

Human Centered Design (HCD) A PLAYBOOK FOR BEGINNERS

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Human Centered Design
is the process that ensures that the designs match the needs and capabilities of the people for whom they are intended.

Norman, Donald - The Design of Everyday Things: Revised and Expanded Edition (p.9). Basic Books. Kindle-Version.

EDITORIAL

EDITORIAL

My HCD Wonderland. A Professional Perspective.

My HCD Wonderland.

by Katrin Proschek, HCD expert and icebauhaus board member

EITORIAL
HCD Wonderland

Why is there so much software out there, that is hard to use?

How many functions of your text-editor or spreadsheet

application do you really use? As an engineer and a teacher, I can very much relate to the passion of developers to create highly functional soft- or hardware, but I can also emphasize with the users of those products, who often face enormous challenges trying to find what they really need among all those functionalities and to learn how they can use them to fulfill their specific tasks or objectives.

In rare cases, software can kill you, like in the case of the famous radiation therapy system Therac-25*, when at least 5 patient were killed by an overdose of more than 100 times the prescribed dose of radiation, due to a misleading interface. One of the most recent examples is the MCAS (maneuvering characteristics augmentation system) of Boeing's 737 Max that caused two fatal crashes in Indonesia and Ethiopia.

In many other cases, software can just annoy you or disturb you while you are attempting to fulfill your tasks. When using software, all of us face situations in which we do not understand which next step we are supposed to carry out, or worse, we get stuck with cryptic error messages.

* <https://web.stanford.edu/class/cs240/old/sp2014/readings/therac-25.pdf>

"Don't make me Think"

(Steve Krug)

Why Human Centered Design (HCD) is the magic wand for creating better products.

Focus on user needs over functions.

Very often, there is too much focus and ambition towards creating great features by applying the latest technology. Far too many development processes start out by enthusiastically designing cool features without considering what the users really need. HCD does the opposite. It follows the philosophy of analyzing user needs and the context of use before deciding which functional features to implement.

Developers understand their users better.

Because context of use analysis delivers very important user requirements, developers learn to understand their users and are less likely to implement features that are not needed. In HCD processes, developers and users interact through the whole process.

HCD is collaborative, interdisciplinary and agile.

User researchers, designers, developers and domain experts work together with each other and with the users from day one to product release, in order to create great user experience. It is a rewarding and fun way to work.

Human Centered Design
provides a set of methods and tools to do context research and design products or systems in a participatory manner.

This is essential when developing projects with partners and ensures that cultural and political contexts are considered.

INTRODUCTION

INTRODUCTION

Collaboration matters. How to use this playbook!

How to use this playbook!

This Human Centered Design (HCD) Playbook is for anyone who finds it interesting, but it is aimed specifically at innovators, tech developers and entrepreneurs developing and implementing digital products and services for target groups in contexts of emerging markets in the global south.

A special emphasis lies in the transfer and scaling of solutions to different cultural contexts. In the ideal case, you are currently working on your own specific project to which you can directly relate the knowledge and exercises presented here.

You may be completely new to the field of HCD, maybe you have read or heard of terms like usability, UX or design thinking or you may already be applying one or the other related tool or guideline. In this brief playbook, we have tried to make some of the core basic concepts, ideas and methods of the field understandable and relatable in a condensed and easily digestible format.

The content of the playbook is divided into different format sections that recur in each chapter: Informative and instructional sections are mixed with examples and exercises to make it easier for you to both understand, relate and apply the different concepts to the context of your own project.

→ **The recurrent theme throughout the playbook is: How to put the users' perspective at the heart of your development process.**

Main content types of each chapter:

→ Knowledge

These are the main informative sections, aimed at providing relevant insight into the different issues covered by the playbook.

→ Exercise

Here you have the opportunity of trying out what you have learned and applying it to your own situation or project context. Simple tasks and templates for print-out are provided.

→ Example

To make it easier for you to understand and carry out the exercises, we have prepared simple examples based on fictional cases.

How to use it!

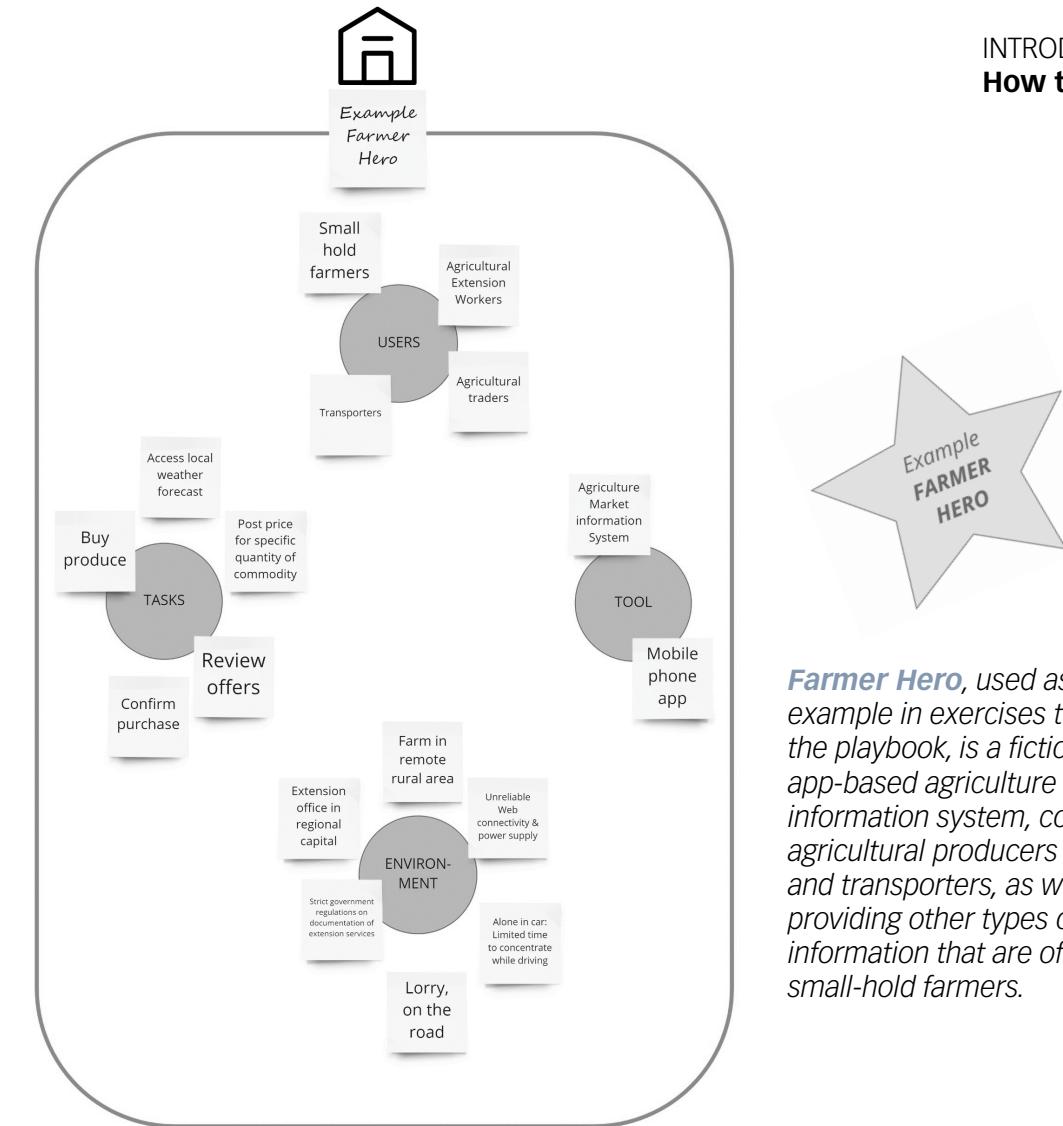
INTRODUCTION
How to use!

We suggest you start at the beginning with chapter one, reading through the knowledge sections and studying the accompanying illustrations, and then proceed by working out the exercises at the end of each chapter, alone or together with the other members of your team. Following the instructions for each exercise, you will find examples of how the exercises could be completed. Those examples, as demonstrated here on the right side, are based on a fictional mobile app that we call "Farmer Hero".

→ **What this playbook is not.** It is not a crash-course on HCD! Studying this document will not turn you into an HCD or UX professional. HCD is a complex subject matter that takes years of practice and dedicated study to properly master. However, we try to set you off in the right direction by inspiring your thoughts and hope that this introductory playbook may spark your interest to continue researching and educating yourself about HCD in the future.

Nor is it a complete set of guidelines for how to integrate HCD into your own work. We hope to give you some new ideas and encourage you to try out new approaches and activities in your work, but actually implementing an HCD process will require more preparation and expertise than what can be provided in this introductory format.

→ **Now, let the journey begin!**



Farmer Hero, used as an example in exercises throughout the playbook, is a fictional mobile-app-based agriculture market information system, connecting agricultural producers with buyers and transporters, as well as providing other types of information that are of use to small-hold farmers.

CHAPTER 01

CHAPTER 01 The User's Perspective HCD –Terminology and Process

Let's start by going through a few of the most basic terms related to the professional field of HCD. All definitions presented in these first two chapters and those you find in our glossary are derived and adapted from the international standard ISO 9241 and from the UXQB International Usability and User Experience Quality Board, that offer certification for usability professionals.

Check here [UXQB](#)

Usability

A system *is not usable per se, but only in relation to a specific context of use!*

Usability is the extent to which an interactive system is effective, efficient and satisfying to use in a specified context of use.

- > An interactive system is **effective** if it supports what users need to do to reach their goals, and if users can figure out how to do it.
- > An interactive system is **efficient** if it supports users in carrying out their tasks using as few resources as possible. In most cases, this means that users must be able to complete their tasks quickly.
- > An interactive system is **satisfying** if it is pleasant to use.

