SMART PRODUCT DESIGN

21.02.2025 | Prof. Venere Ferraro

POLITECNICO
MILANO 1863

ANALYZING THE USER INTO THE DESIGN PROCESS

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Contents

Overview

1. **Design Process in Brief**

2. **Methods for understanding users**

   - Direct Methods

   - Indirect Methods

   - Instrumental Methods

1. **A case Study**

DESIGN PROCESS

01

Interaction design is about shaping digital things for people's use"
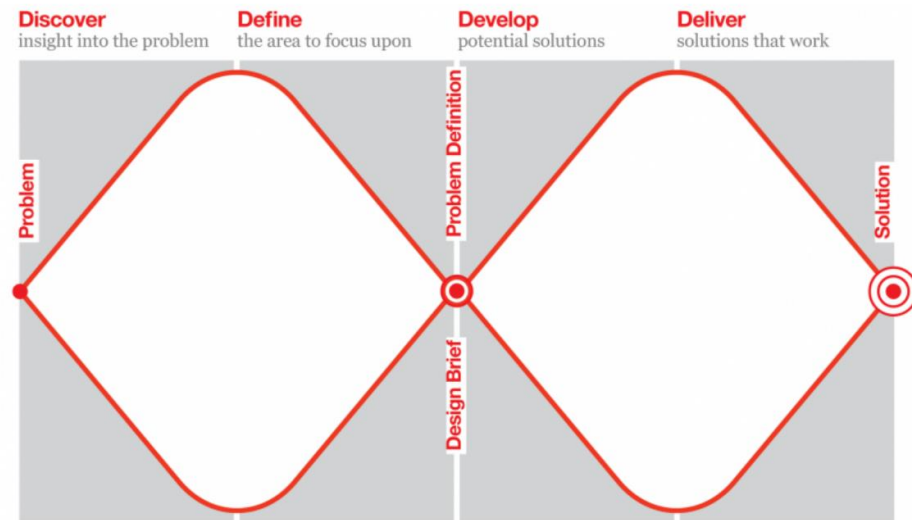
TECH

DESIGN

PSYCOLOGY

*Jonas Lowgren

When designing smart products, the designer should ask the **what**, the **how** and the **why** of the interaction.

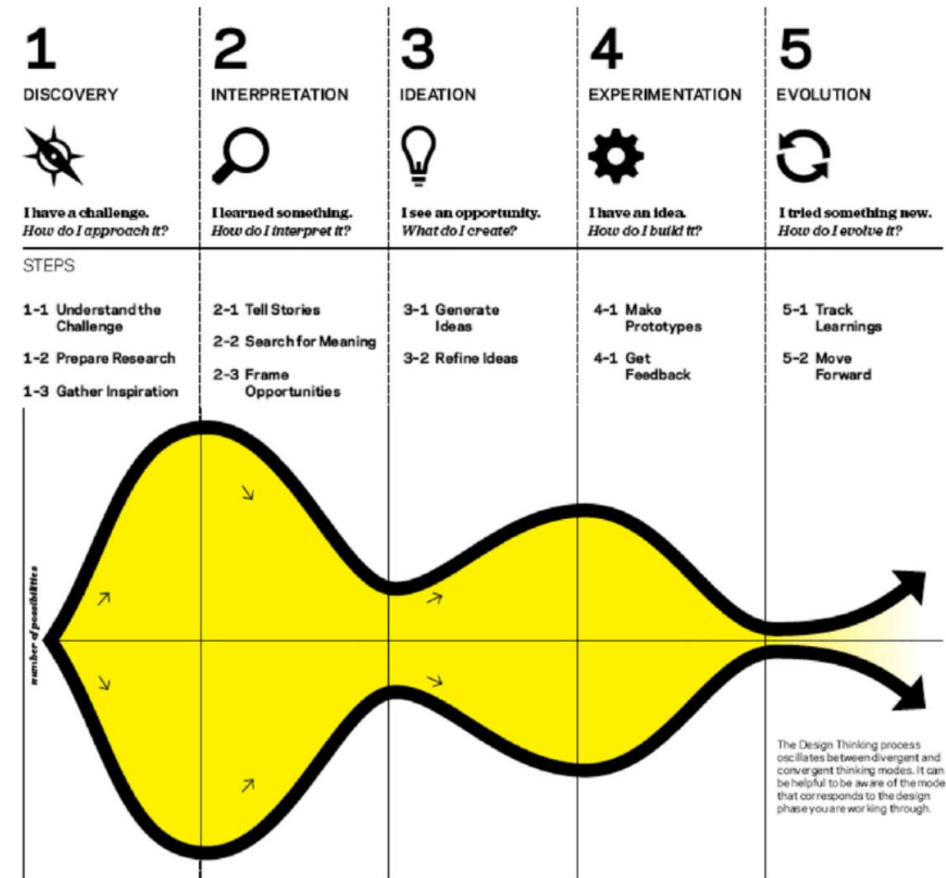(M. Hassenzahl)

Design Process

- Convengence / Divergence
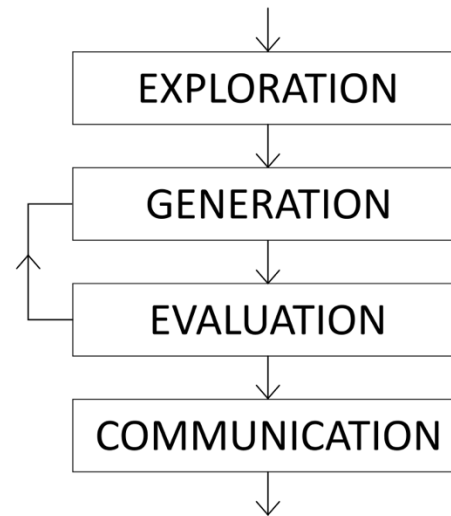 Number of possibilities

Double Diamond
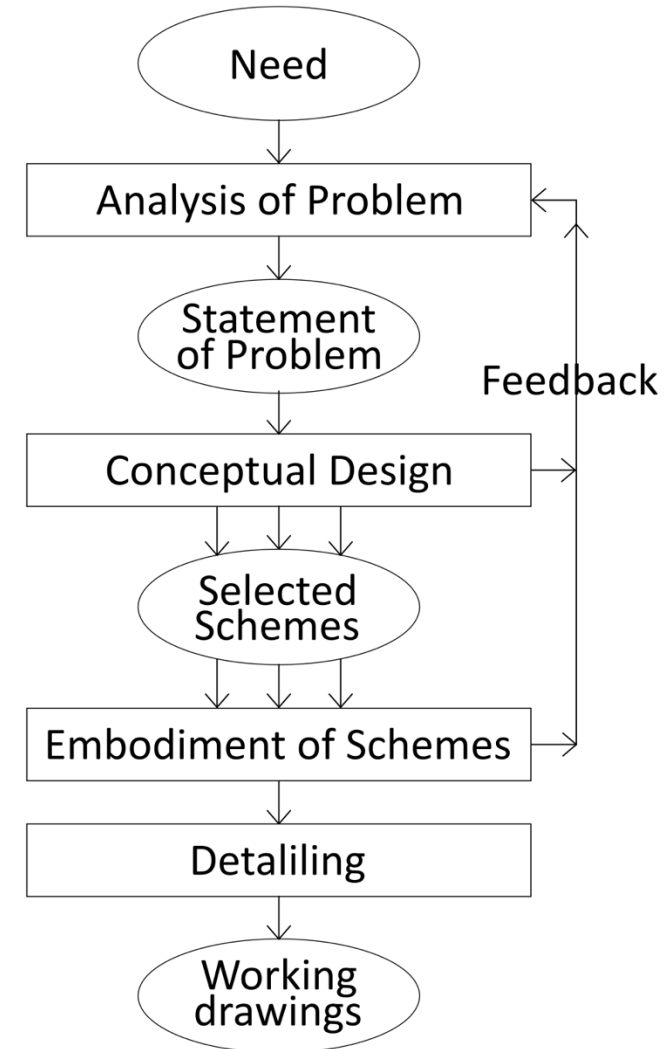(Design Council, 2004)

