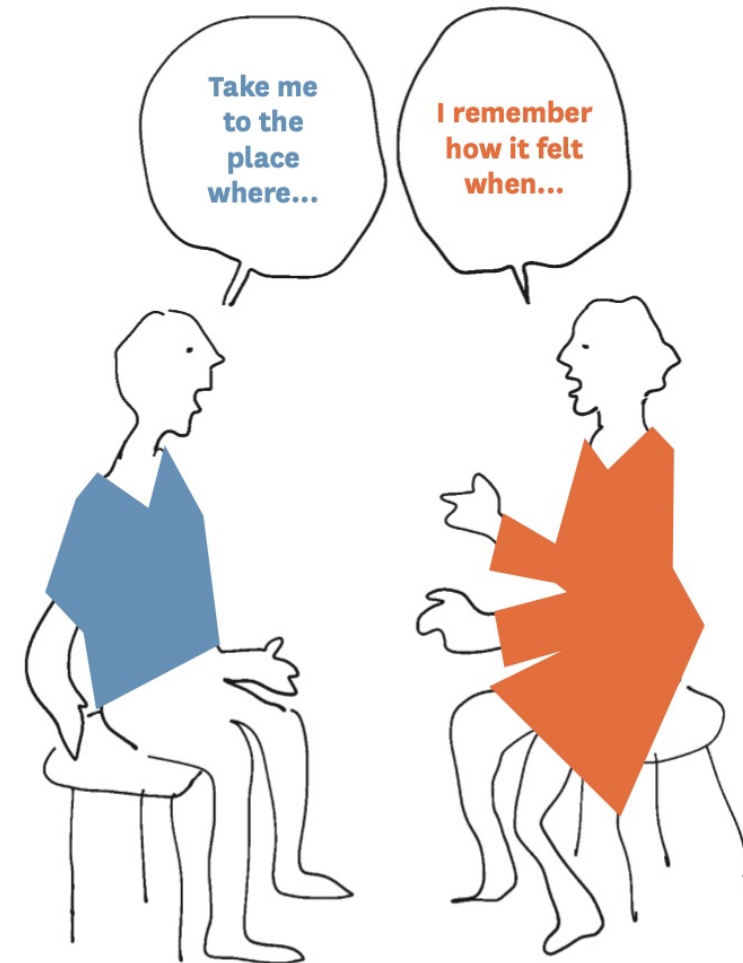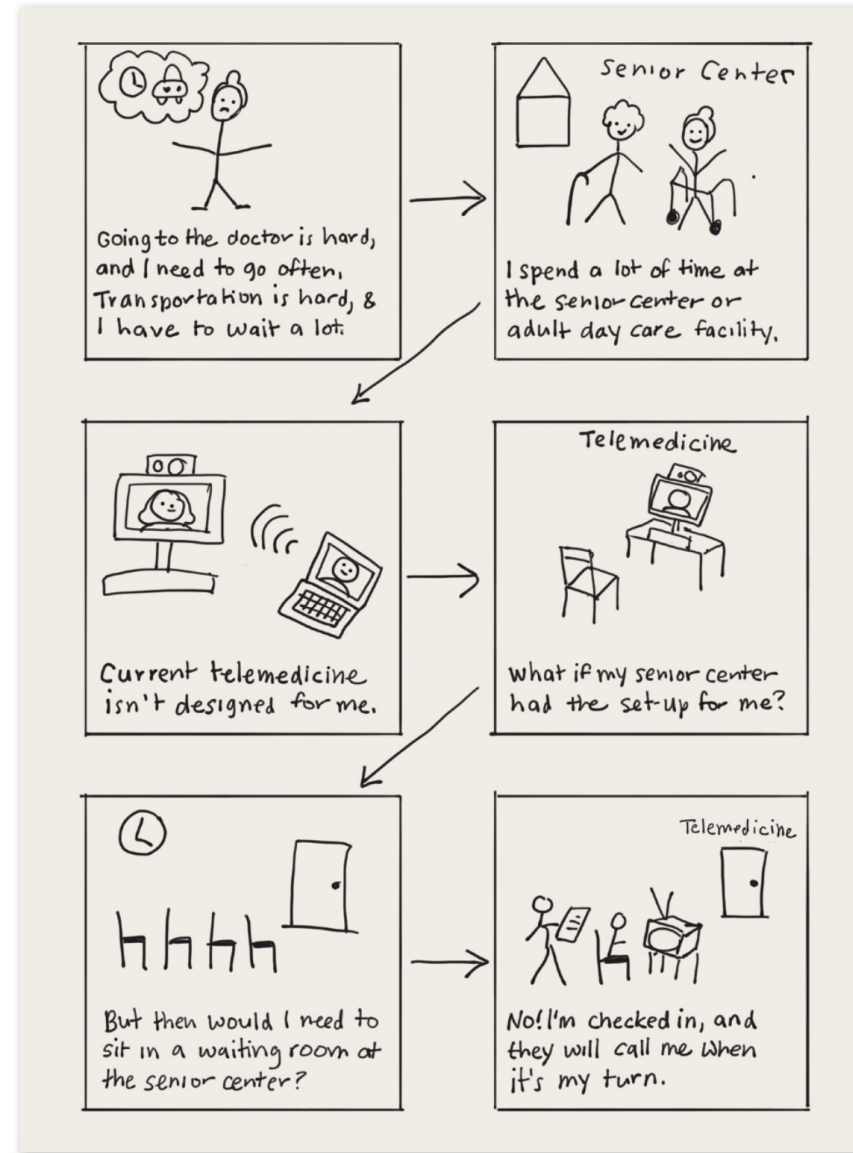
Storyboard