As you can see, there are three essential criteria to this definition, and we will go through them now one by one with simple examples.

Usability is the extent to which an interactive system is effective, efficient and satisfying to use in a specified context of use.

Terminology and Process: Effectiveness

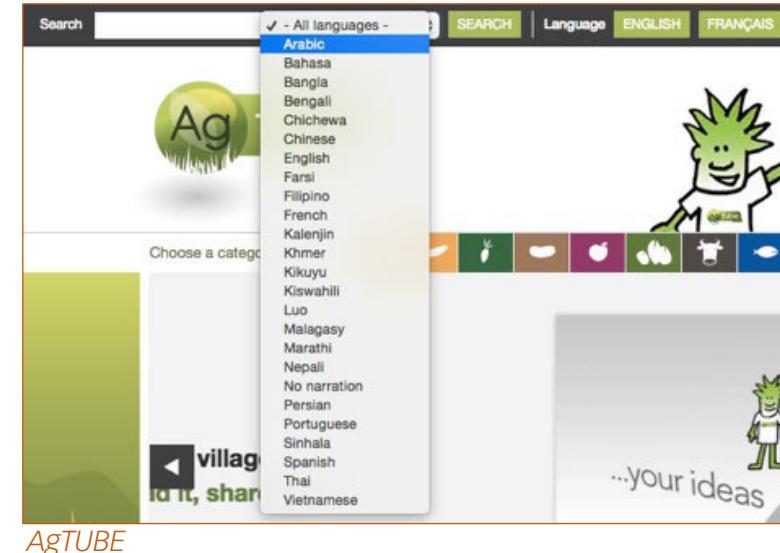
What you see here on the right side are the interfaces of two digital services offering educational content for small scale farmers in different countries across the global south.

> **AgTUBE** offers instructional videos in different local languages. But the overall user interface is only available in English and French, which means that a user who only speaks and reads a local language like Farsi or Nepalese will have difficulties figuring out how to find the right content, even though that content itself has been produced in that specific language.

The design is therefore not effective, because it does not support the user to reach his or her goal.

> The user interface of **Tambero** can be changed into a large variety of different languages. And, furthermore, to find and select the right language, the names of the languages are displayed both in English and in the original local alphabet and writing.

For users who don't speak or read English or French, Tambero's language selection interface solution is more effective than the one implemented in AgTUBE's interface design.



AgTUBE



Tambero

*The second important factor of usability is **efficiency**.*

> The example you see here is from the guiding system of the airport in Munich. As you can see, the sign pointing left displays exactly the same symbols as the one pointing right, meaning that no matter in which direction a passenger heads, he or she will arrive at the same destinations.

The reason for this is that the layout of the airport is circular, so after completing the whole circle, a passenger will of course have reached each of the points of interest along the way.

> For the user to be sure to reach a particular destination in the most efficient way, the signs should instead provide information about which of the two alternative directions is the nearest to reach that destination from the place where the passenger is currently standing.

While this guiding system does enable the user to effectively find what he/she is looking for, the communication is not efficient.

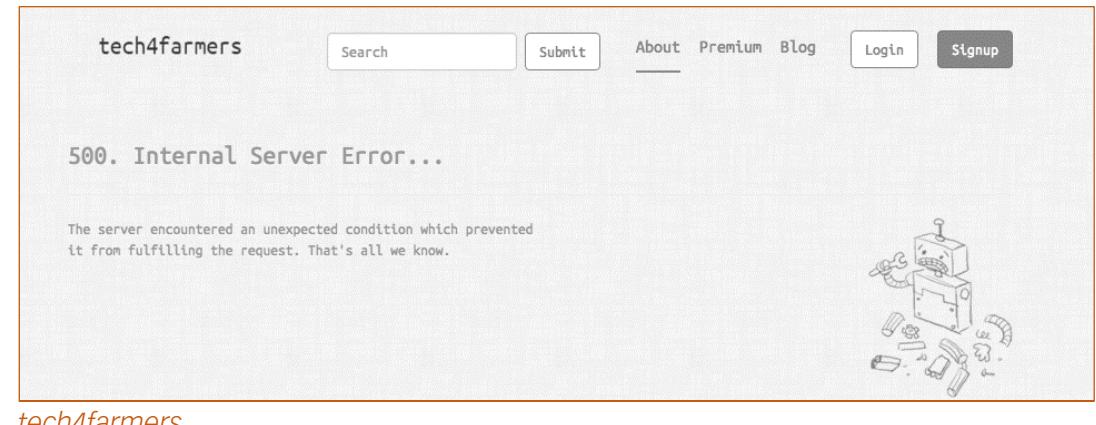


Non-efficient communications at Munich airport

The third criterium for usability is **user satisfaction**. An interactive system is satisfying if it is pleasant to use.

- > The example here from another agriculture app shows an error message reading “500. Internal Server Error ... The server encountered an unexpected condition which prevented it from fulfilling the request. That’s all we know”.
- > It provides no further information to help the user recover from the error or to avoid similar errors in the future and may easily leave the user insecure and frustrated.

An unspecific message like this one risks decreasing user satisfaction.

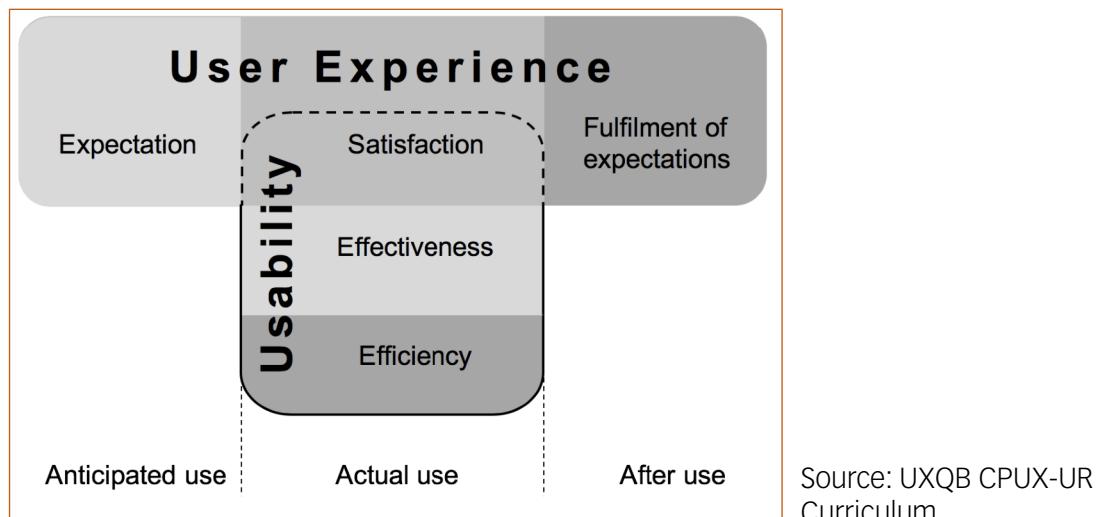


1.2 Terminology and Process

User Experience

Another common term within the field of HCD is **user experience** or, in short: UX. It is defined as follows: The user experience is a user's perceptions and responses that result from the use and/or anticipated use of a system, product or service.

- > User experience considers satisfaction before, during and after use.
- > UX before use may be influenced by company branding, customer reviews, previous interactions, etc.
- > UX after use may be influenced by product delivery, post-sales support, recent interactions, etc.



User experience is a user's perceptions and responses that result from the use and/or anticipated use of a system, product or service.

1.3 Terminology and Process

Accessibility

The term **accessibility** goes beyond mere usability in that it puts special user groups in focus and increases the requirements to accommodate for those specific needs.

- > Accessibility is the extent to which an interactive system enables users to interact with it, regardless of their level of vision, hearing, dexterity, cognition, physical mobility, etc.
- > There exist different sets of standards and guidelines for accessibility, such as the "W3C Web Content Accessibility Guidelines" and different countries have different level of legal requirements for accommodating these groups.

Accessibility is the extent to which an interactive system enables users to interact with it, regardless of their level of vision, hearing, dexterity, cognition, physical mobility, etc.