IDEO Design Process
(IDEO, 2012)

Engineering Process

ENGINEER PERSPECTIVE

• Iterative process
  step-by-step

EXPLORATION

GENERATION

EVALUATION

COMMUNICATION

Four Stage Design Process
(Cross, 2000)

Need

Analysis of Problem

Statement
of Problem

Feedback

Conceptual Design

Selected
Schemes

Embodiment of Schemes

Detaliling

Working
drawings

Engineering Design Process (French, 1985)

Design Process

Design Process

WHY

Focus on
USERS

methods to analyse
Users

WHAT

Focus on
SYSTEM

methods to analyse
market/technologies/
trends/
opportunities

HOW

Focus on
**PRODUCT/
SERVICE**

methods to analyse
existing
products/services'
features
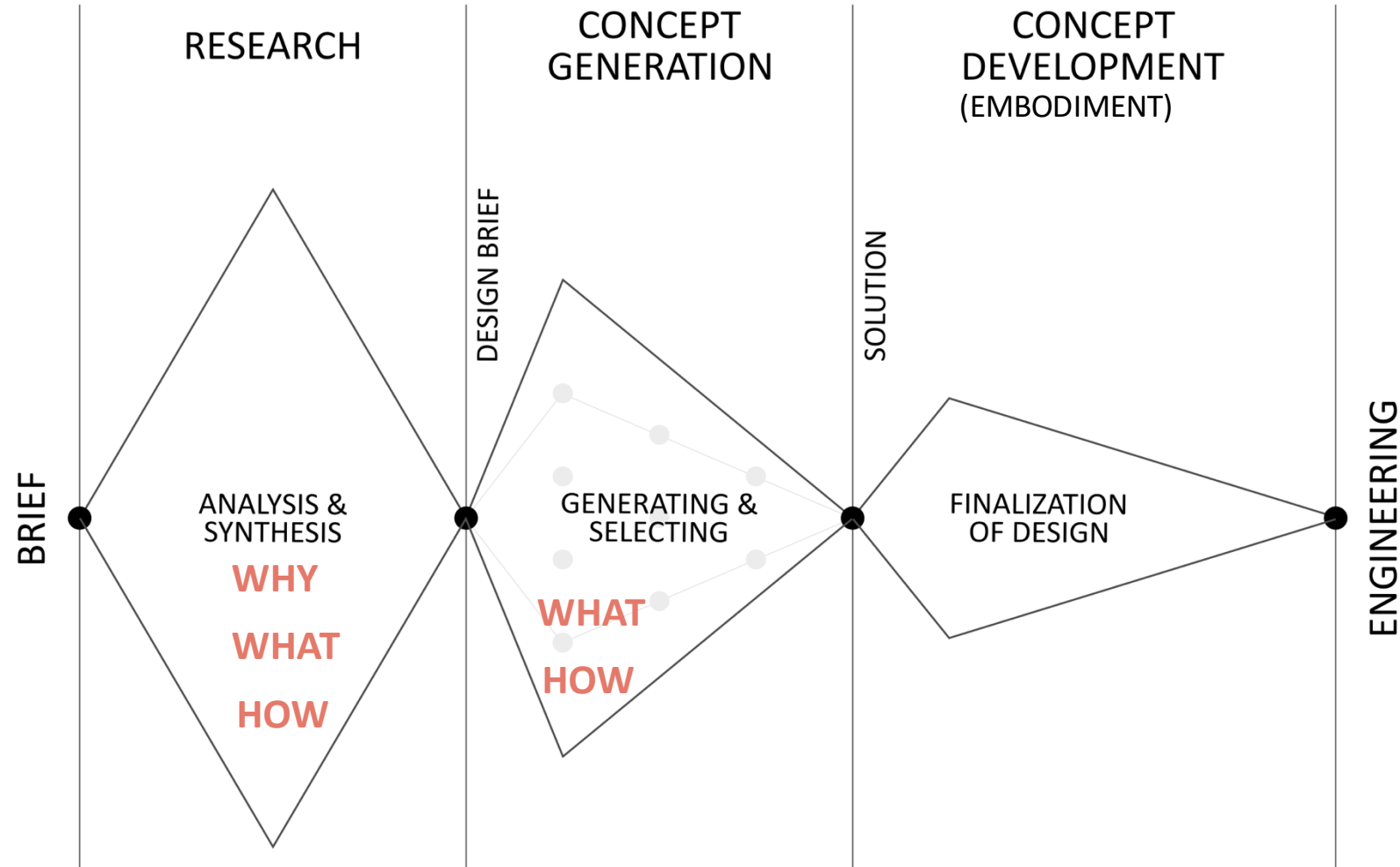
METHODS TO ANALYSE THE USER