➢ **Storyboard** consists of a few pictures or sketches with notes that explain the action.

➢ Filmmakers use storyboards to plan the visual flow of a movie. Designers use them to plan the interactive use of a product or service

➢ In a design workshop setting, participants can sketch on sheets of paper that have been pre-printed with four to six boxes.

➢ Usually, the characters of a storyboard have a problem they want to solve or a task they need to complete, such as enrolling patients in a clinical trial or getting to a medical appointment.
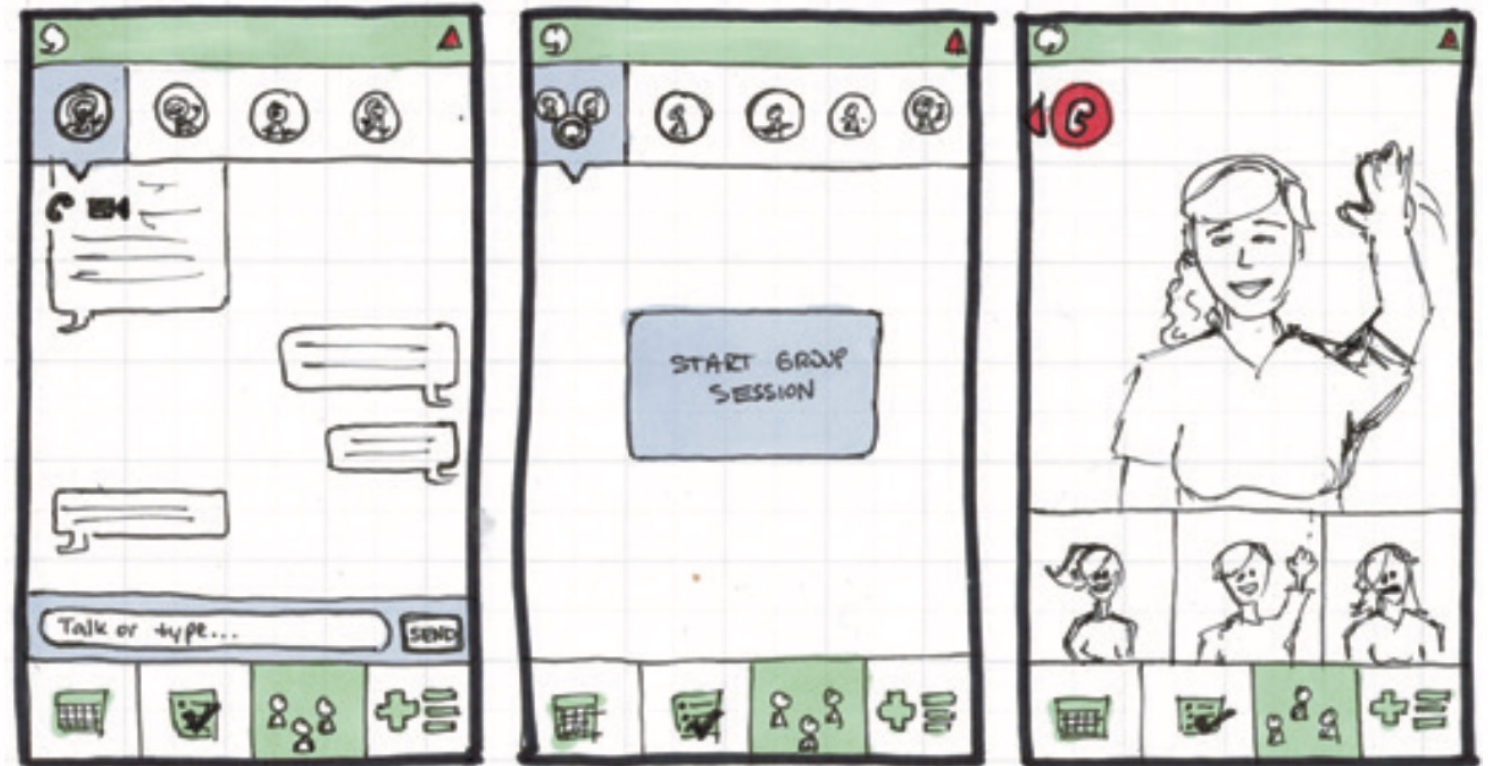
Storyboard: An example