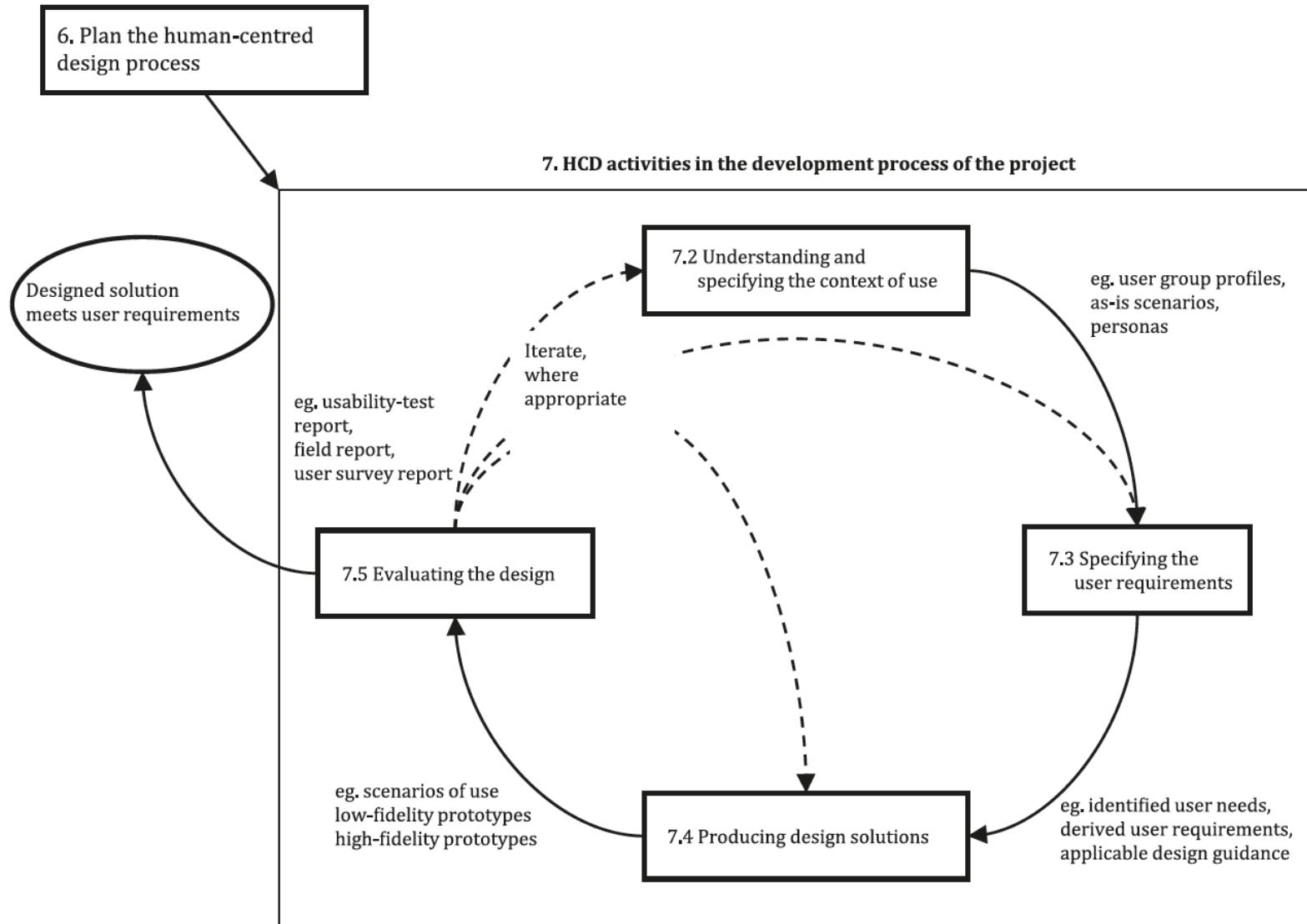
1.4 Terminology and Process

Human Centered Design

Finally, the term **Human Centered Design** or in short **HCD**. On the next page you find a diagram of the HCD process as described in the DIN ISO Norm Nr. 9241-210. A few key aspects characterize the process:

- > HCD is based on a thorough analysis of the context of use, including users, goals, tasks, resources and environment.
- > Users should have a strong role throughout the process, both in the research and development phases and in the evaluation of designs and prototypes.
- > The process is iterative in that it continues in a cyclical fashion until the user requirements are met.
- > HCD addresses the whole user experience.
- > ISO 9241 is a family of standards that cover different aspects of HCD

Human Centered Design is an approach to design that aims to make interactive systems more usable by focusing on the use of the interactive system and applying usability knowledge and methods.



Source: DIN EN ISO 9241-210

EXERCISES 01

Chapter 01 Exercises

EXERCISE 1: Homemade Disaster

Your task:

Evaluate this user interface of a TV remote control from the perspective of an HCD professional!

Can be done as a group work or alone.

STEP 1 – 5 min:

Highlight as many usability problems as you can find on the remote control with a colored pen.

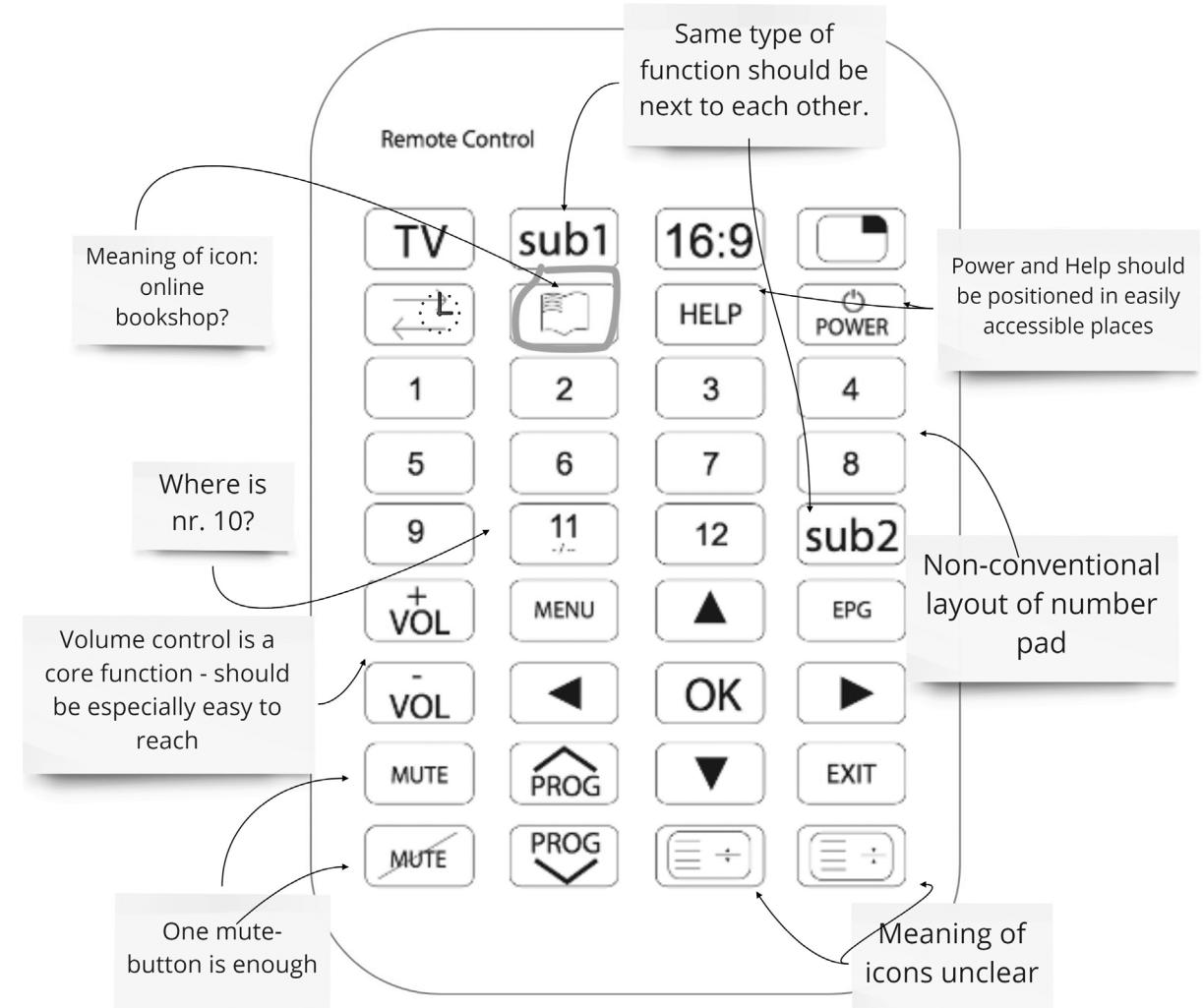
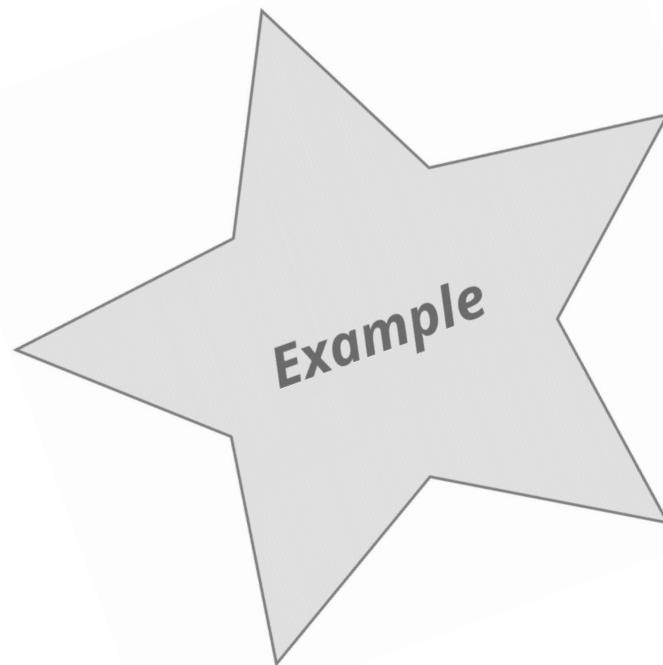
STEP 2: - 10 min

Then explain the reason of each problem by writing notes and discuss with your peers or your team members.



EXERCISE 1: Homemade Disaster - Example

CHAPTER 01
Exercise 1
Homemade Disaster
Example



EXERCISE 2: Usability Evaluation

Your task:

How can you measure if your interactive system is usable?