02

Methods to analyse the User

DIRECT METHODS

•UNSTRUCTURED INTERVIEWS

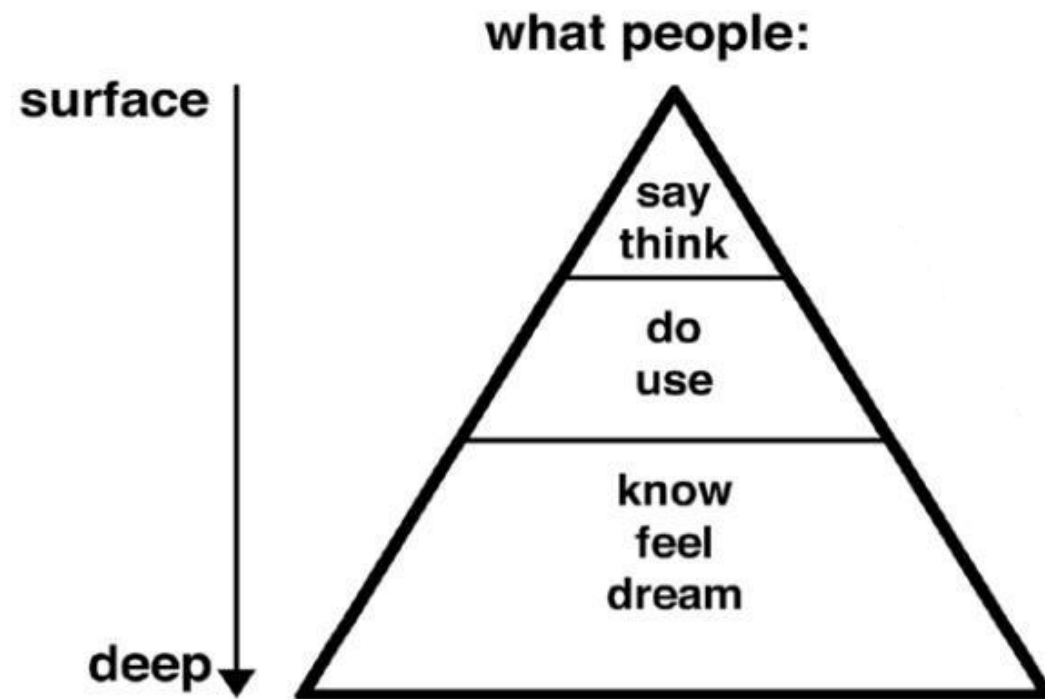•SEMI-STRUCTURED INTERVIEWS

•QUESTIONNAIRES

•DIARIES

•FOCUS GROUPS

……

INDIRECT METHODS

•OBSERVATION

•SHADOWING

•CAMERA STUDIES
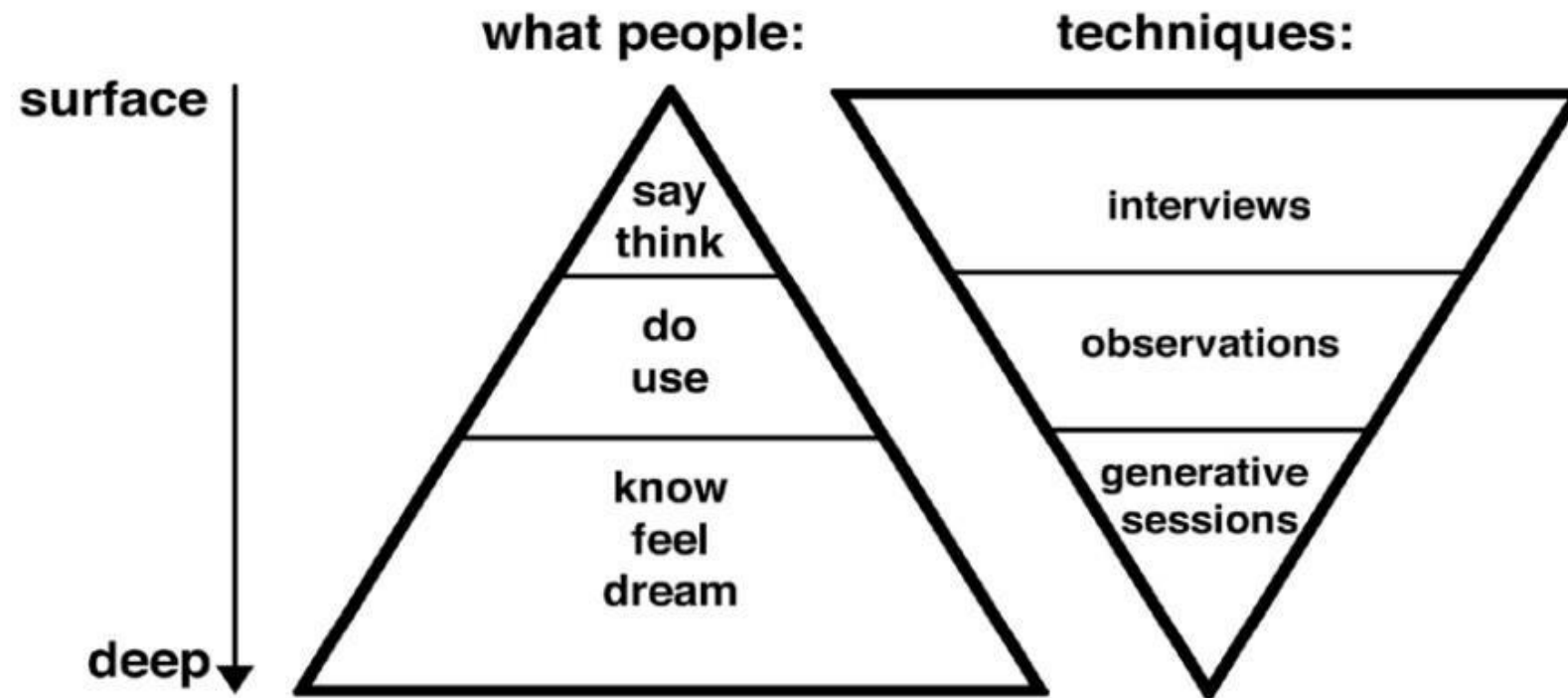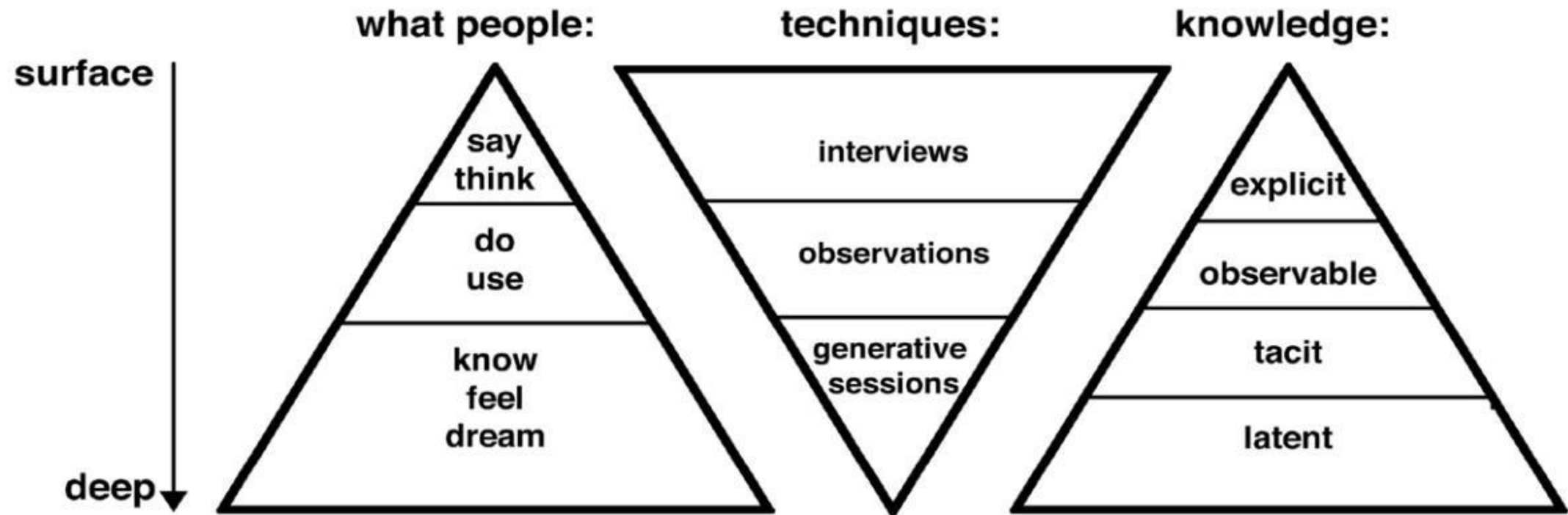
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INTRUMENTAL METHODS

…………….