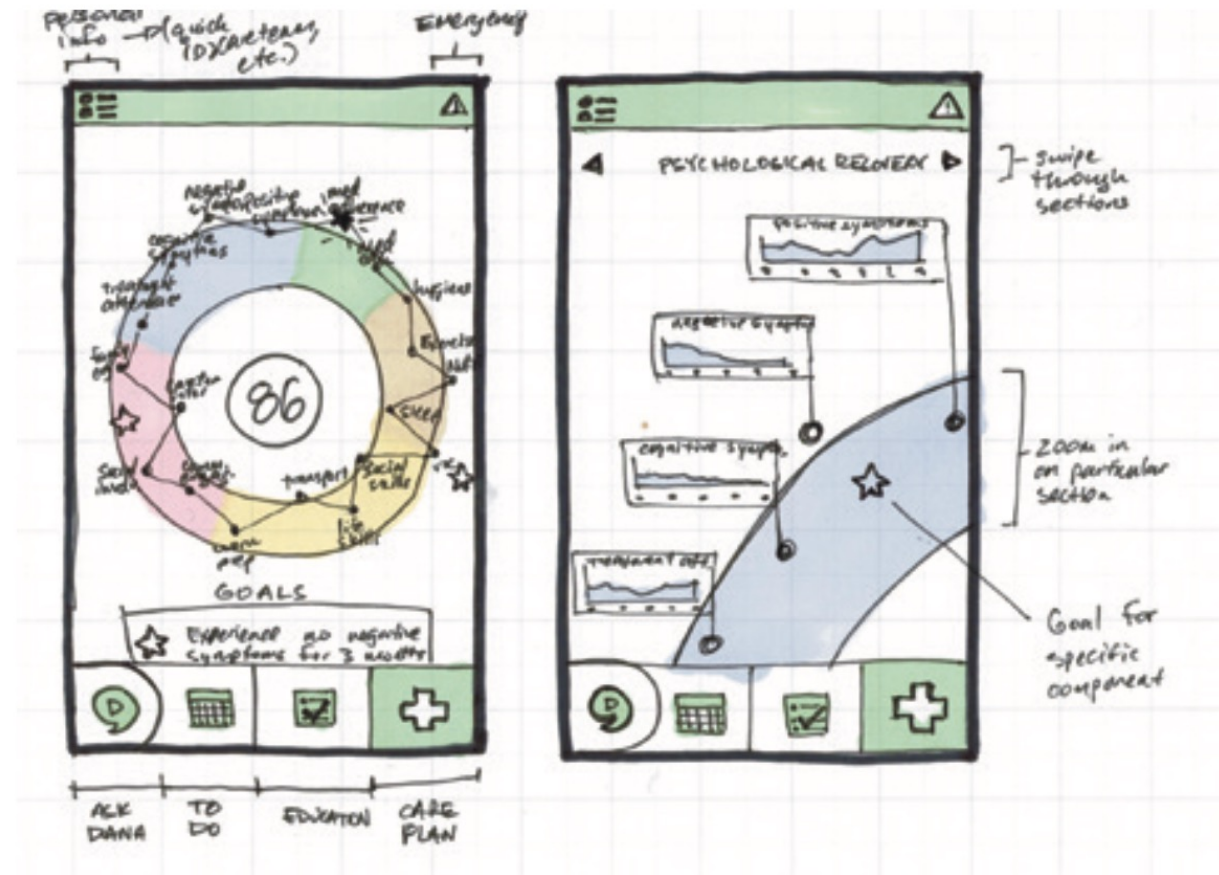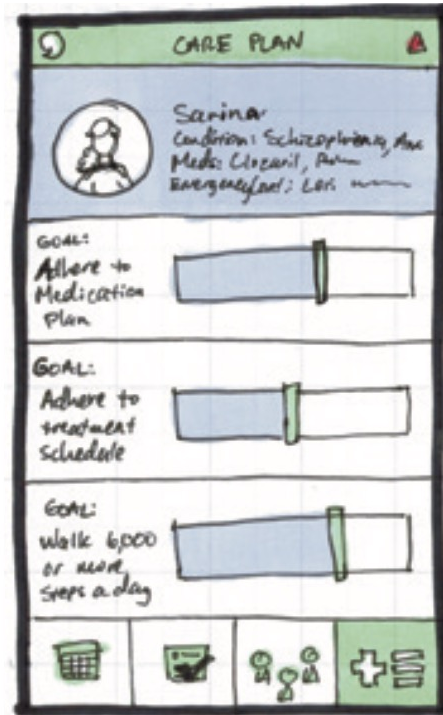# Storyboard for designing apps