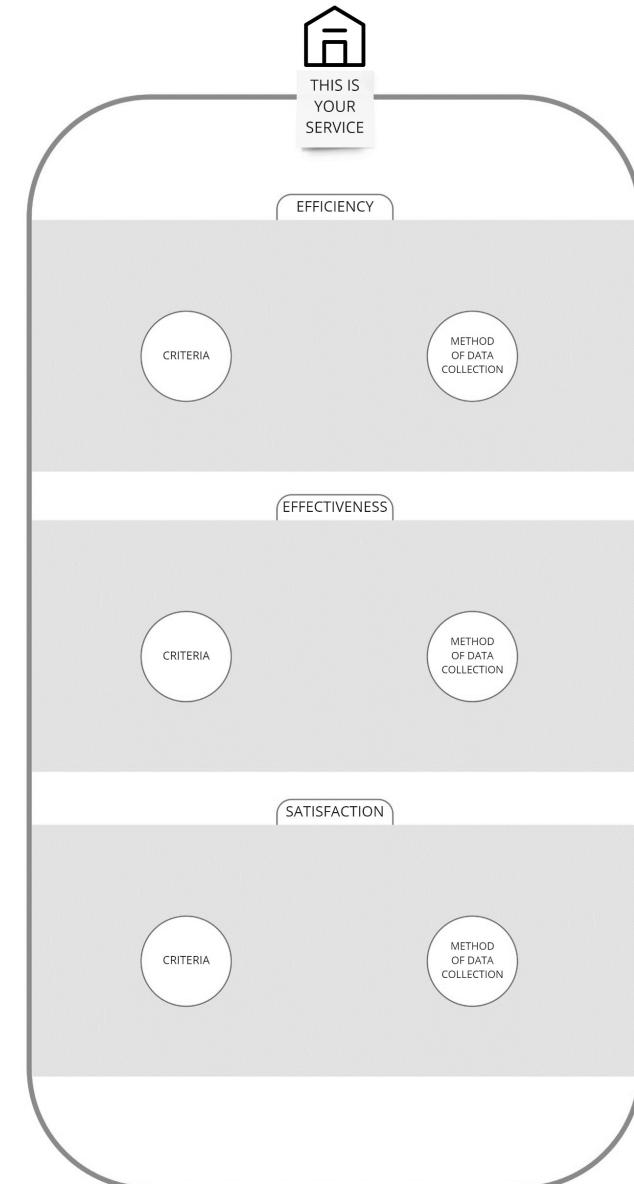
STEP 1 – 10 min:

First, think about your own product or service (in case you are working on one). Individually write down on post-it notes, what criteria you could define for measuring each of the three factors that together make up the usability of the system. For each criterion, name a corresponding method of data collection that can be used to verify its completion. Paste the post-its onto the corresponding fields of the template.

- > Acceptance criteria are quantitative or qualitative measurements of what a member of the user group should be able to achieve by using the system.
- > Methods of data collection refers to, by what means you can find out if the criteria have been met or not.

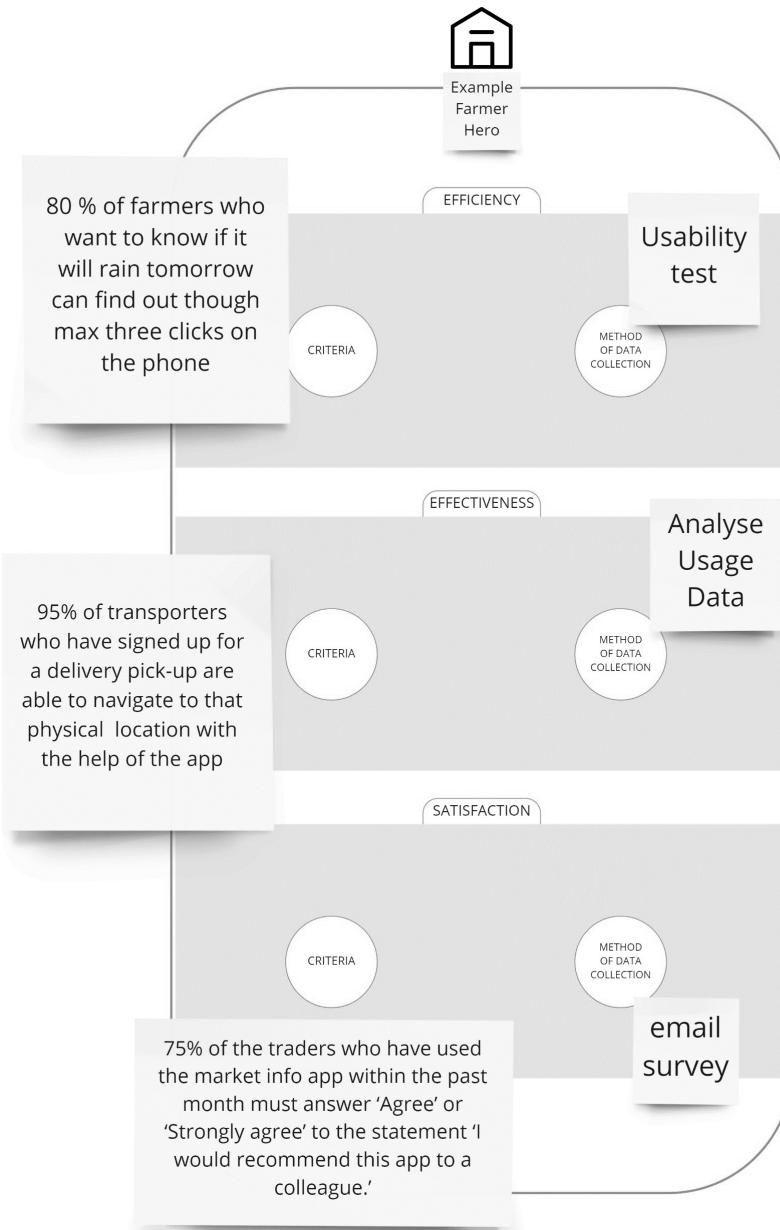
STEP 2 – 20 min:

Discuss your suggestions in your team and highlight common identified outcomes.



30 min

EXERCISE 2: Usability Evaluation - Example



EXERCISE 3: HCD step by step

Your task:

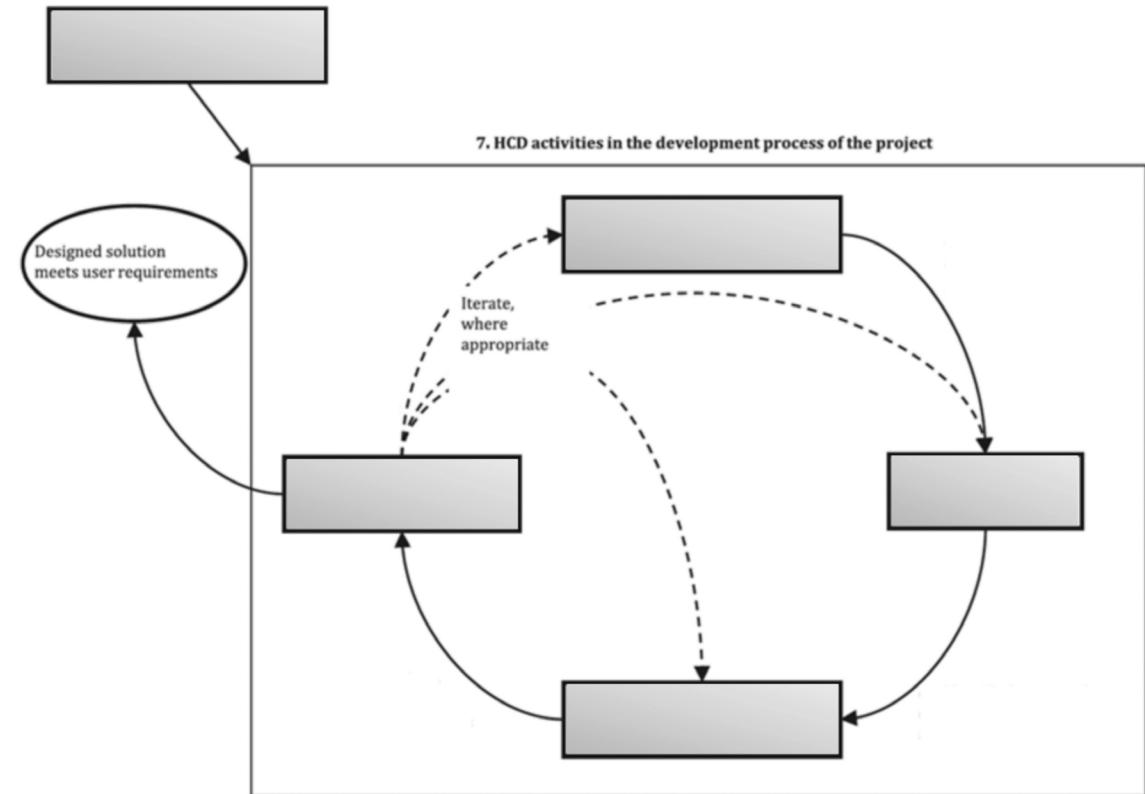
Complete the steps of the HCD cycle!

STEP 1 – 5 min

First identify the five activities as main steps of the HCD cycle according to the DIN EN ISO 9241-210 norm. Put them in the right order in the map.