Methods to analyse the User

Methods to analyse the User

Methods to analyse the User

Methods to analyse the User
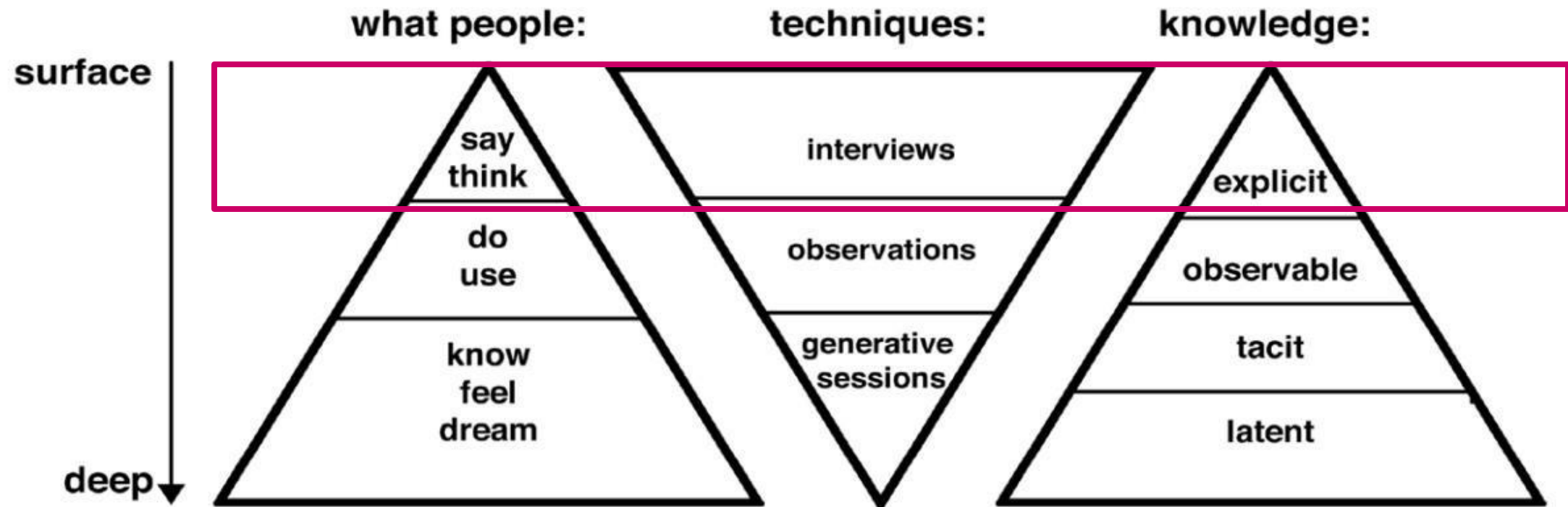
DIRECT METHODS

Methods to analyse the User

INDIRECT METHODS
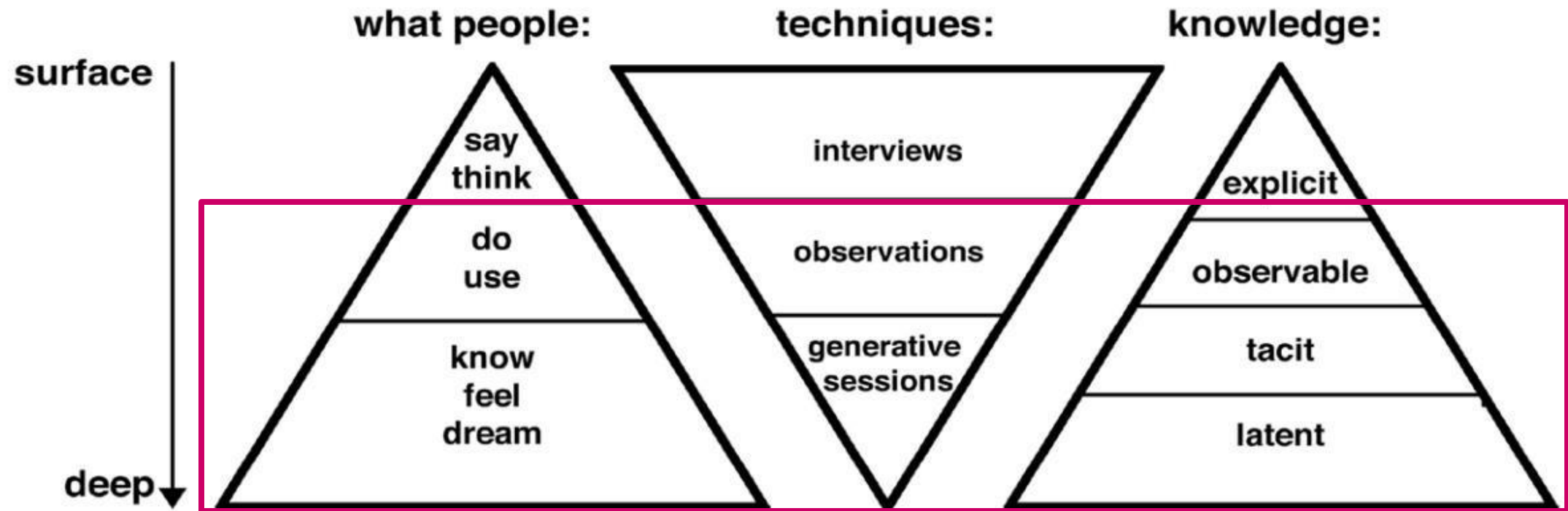
Methods to analyse the User

BEFORE STARTING

-Put your **experiences, understanding**, and expertise aside.

-They should be used at the right time, and with **intentionality**.

-Your assumptions may be **misconceptions** and **stereotypes**, and can restrict the amount of **real empathy** you can build.

-Put aside these biases, so that you can **approach a design challenge afresh**.

Methods to analyse the User

BEFORE STARTING

ASSUME A BEGINNER MINDSET
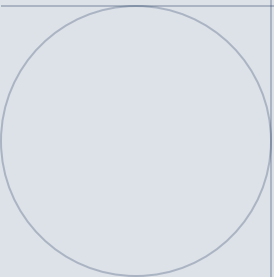
DIRECT METHODS

01.1

Methods to analyse the User

DIRECT METHODS

- UNSTRUCTURED INTERVIEWS
- SEMI-STRUCTURED INTERVIEWS
- QUESTIONNAIRES
- DIARIES
- FOCUS GROUPS

Direct Methods

- UNSTRUCTURED INTERVIEWS

- SEMI-STRUCTURED INTERVIEWS

- QUESTIONNAIRES

- DIARIES

- FOCUS GROUPS

INTERVIEWER

SELF REPORT

GROUP + LEADER

Unstructured Interview
What

In unstructured interviews, the interviewer has a clear plan in mind regarding the focus and goal of the interview.

Unstructured Interview

WHY

- to develop an **understanding of a not fully understood or appreciated culture, experience, or setting**.

- to focus the respondents' talk on a **particular topic of interest, in order to test out the researcher's preliminary understanding**, while still allowing for discovering new ways of seeing and understanding

- to develop **more structured interview** guides or surveys.

Unstructured Interview

HOW

EXAMPLES

ORAL HISTORY INTERVIEWS.

Collecting people's life stories or histories in their own words. May be a way to **reach groups and individuals who have otherwise been oppressed, ignored**, forgotten or not-yet- reached in terms of recording histories and experiences.

Unstructured Interview
How

Quit Smoking?

Why?

How?

Semi-Structured Interview
What

In semi-structured interviews, the interviewer poses **open- ended questions to which the user replies**.

There is a structure and order of questions to follow, but this can be changed according to how the conversation develops.

Semi-Structured Interview

WHY

- to understand a person's **thoughts, emotions, and motivations**, so to determine how to innovate for him or her

- to identify the user's needs by understanding the **choices that person makes and the behaviors that person engages in**.

Semi-Structured Interview

HOW

Ask why. Even when you think you know the answer, ask people why they do or say things. The answers will sometimes surprise you. A conversation started from one question should go on as long as it needs to.

Encourage stories. Whether or not the stories people tell are true, they reveal how they think about the world. Ask questions that get people telling stories.

Semi-Structured Interview

HOW

Look for inconsistencies. Sometimes what people say and what they do are different. These inconsistencies often hide interesting insights.

Pay attention to nonverbal cues. Be aware of body language and emotions.

Don't be afraid of silence. Interviewers often feel the need to ask another question when there is a pause. If you allow for silence, a person can reflect on what they've just said and may reveal something deeper.