Homescreen

Group sessions

Storyboard for designing apps

Goal tracking

Health metrics

Questionnaire

➤ **Questionnaire** consists of a series of open and/or closed questions devised for the purposes of a survey or statistical study.

➤ Allow to easily get answers from the intended final users

➤ **Pros**:
- Usually it contains standardized questions
- Allow to map answers to standard scores
- They are anonymous so people are more confident to tell the truth

➤ **Cons**:
- It is difficult to span the universe of possible questions
- Time consuming: people may build fatigue and start putting random answers
- They are not very flexible

Persona

➢ A **persona** is a fictional archetypal character who represents potential users.

➢ Each persona has i) a portrait, ii) a background narrative and iii) a name.

➢ The goal is to bring each persona to life with a concise set of narrative details relevant to the design challenge

➢ The designed group of personas must be inclusive. There should be the "average" persona and "extreme/edgy" personas.

Creating a user Persona

➢ **Name**: pick a name that is easy to remember and use it in conversations: "What should Ashley do here?"

➢ **Backstory**: name some defining events in the character's life, e.g., a person that does not speak English.

➢ **Scenario**: Create a short narrative sketch in which persona confronts a challenge. What situation has brought her to the hospital?

➢ **Emotions**: How does the persona feel about her situations? Is she angry, or confident?

➢ **Motivation**: What does the persona wants to achieve?

➢ **Behaviours**: What is the persona doing to achieve her goals?

➢ **Ability inhibitors**: What actions or situations might be causing anxiety or distress?

An example: Ashley

ASHLEY

A young expert patient in a new town

17-year-old woman with migraines arrives at the ED with acute onset of a severe headache. She is new to town, having just started undergrad at UVA. She is a highly informed patient with a detailed care plan but has been receiving care from a team at her hometown hospital in California. Her parents, who are very involved in her care, have already called the ED to check on her.

"I wish I could talk to my doctor back home. And I wish my mom and dad were here now..."—ASHLEY

MOTIVATION

ASHLEY wants the pain to stop. She wants to go home, where she can get away from the bright lights and loud noises of the ED.

MOM & DAD want Ashley's physician at her hometown hospital to call all the shots and tell UVA's ED what to do.

BEHAVIORS

ASHLEY is tired of telling her medical history to multiple people (triage nurses, techs, medical students, residents, attending physicians). She asks if they can just get her medical records from home already.

MOM & DAD are texting and FaceTiming Ashley constantly and asking to speak to ED staff every 20 minutes to ask what's going on and make suggestions.

ABILITY INHIBITORS

ASHLEY is having a hard time keeping her composure because her headache is so severe. She is getting impatient with her parents and with the clinical care team.

MOM & DAD are upset that they're not physically present with their daughter.

An example: Sue
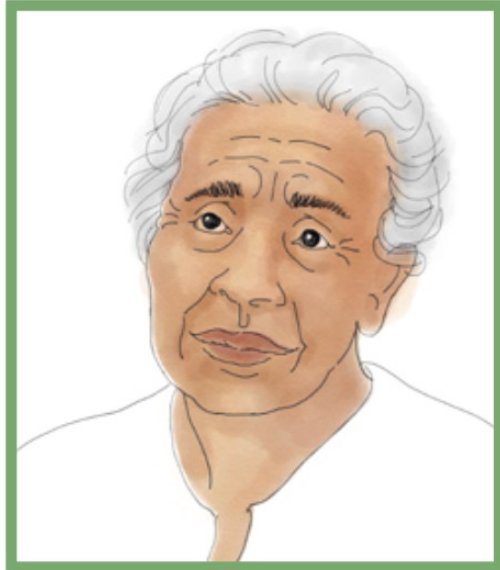
SUE
A recent immigrant with a ground-level fall

60-year-old woman who speaks only Tibetan is brought to the ED by her neighbor Jane, who saw her fall in her driveway. The patient is holding her hip. The patient's daughter is on her way to the hospital but is traveling from far away and won't arrive for a few hours.