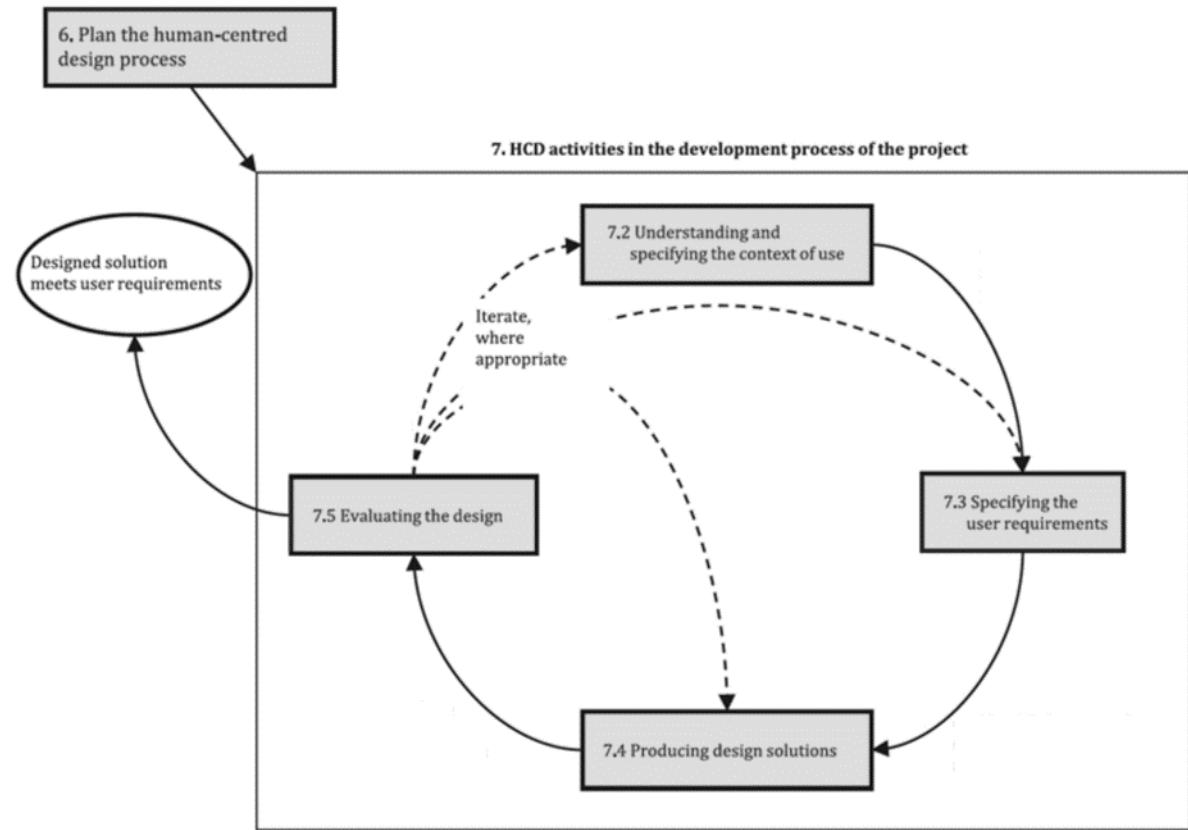
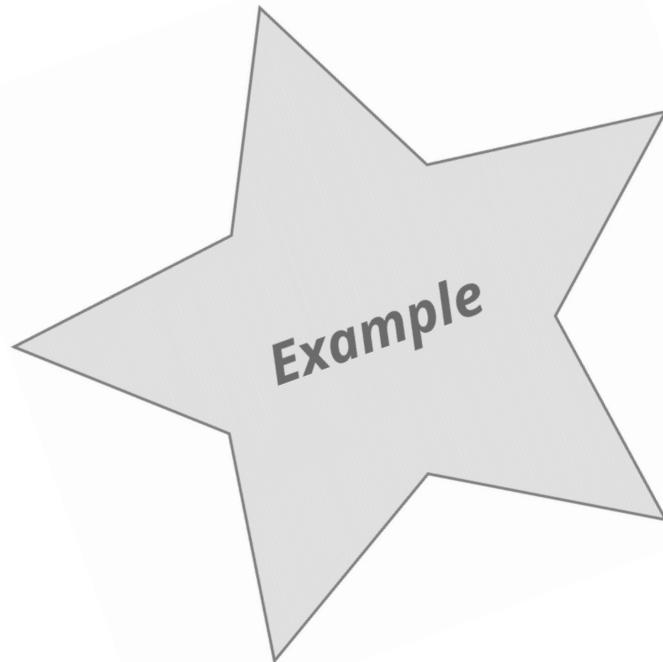
STEP 2 – 10 min

Compare with your peers, how you each understand the different steps of the HCD cycles. Discuss how you could apply the HCD cycle of activities to your own professional practice!



EXERCISE 3: HCD step by step - Example

CHAPTER 01
Exercise 2
HCD step by step
Example



Chapter 01

Final notes

In this first chapter of the HCD playbook, we defined a few main concepts: usability and its three defining criteria effectiveness, efficiency and satisfaction, as well as the terms user experience, accessibility and Human Centered Design (HCD).

CHAPTER 02

CHAPTER 02 The User's Perspective HCD – Context of Use – an Orientation

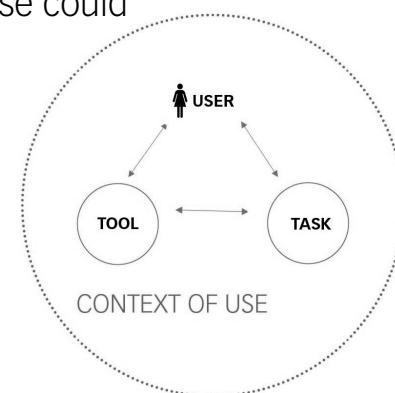
In this second chapter of our playbook on human centered design, we will have a closer look at what the context of use is and why it is so important when designing products with a human centered approach.

2.1 Context of Use

Usability and Context of Use

For HCD experts, **context of use** is the combination of the users themselves with their specific characteristics, their goals, tasks and resources, acting in specific environments.

- > Usability is about how well a user can fulfill a task with a specific tool to reach a specific goal.
- > The environment in a context of use includes the technical, physical, social, cultural and organizational environments.
- > The influence of **technical or physical environments** is easy to understand. If I am sitting on a comfortable office chair on a desk of appropriate height, it will be easier to work with my computer than working with the same laptop while I am lying in my hammock.
- > To understand **social, cultural and organizational environments** and draw the right conclusions about how those could influence the user experience requires more research and understanding.



Context of use
is a combination of users,
goals, tasks, resources, and
environments.

2.2 Context of Use

Analyzing

> **Goal:** context of use descriptions are created to describe important and relevant factors in a format that is easy to understand and relate to.

> They are suitable for identifying user needs, which are later used to derive system related user requirements.

> **Methods:** (contextual) interviews, observations, on-site visits, surveys, focus groups, workshops, analyze already existing systems, literature research, etc ...

To transfer the gained knowledge to those who will later develop and implement the products, it is important to document all learnings in a format that is easy to access and understand.



An Indonesian beekeeper is explaining his own beehive model and narrating his long history of experience in beekeeping and honey production. (SAMS project)

Source: A. M. Paramit Chalid, Labtek Indie

Analyzing the context of use at the beginning of a project is essential. To do context research means to really understand who users are and how they are influenced by their environment.

2.3 Context of Use Documenting

In this short introduction, we show you only one first example of a documentation type.

- > Teams that are developing and implementing a technological solution need to empathize with the users and need to predict and anticipate the users' reactions. To make this easier for the developers, you can for instance create **persona descriptions**.
- > Personas are not real people; they are realistic representations of users, constructed from empirically determined data, for example from observations or interviews. A persona is a fictitious but realistic description of users and what they intend to do when using an interactive system.
- > In the image below you see an example of a persona description for an Indonesian beekeeper named Dicky.

The screenshot shows a persona document titled "The Experienced New Generation Beekeeper" for "DICKY". The document includes a profile picture of a man holding a honeycomb, basic demographic information (Occupation: Full-time Beekeeper, Location: Suburban, Age: 20-40 years old), and detailed user requirements. It also features a summary of challenges and a section on metrics. At the bottom, there are icons for Economic security, Adaptability to technology, Readiness to learn, and Optimism and confidence.

Profile:
Dicky is an optimistic and confident beekeeper. He acquires knowledge on beekeeping methods from previous generations. Additionally, he develops new methods while explores further through the process of networking with other beekeepers and beekeeping scientists. Although he is open to new knowledge, Dicky has certain prerequisites before he accepts it. Dicky often faces challenges and risks in beekeeping, but he still delivers well because there is guarantee of a greater profit. Dicky is very keen on sharing his experiences and lessons learned to other beekeepers, and they regularly communicate with him to consult their beekeeping problems through online or offline platforms.

Metrics:

- Has quite years of experience as a beekeeper
- Has a Standard Operating Procedure (SOP) and a neat beekeeping management
- Already has a mechanism to control the behavior of bees in analog way
- Beekeeping independently and not dependent on any associations
- Has strong social and economic capital
- Exposed by new knowledge and technology

Challenges:

- New knowledge and methods are accepted with certain conditions and preconditions
- Old knowledge about the method of beekeeping is accepted as habitual (taken for granted)
- Is faced with operational costs and relatively high social costs associated with beekeeping