Semi-Structured Interview

HOW

Don't suggest answers to your questions. Even if they pause before answering, don't help them by suggesting an answer. This can unintentionally get people to say things that agree with your expectations.

Ask questions neutrally. "What do you think about buying gifts for your spouse?" is a better question than "Don't you think shopping is great?" because the first question doesn't imply that there is a right answer.

Semi-Structured Interview

HOW

Only ten words to a question. Your user will get lost inside long questions. Only ask one question at a time, one person at a time.

Make sure you're prepared to capture. Always interview in pairs.
If this is not possible, you should use a voice recorder—it is impossible to engage a user and take detailed notes at the same time.

Semi-Structured Interview

HOW

Only ten words to a question. Your user will get lost inside long questions. Only ask one question at a time, one person at a time.

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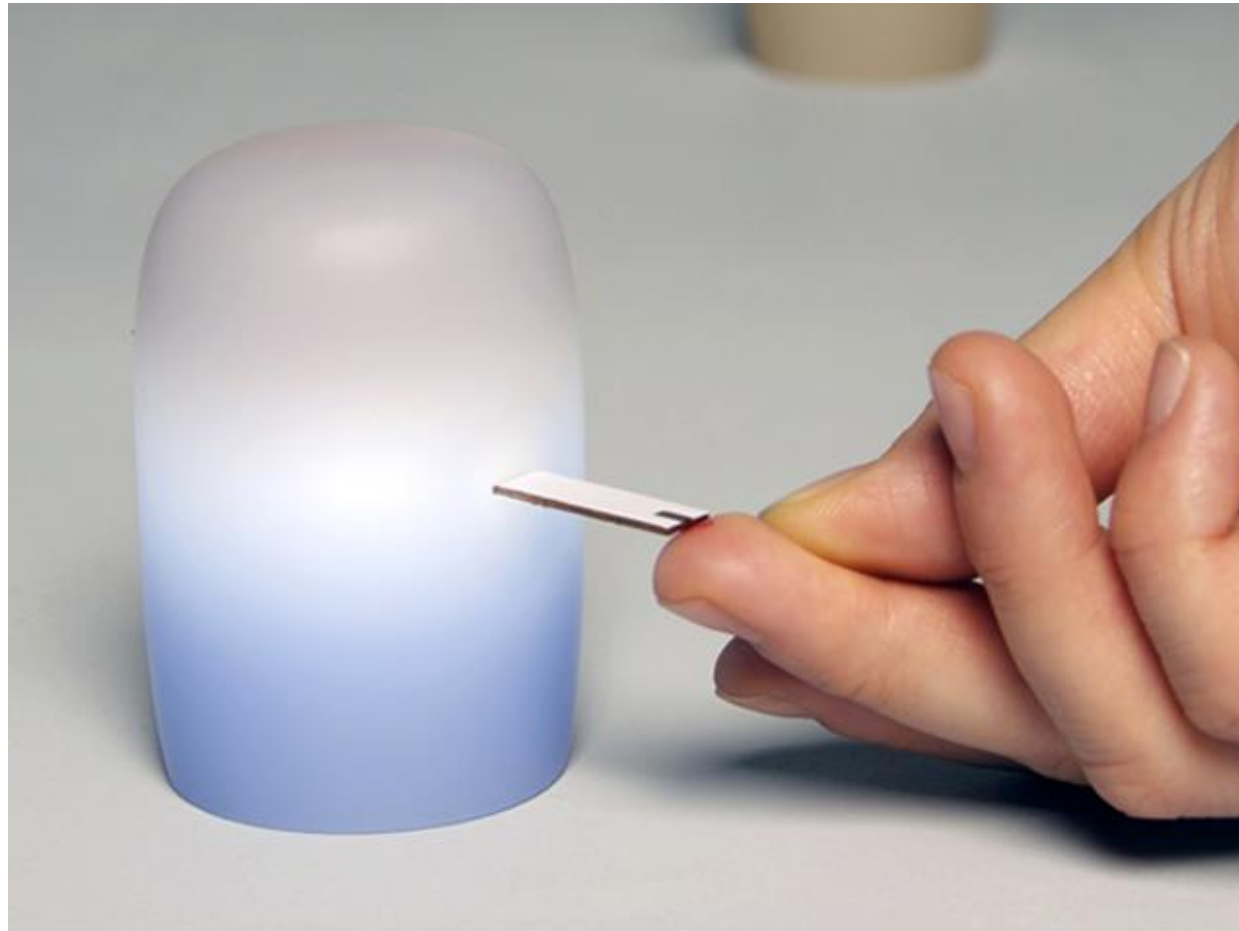
Semi-Structured Interview

MEASURE LESS

Semi-Structured Interview

We Need Your Feedback!

You have successfully signed out of your SurveyMonkey account. Now help SurveyMonkey improve by taking this short customer satisfaction survey. All feedback will be kept confidential.

1. How likely are you to recommend SurveyMonkey to someone else?

◯ Extremely likely
◯ Very likely
◯ Somewhat likely
◯ Slightly likely
◯ Not at all likely

2. Given the services provided by SurveyMonkey, is the price too low, too high, or about right?

◯ Much too low
◯ Somewhat too low
◯ A little too low
◯ About right
◯ A little too high
◯ Somewhat too high
◯ Much too high

3. Is SurveyMonkey the only online survey tool you use?

◯ Yes
◯ No

If no, please specify other online survey tools you use:

[   ]

Questionnaire/Survey
What

Close questions with yes/no or multiple choice answers.

Responses can be analysed by statistical methods and can produce quantitative results.

Questionnaire/Survey

WHY

- to produce consistent data that can be compared across a number of respondents.

- do not require the development of relationship between interviewer and interviewee

- used when literature in a topical area is highly developed or when the use of observational and other less structured interviewing approaches provide the researcher with adequate understanding of a topic to construct meaningful and relevant close-ended questions.

Questionnaire/Survey

HOW

- The interviewer asks each respondent the same series of questions.

- The questions have a limited set of response categories.