"I really wish I could talk to my daughter."—SUE

MOTIVATION
SUE wants to communicate with the care team, but no one speaks her language.

JANE, Sue's neighbor, wants to help Sue but doesn't know how to communicate very well with her.

BEHAVIORS
SUE is trying to talk to the ED team and to Jane in Tibetan. A lot of people are saying things to Sue in English, and this seems to make her more upset as time goes on.

JANE is trying to help Sue use Google Translate on her phone to communicate with her and with the ED team.

ABILITY INHIBITORS
SUE is in pain, not sure what's going to happen to her, and very concerned about getting an expensive bill from the hospital.

JANE wants to help her neighbor and doesn't want to leave her alone without a translator, but she is supposed to be at a family gathering and needs to leave before Sue's daughter arrives.
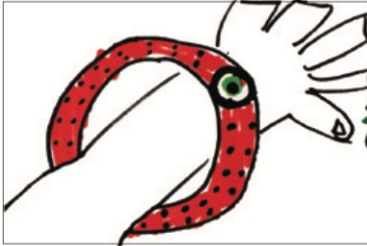
Journey map

➢ **Journey map** is a tool that help understand a user's experience of a product, service, or space over time.

➢ They are **dynamical** tools

➢ Journey maps can be used to analyze existing health care solutions

➢ They can be also used to design the interaction with hypothetical new tool over time (see next slide)

Journey map: An example

➢ This journey map was created during a health design workshop in which participants developed an ideal product concepts for patients newly diagnosed with type 2 diabetes

Journey Map	Scenario Sarah is newly diagnosed with T2 diabetes.	User goals Sarah wants to tackle her new normal.	Product or service Embracelet—diabetes treatment hub
Stages			
Diagnosis	Sarah receives tool for customizing treatment.	Sarah prioritizes immediate needs.	Sarah and her doctor stay informed.
Action | What is the user doing?			
Sarah receives the news of her type 2 diabetes diagnosis from her doctor.	She puts on the Embracelet and syncs it to the platform.	Manage appointments, get reminders for refills, send vitals to clinicians, tap the bracelet for info, and communicate with care team.	Sarah shares info with her care team. They can support her when she needs help.
Touchpoints | How does the user interact with the product or service?			

Emotion | What is the user thinking and feeling?			
Overwhelmed. Sarah is consumed with negative emotions. She feels paralyzed.	Skeptical. Will this really help?	Comforted. Her condition begins to feel more manageable.	Confident. Sarah will be able to handle this.

Let's try

➢ **Core problem**: Sleep issues

➢ **Our idea**: We can create a mobile app for that!

➢ What you have to do:

1. Create a **persona**
2. Use that persona as a character of a (simple) **journey map** where he/she will use your app for the problem at hand

➢ You can do this individually or as a group (with a group this is easier)
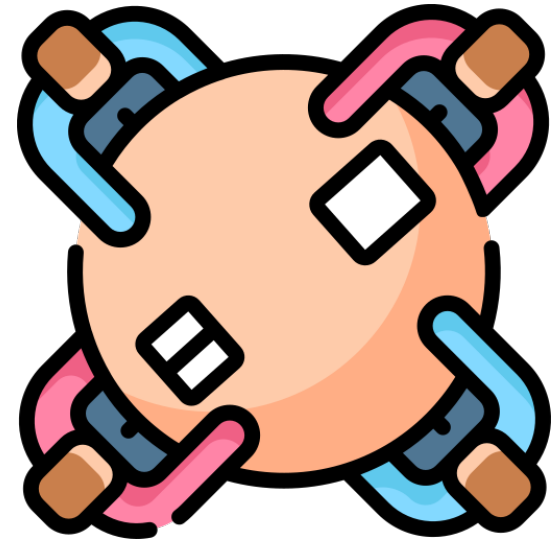
References

➢ Ku, Lupton - Human Design Thinking: Creating Products and Services for Better Health – Cooper Hewitt