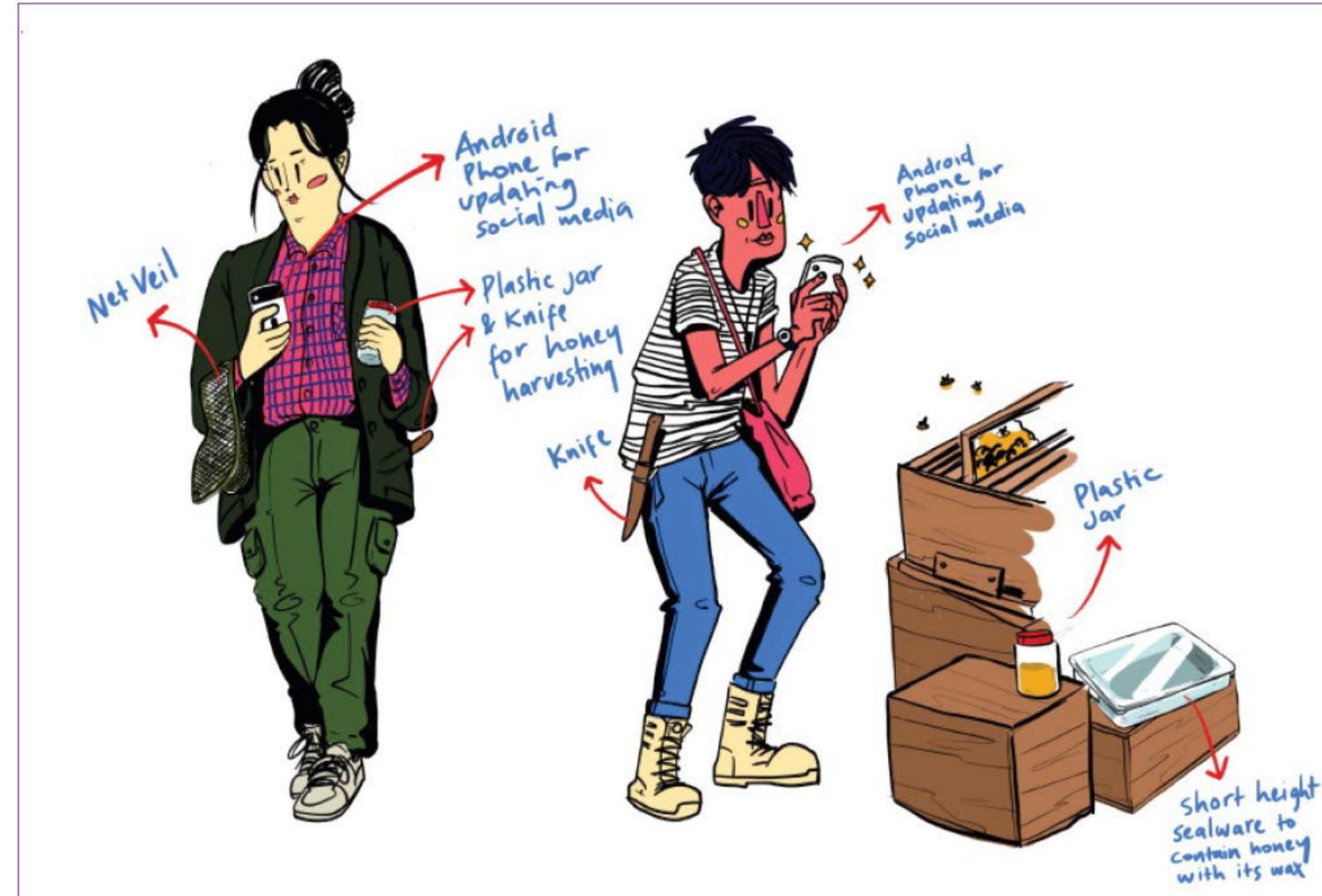
Source: A. M. Paramit Chalid, Labtek Indie / SAMS project

To document who the future users really are is important for a team who will implement the product.

Context of Use: Documenting

CHAPTER 02 Context of Use

Here on the right, you see an example of a drawing of Dicky's essential work situations intended to further enhance the persona description on the previous page.



Source: A. M. Paramit Chalid, Labtek Indie / SAMS project

2.4 Context of Use

Understanding it, is a step in HCD.

> Why is it so important to understand the context of use?

- it improves usability and user experience
- it prevents development of unnecessary functions
- it offers unique opportunities to involve the implementing team in order to give them a deep understanding of their users ...

> What challenges are there?

Very often context of use analysis is cut short or even cancelled due to shortage of money and time. It can be challenging to gain access to users and the users' context.

HCD experts often face clients who are unaware that investment in context of use analysis saves money by preventing premature, assumption-based implementations.

You will learn more about cultural factors of user environments in chapter 3. On the next pages you find two examples of solutions where physical, cultural and social environment factors had a crucial influence on the design.

Understanding the context of use can give you important knowledge about how to improve the usability of your product and create a great user experience for its users.

Context of Use: Understanding it as a step in HCD (1/2)



Regional infrastructure and demographics: This is a detail of the Mexico City subway system map. If you look closely, you can see, that every station is represented by a small picture or icon.

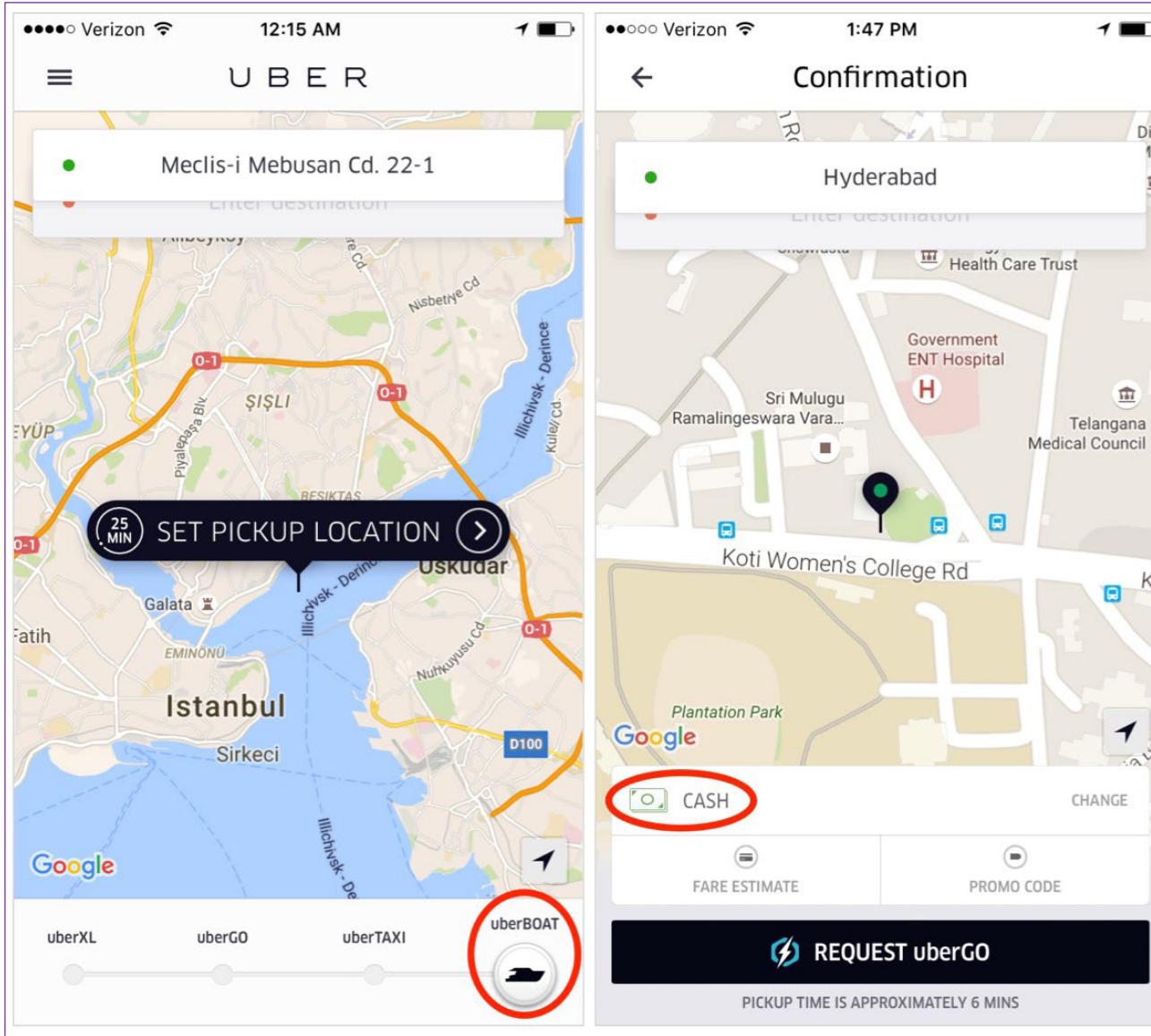
Source:
<https://mexicometro.org/news/2015/11/updated-metro-map/>



Each of these icons bears a resemblance to an existing landmark. This system was created to ensure that everybody - literate or illiterate – is able to use the metro without help.

Source: <https://mexicometro.org/news/2015/11/updated-metro-map/>

Context of Use: Understanding it as a step in HCD (2/2)



Regional infrastructure and demographics: In these examples from the Nielsen-Norman group, you see two examples of how the local geographic and cultural context influenced the design of the global Uber ride sharing service in different countries of implementation.

The screenshot on the left shows the addition of "uberBOAT" as a transport option in Istanbul, due to the city's location on the banks of the Bosphorus straight.

On the right side you can see that Uber users in India have the option of paying for their ride in cash as opposed to only digital payment options.

Source:
<https://www.nngroup.com/articles/cultural-nuances/>

02

EXERCISES

Chapter 02 Exercises

EXERCISE 4: Environments

Your task:

Compare and discuss relevant environments for services.

The following are some research findings from a context of use analysis for the fictional agriculture information system Farmer Hero. Identify and discuss influences of different environments of your own product.

Step 1 - 5 min

Sort the examples of the Farmer Hero app below, according to which aspect of the environment they belong to.

Step 2 – 15 min

Follow up with the same procedure for your own solution or product.



Unreliable Web connectivity & power supply

Strict government regulations on documentation of extension services

Farm houses mostly do not have exact street address and house number

Farmers live on their farms together with average eight other household members

Digital wallets can be topped up with cash in authorized agent offices available in each district.