- Little room for variation in responses and few open-ended questions included in the interview guide.
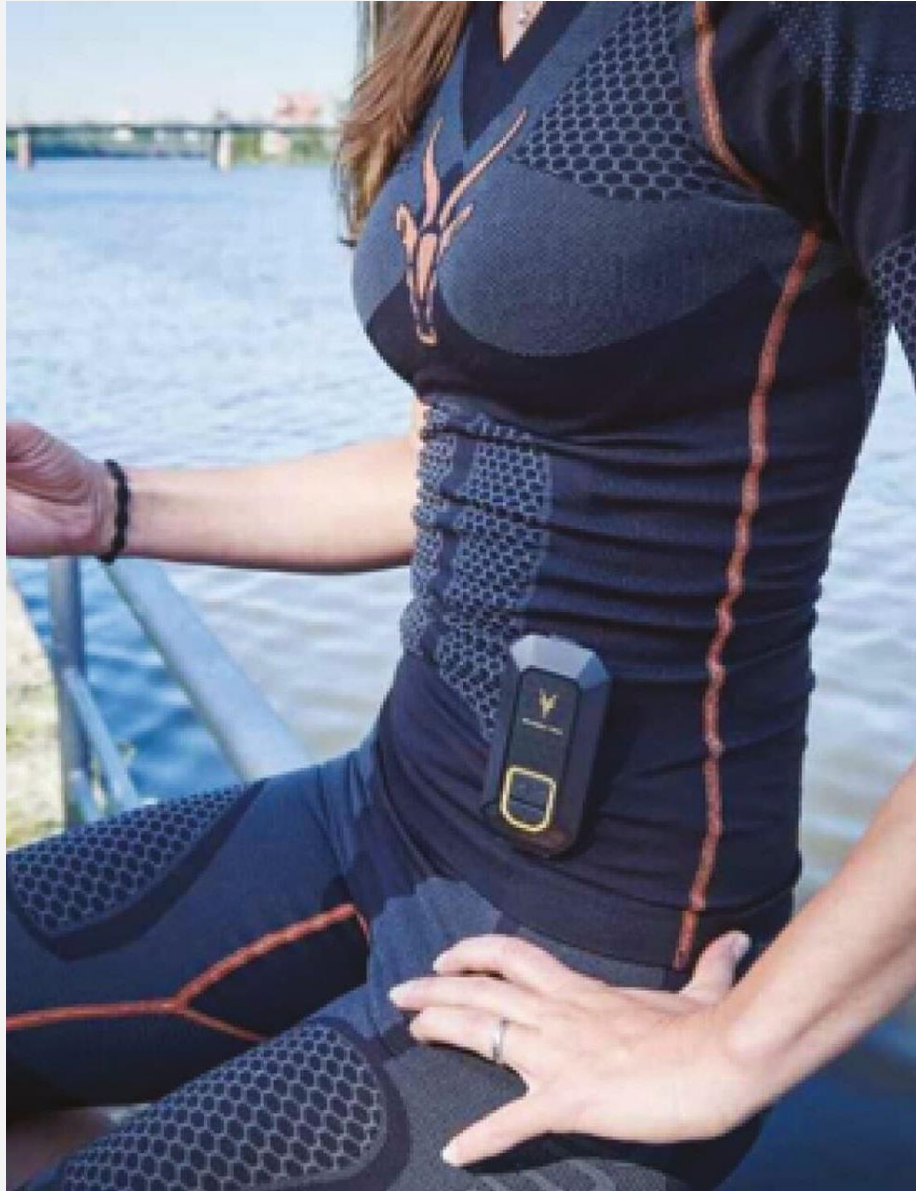
Questionnaire/Survey

HOW

- Questioning is standardized and the ordering and phrasing of the questions are kept consistent from interview to interview.

- The interviewer plays a neutral role and acts casual and friendly, but does not insert his or her opinion in the interview.

- Questionnaires can also be self-administered

Questionnaire/Survey
Examples

What kind of outdoor sports do you like?

-

-

-

-

-

-

-

-

Questionnaire/Survey
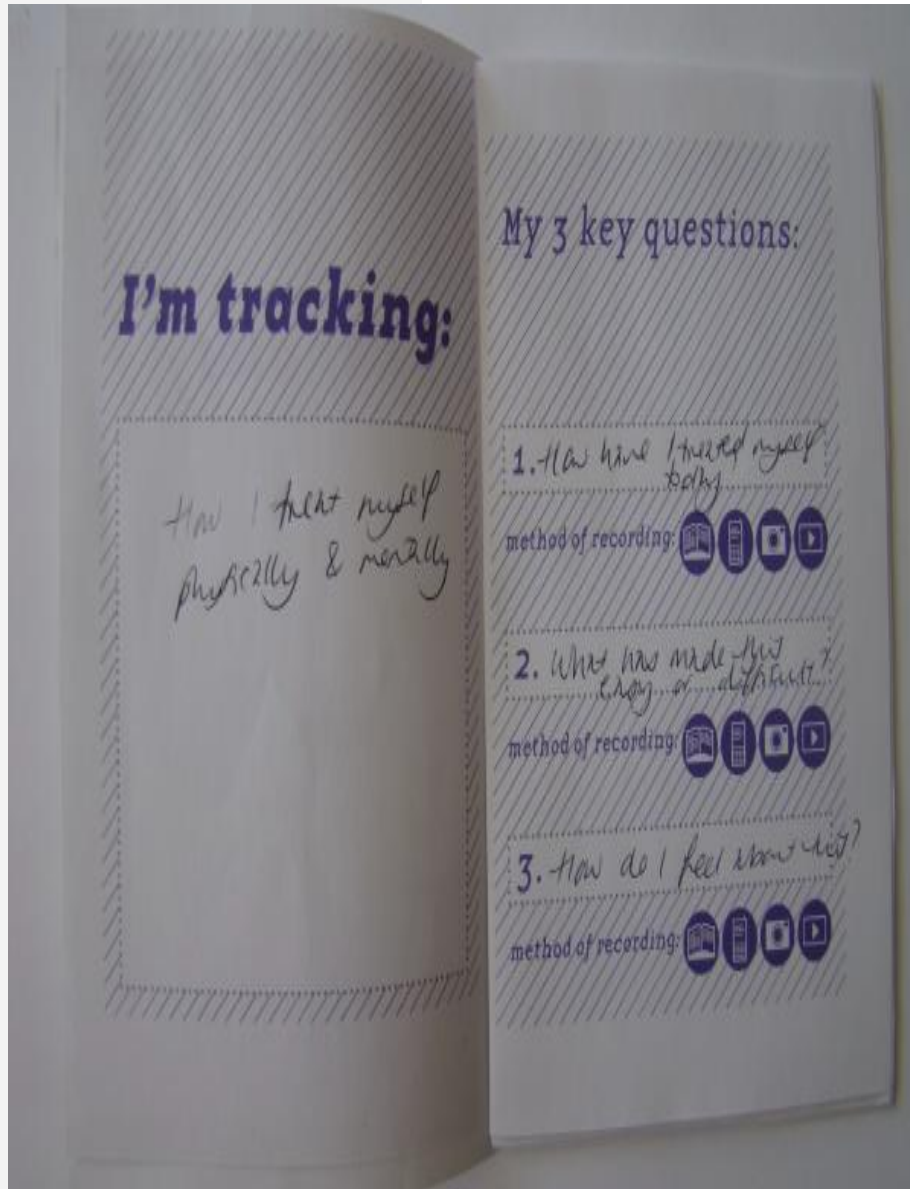## Examples

Do you like outdoor sports?

YES

NO

IF YES, What kind of outdoor sports do you like?

–

–

–

–

Diaries
What

Diaries are used when it is difficult or impossible to directly access a certain place (like people's homes) or access it is too time consuming.

Diaries
What

User Diaries are a methods for gathering in- depth qualitative information from users by giving them a way of recording away from researchers.

Diaries

HOW

- **Identifying the correct people to take part**. Small group is sufficient; the aim is to get rich information and insights to drive the design process

- User Diaries are created based on **the context of the project** and needs of the design team. The diary period can vary from a few hours to a number of months and is dependent on the project.

Diaries

HOW

In general User Diaries consist of three main sections:

1. **Background information** that covers name, age, occupation, location, family, hobbies & interests, likes & dislikes. This helps to give someunderstanding.
2. **A section for users to complete** over topics – just like a diary. This should have topics prompts or questions to provide some structure. It might use photography or video to document.
3. **Additional questions and tasks that provide stimulus** to users to gain more insight from them on particular topics.

Diaries
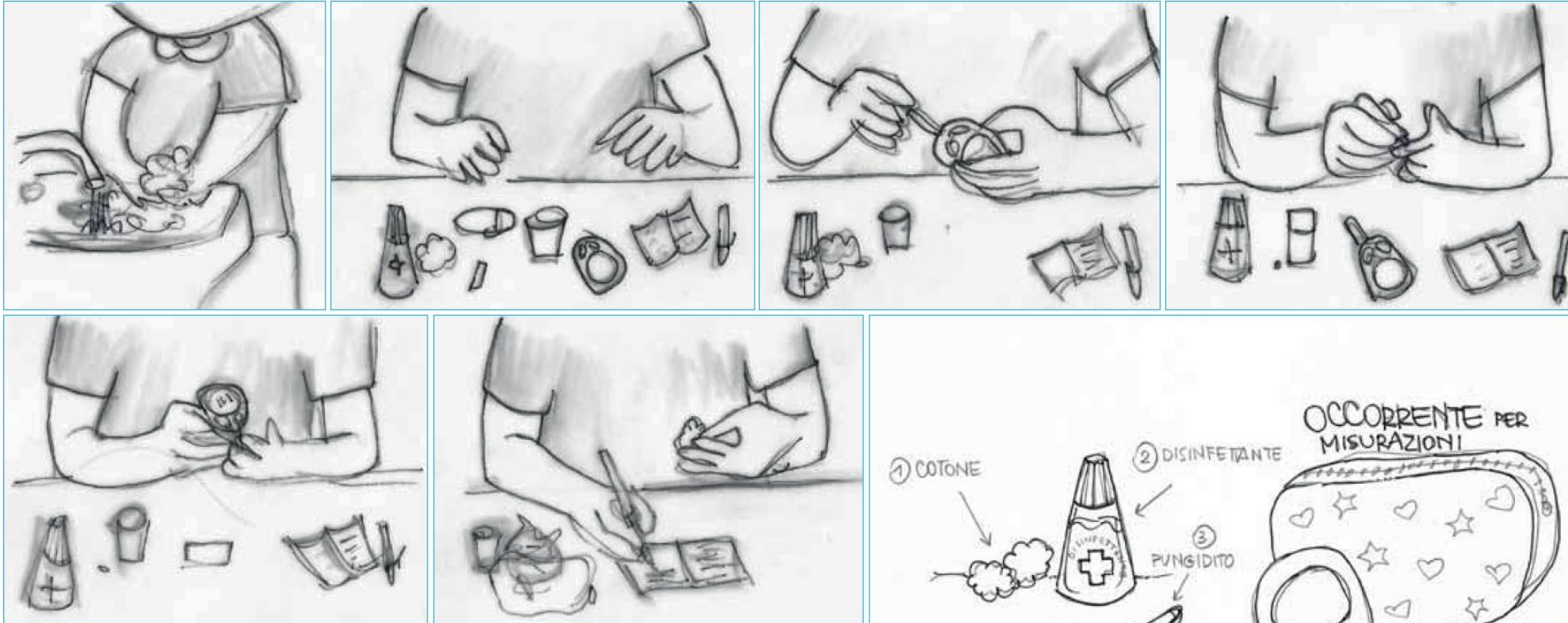
3 - 10 times a day

Possibility of errors in the measurements
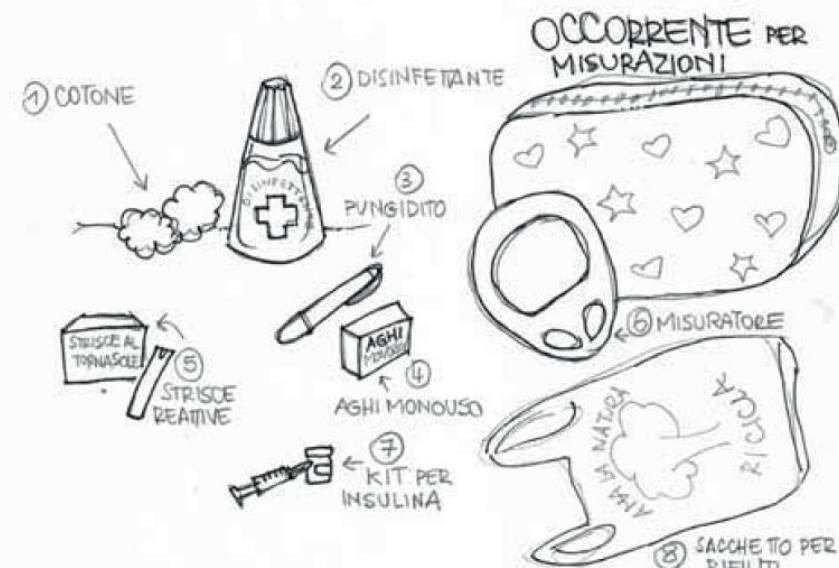
Focus Group
What

In focus groups, data is collected through a **semi-structured group** interview process.

Focus groups are moderated by a group leader. Focus groups are generally used to collect data on a specific topic.

Focus Group

WHY

- To get perspectives and experiences from people on a topic, particularly when these are people who might otherwise be marginalized

- Provide access to comparisons that focus group participants make between their experiences.

# Focus Group

HOW

- **Standardization of questions**. Focus groups can vary in the extent to which they follow a structured protocol or permit discussion to emerge

- **Number of focus groups conducted** - or sampling will depend on the 'segmentation' or different stratifications (e.g. age, sex, socioeconomic status, health status) that the researcher identifies as important to the research topic

Focus Group

HOW

- **Number of participants per group.** The rule of thumb has been 6-10 homogeneous strangers, but there may be reasons to have smaller or slightly larger groups

- **Level of moderator involvement -** can vary from high to low degree of control exercised during focus groups (e.g. extent to which structured questions are asked and group dynamics are actively managed)
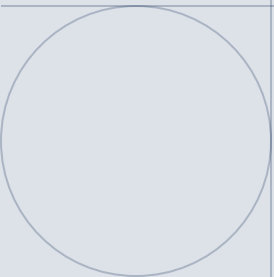
INDIRECT METHODS

01.2

Methods to analyse the User

INDIRECT METHODS

- OBSERVATION

- SHADOWING

- CAMERA STUDIES

Observation
What

Observation (ethnography) studies are defined as:

"methods used to capture human behaviour in the context of the person's natural environment, as a means of gaining insights about people's behaviours and unarticulated motivations, drivers, needs, in order to create innovative solutions".

Observation

WHY

Design ethnography helps answer questions like:

- what is necessary to innovate with success? (needs/design space)
- what are the key social actors and roles to take into account? (target)
- which are the limiting factors? (constraints)

Observation is used to investigate user's behavior, motivations, problems, practical needs.

Observation

HOW

Watch people as they interact with products, services and environments and identify areas where problems occur.

Pick your scenario and record your observation with photos or video.

Analyse the material after the event (and even catch important details you might have missed, like the expressions on people's faces).

Shadowing
What

Shadowing is an ethnographic technique to understand a person's real-time interactions with products, services or process and their shifting contexts and needs over the course of a day.
Shadowing can be conducted over long periods of time or applied more rapidly to gain a quick understanding of a problem.

Shadowing

WHY

- to gain understanding of a user's behaviour, opinions and drivers

- to understand a person's role and paths through an organization or interactions with other objects or people in a given setting.

- to gain a rich understanding of user's motivation and to capture
- what people do and not what they say they do

Shadowing

HOW

Domain and Demographics – Locate the right venue to research and the appropriate person(s)

Secure Access – This is a critical step, as it could take as long to gain access as it does to complete the entire shadowing period. Access needs to be as unrestricted as possible and could involve contacting third parties for proper permissions.

Develop Trust – The goal of shadowing is to gain insider status. Once you have been given access, the researcher must create a healthy rapport with the person being shadowed.

Shadowing

HOW

Shadowing – The researcher closely follows an individual over a set period of time while writing field notes or using video recording. The researcher asks frequent questions for clarification and prompts the participant to give a running commentary on his or her actions and choices (talk aloud technique).

Record – The researcher records and compiles the field notes from the shadow period and adds debriefing notes to maintain freshness of experience.