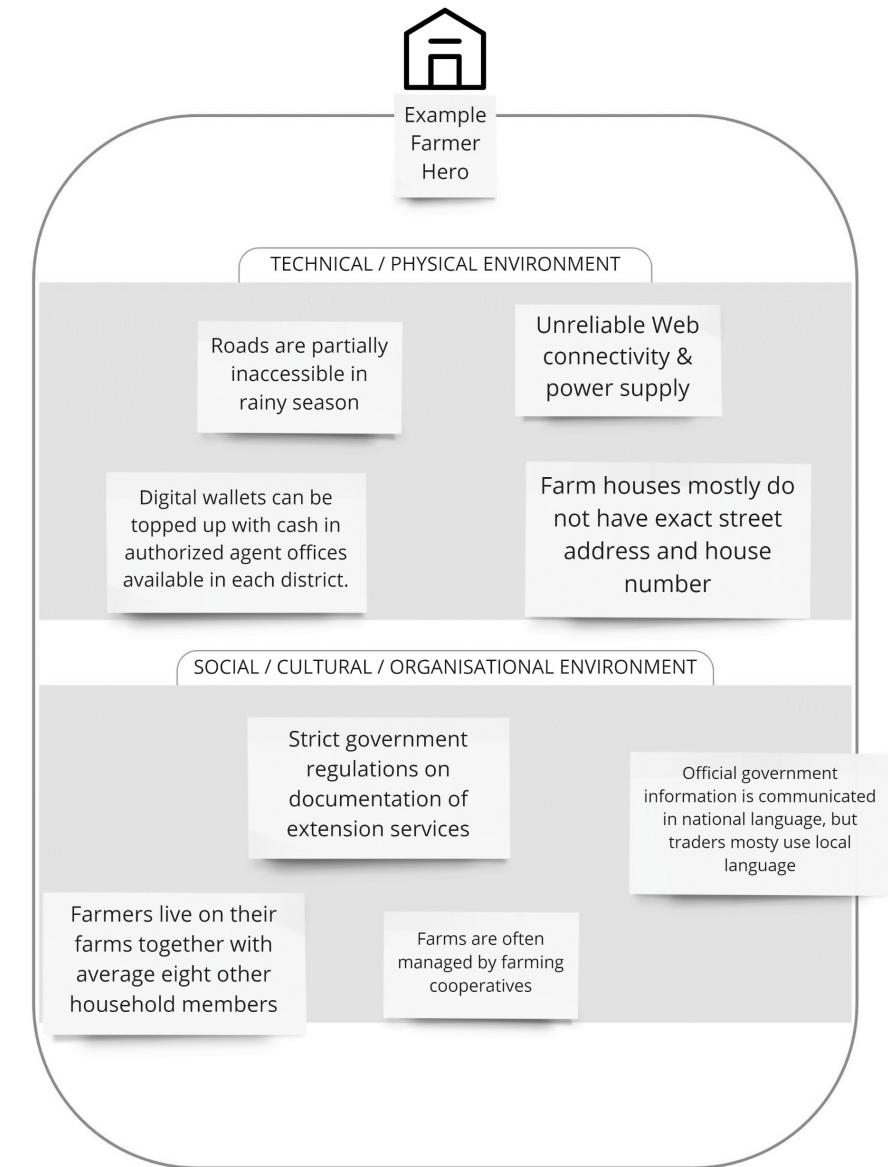
Official government information is communicated in national language, but traders mostly use local language

Roads are partially inaccessible in rainy season

Farms are often managed by farming cooperatives



EXERCISE 4: Environments - Example



EXERCISE 5: Context of Use

Your task:

Taking your own project as an example, define the four elements: Users, tasks, tools and environment!

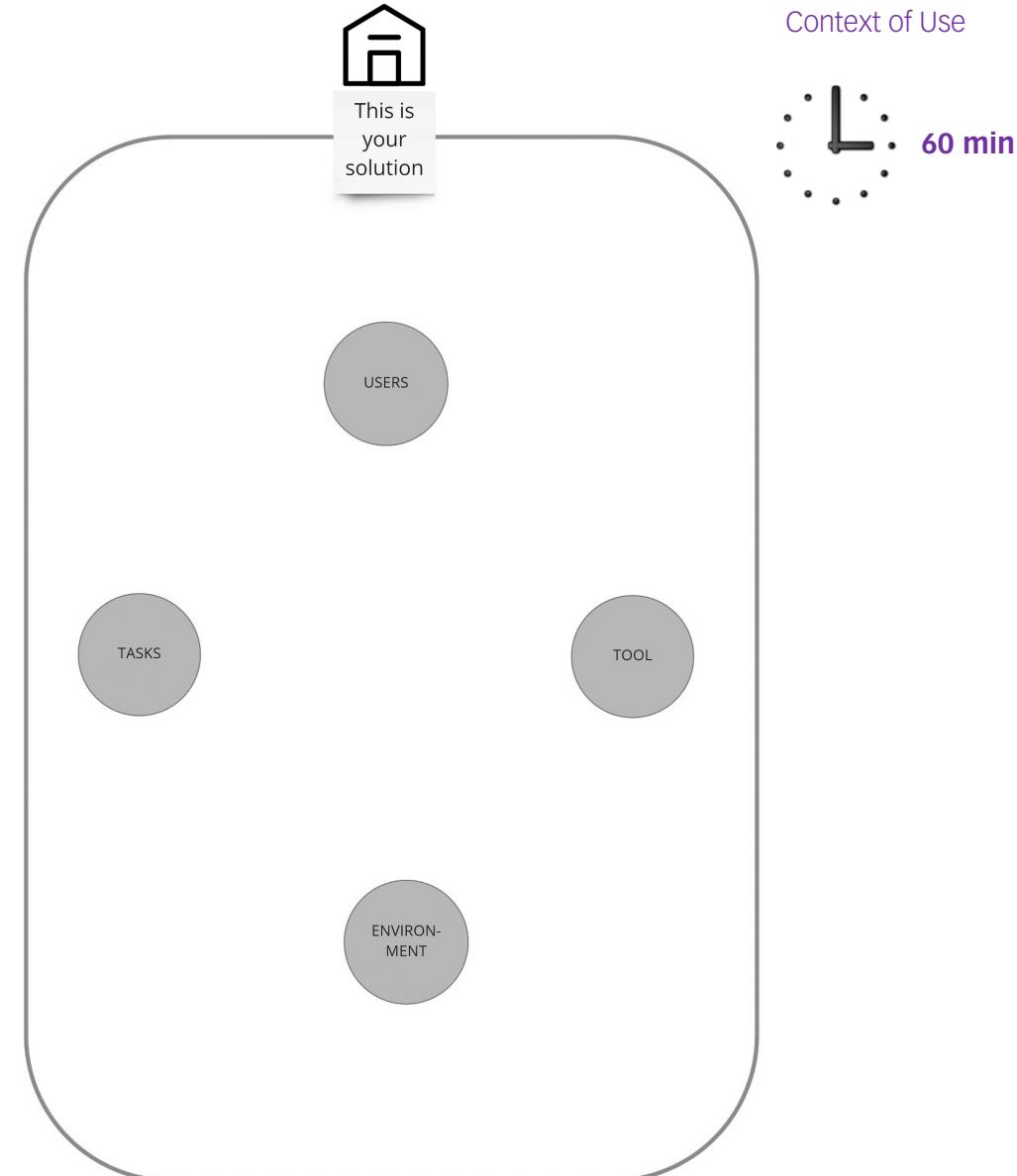
Answer the guiding questions step by step within your team and make sure that you have a common understanding of the terms and their relations.

1) Users: Who are the target users? There may be only one main user group or several different ones for different roles in the system. User groups may also be comprised of sub-groups.

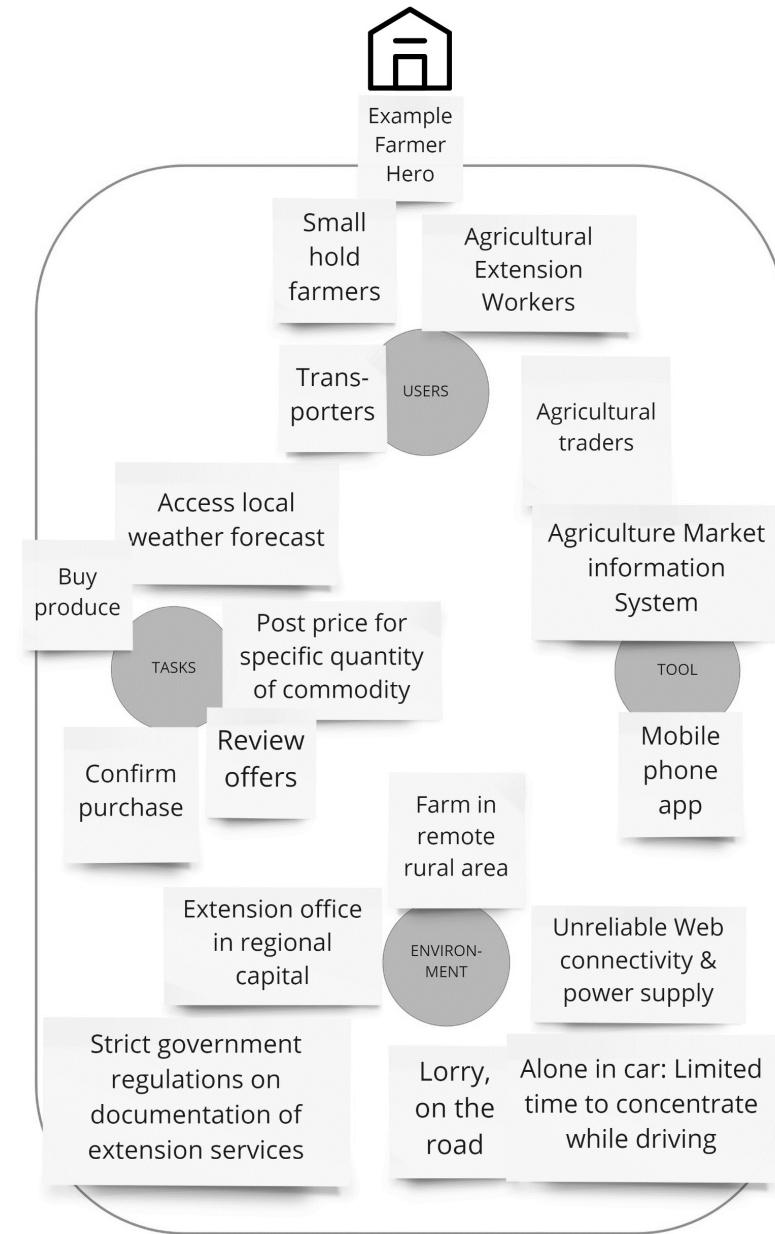
2) Tasks: Tasks are a set of activities undertaken by a user in order to achieve a specific goal. What should the users be able to do? (Please note that tasks also consist of subtasks, which should be considered as well.)