Analysis – The researcher analyzes the large data set.

Shadowing

HOW

Shadowing

HOW

Camera Studies
What

A User Camera Study allows designers to understand a user's experience by seeing it through their eyes.

It consists in asking a person to take pictures of situations/objects/moments that are relevant for him/her, to analyse them later on.

Camera Studies

WHY

- to understand your users' lives, and specific tasks within the context of their lives.

- to understand a user's experience by seeing it through their eyes

- to understand environments to which you might not normally have access.

Camera Studies

HOW

Identify subjects whose perspective you are interested in learning more about.

Provide a camera to your subject and instructions such as: "Please document your [morning routine] experience with this camera." Or, "Take pictures of things that are meaningful to you in your kitchen." Frame your request a little broader than what you believe your problem space might be, in order to capture the surrounding context. Many insights can emerge from that surrounding space.

Camera Studies

HOW

Have your subject walk you through the pictures and explain the significance of what they captured. Return to a good empathetic interviewing technique to understand the deeper meaning of the visuals and experience they represent.
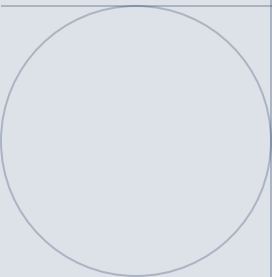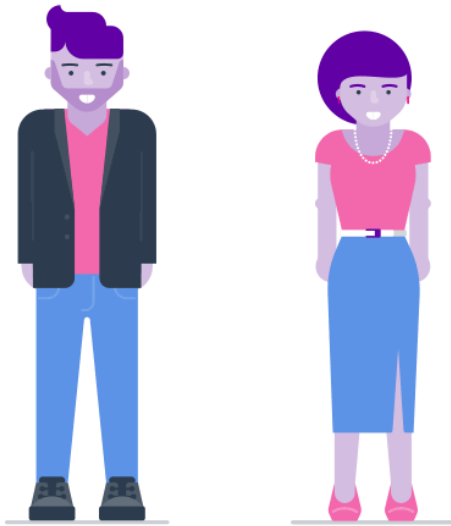
INSTRUMENTAL METHODS

01.3

User or Consumer?

Customer/Consumer VS User

Customer

The one who purchase the product.

NEUROMARKETING

Consumer

Someone who consumes a product. S(h)e could be the customer

DESIGN

User

Someone who uses a product.

Neuromarketing

Main Objective

Neuroscience and Consumer Behaviour Psychology (as well as Neuromarketing) as specific fields of applications of neuroscience and cognitive science to **understand the consumers:**

- **as measurement of physiological and neural signals to gain insight into customers' motivations, preferences, and decisions**

- **identify customers' non-conscious responses**

Design and Neuromarketing

Design

- Unstructured Interviews
- Semi-structured Interviews
- Questionnaires
- Diaries
- Focus Groups
- ……

NON-INSTRUMENTAL METHODS

- Observation
- Shadowing
- Camera Studies
- ……

Neuromarketing

- Eye-tracking (gaze)
- Pupillometry.
- Facial coding.
- Biometrics.
- Electroencephalogram.
- …..

INSTRUMENTAL METHODS

Eye Tracking
What

The technique **focuses on gaze and where customers direct it**.

With its help, you can figure out **colors, fonts, ads,** designs that succeed to grab their attention.

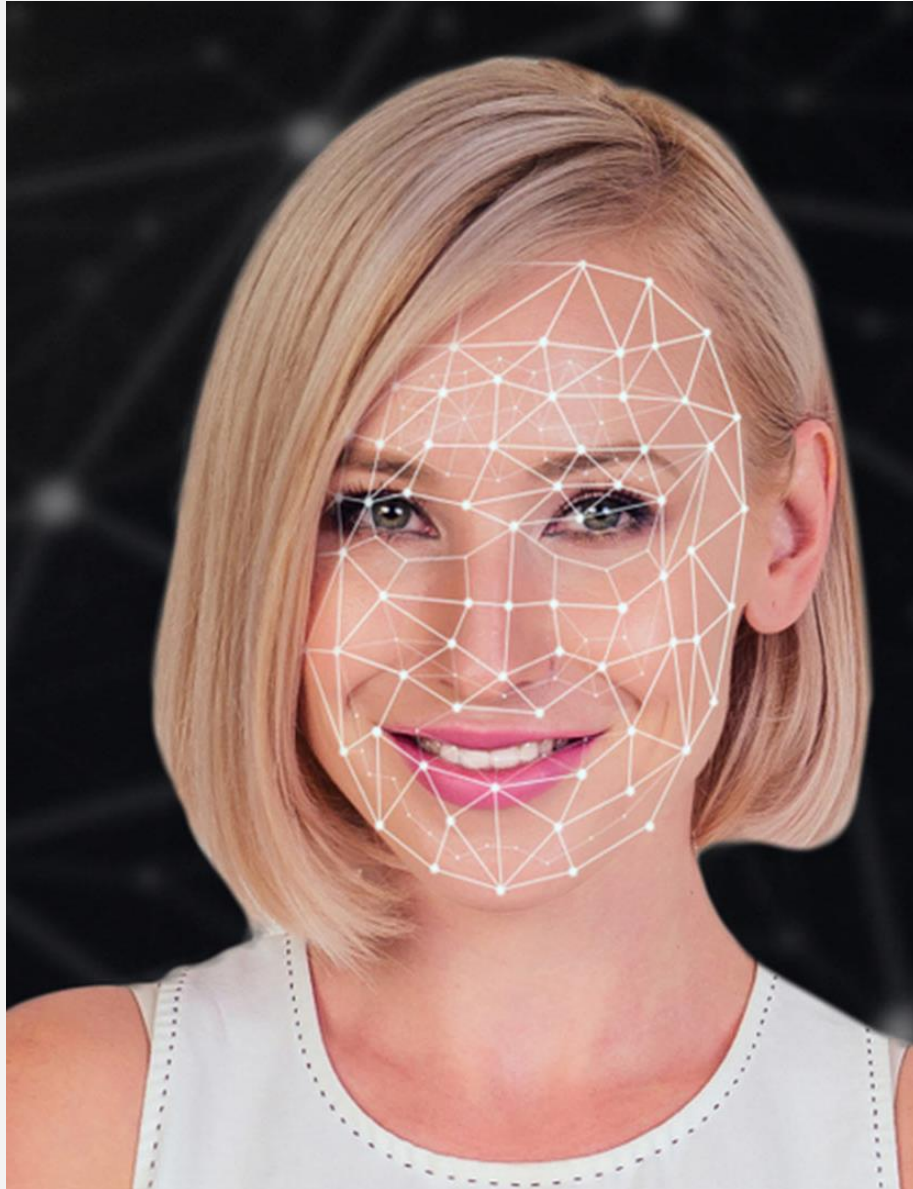Although the technique is easy to manage, **it won't help you evaluate customers' emotions**.

Pupillometry
What

This method draws conclusions based on the state of subjects' pupils.

It checks whether the pupils are dilated to assess the **level of customers' engagement.**

Facial Coding
What

This method focuses on the facial expressions of subjects to identify **emotional responses**.

It enables you to figure out the emotions people feel**:**
happiness, fear, anxiety, surprise, satisfaction, etc.

Biomimetrics
What

This technique identifies the level of engagement and the type of response (positive or negative) based on **skin respiration, conductance, and heart rate**.

Electroencephalogram
What

It enables to reveal **customers' engagement** and recall with the help of electrical signals that come from **neurons inside the brain**.

A CASE STUDY

03