3) Tools: What is the (digital) tool that supports the users' goals? (Could consist of hard- and software components)

4) Environment: The physical, social and technical conditions under which a user interacts with an interactive system. The social conditions include the organizational conditions.



EXERCISE 5: Context of Use - Example



Chapter 02

Final notes

We have now looked a bit more closely at how to understand the context of use of a digital service and why it is important for its usability. Understanding the context of use is the first step in the HCD cycle. The documented research findings from this step serve as a basis for all further steps of development and evaluation.

CHAPTER 3

The User's Perspective

HCD – Cultural Factors and Metaphors

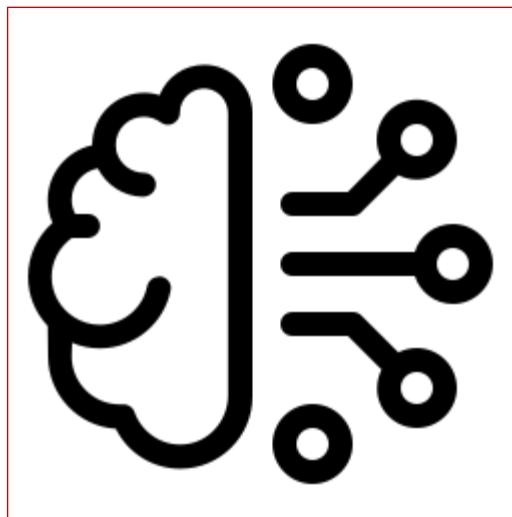
In this third chapter, we will look at some basic concepts from the domains of psychology, anthropology and cognitive science that help to better understand the process of human computer interaction and the way that user interface design can guide the user's attention and intuitive understanding to avoid usability problems, also in cross-cultural contexts of use.

3.1 Cultural Factors and Metaphors

Mental Models

We start out with the concept of a „mental model“. American cognitive scientist Donald Norman has been exploring this concept within the field of usability engineering since the early 1980s. He defines the term like this:

A **mental model** is what the user believes about the system at hand. It is based on belief, not facts: that is, it's a model of what users know (or think they know) about a system such as your website.

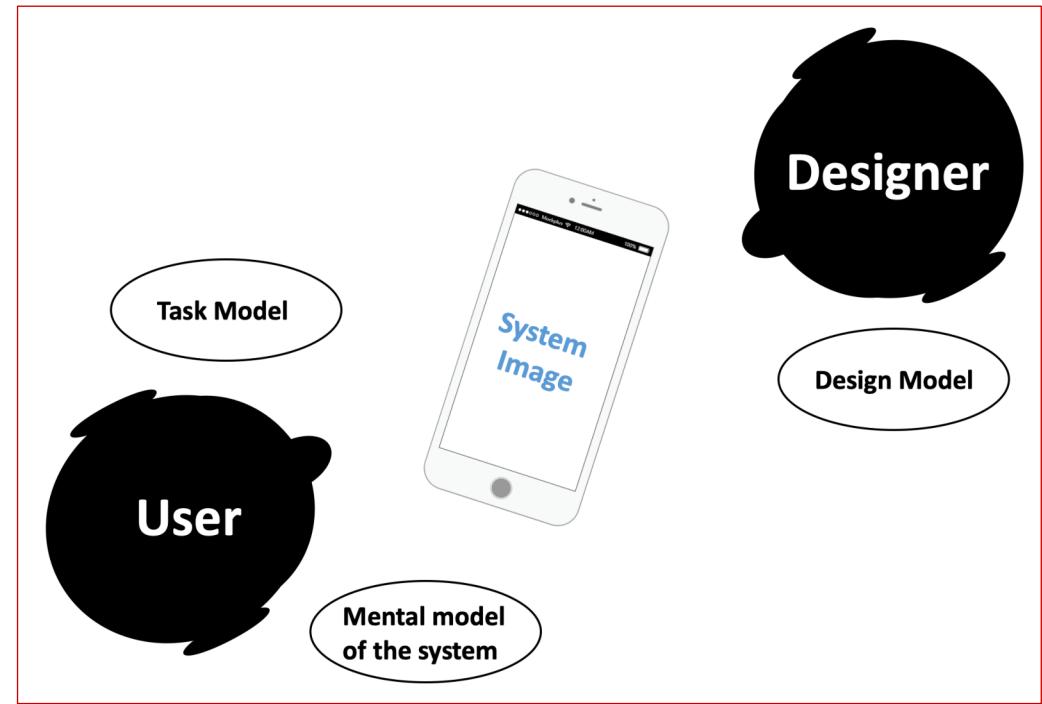


A mental model is what the user believes about the system at hand. It is based on belief, not facts.

(Nielsen Norman Group)

Here you see a simple illustration of the **process of user interaction** with a digital service. Essentially, it is a communication between two stakeholder-roles. Each of these parties have their own understanding of the situation.

- > First of all, the user has a set of own objectives, like for instance to purchase a concert ticket. The user forms a mental model of how the digital system might function. These assumptions may be based on the user's previous experiences and immediate perception of the user interface. The user generates a task model anticipating the sequence of steps that would be needed to complete with the system to achieve the objectives.
- > How the system actually functions depends on how it was conceived and developed by the designer. The design model may often differ significantly from the user's mental model. This mismatch is a major cause of usability problems.
- > The task of the designer now is to communicate to the user, how the digital system does actually function. The designer can communicate through the design of the system image. The system image includes the graphical user interface, hardware components, like buttons, input slots, levers or acoustic signals, and so on.



*Mental models in the process of a user's interaction with a digital device,
according to Donald Norman*

Cultural Factors: Mental Models

CHAPTER 03 Cultural Factors

In general, the designer communicates by integrating “affordances” into the system image. An **affordance** is an aspect of an object that makes it obvious how the object could be used.

- > For instance the handle of a **cooking pot** (1) indicates to the user that he/she can pick up the pot by grabbing and holding on to the handle.
- > In the case of a **digital product** (2), a menu of tabs in a web browser window indicates to the users that they can click on individual tabs to access web pages that are currently hidden, and so on.
- > To avoid unnecessary explanations, the designer should rely as much as possible on the users’ prior experience and knowledge. We will now look closer at two design tools that can be particularly helpful here: conventions and metaphors.



1) “Affordance”: The handles of a cooking pot afford grabbing them to pick it up.

Source:
[@N02/10050193566/](https://www.flickr.com/photos/89878360)



2) Tabs in a tab-menu afford clicking on them to access pages hidden behind the current one.

3.2 Cultural Factors and Metaphors

Metaphor

Metaphors - as they rely on prior learning - are of course culture dependent. It is therefore essential that the designer be aware that - even in the case of very simple concepts - the actual end-users' mental model may differ significantly from the designer's own understanding.

There are different main types of metaphors:

- > **Functional:** A power switch is an example of a functional metaphor, in that the functional behavior is analogous between source and target domain.
- > **Organizing:** An organizing metaphor, on the other hand, would be for instance the classic desktop metaphor.
- > **Visual:** A visual metaphor like the image of a stop-sign may not have any functional or organizing resemblance with the physical world, but serve as an easily understandable signal on a symbolic level.

A metaphor is a mental model of an already known situation or concept, transferred onto a different, but analogous, domain.

Cultural Factors: Metaphor - Functional

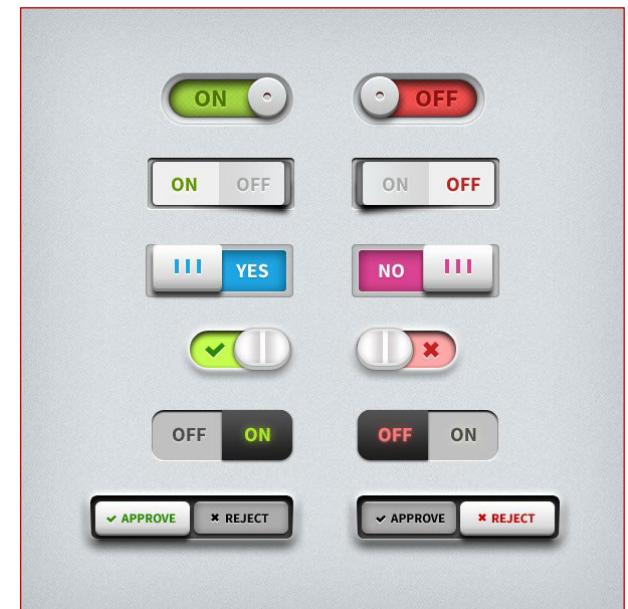
> First an example for a **functional metaphor**: a simple power switch is a device that pretty much any potential user would know how to operate.

Therefore, by integrating the visual representation of such a switch as a part of the graphic user interface, no additional instructions are necessary – the user will intuitively know that “flipping” the switch will lead to switching on or off a specific function.

In a functional metaphor, the functional behavior is analogous between source and target domain.



Source domain: Everyday electric appliances



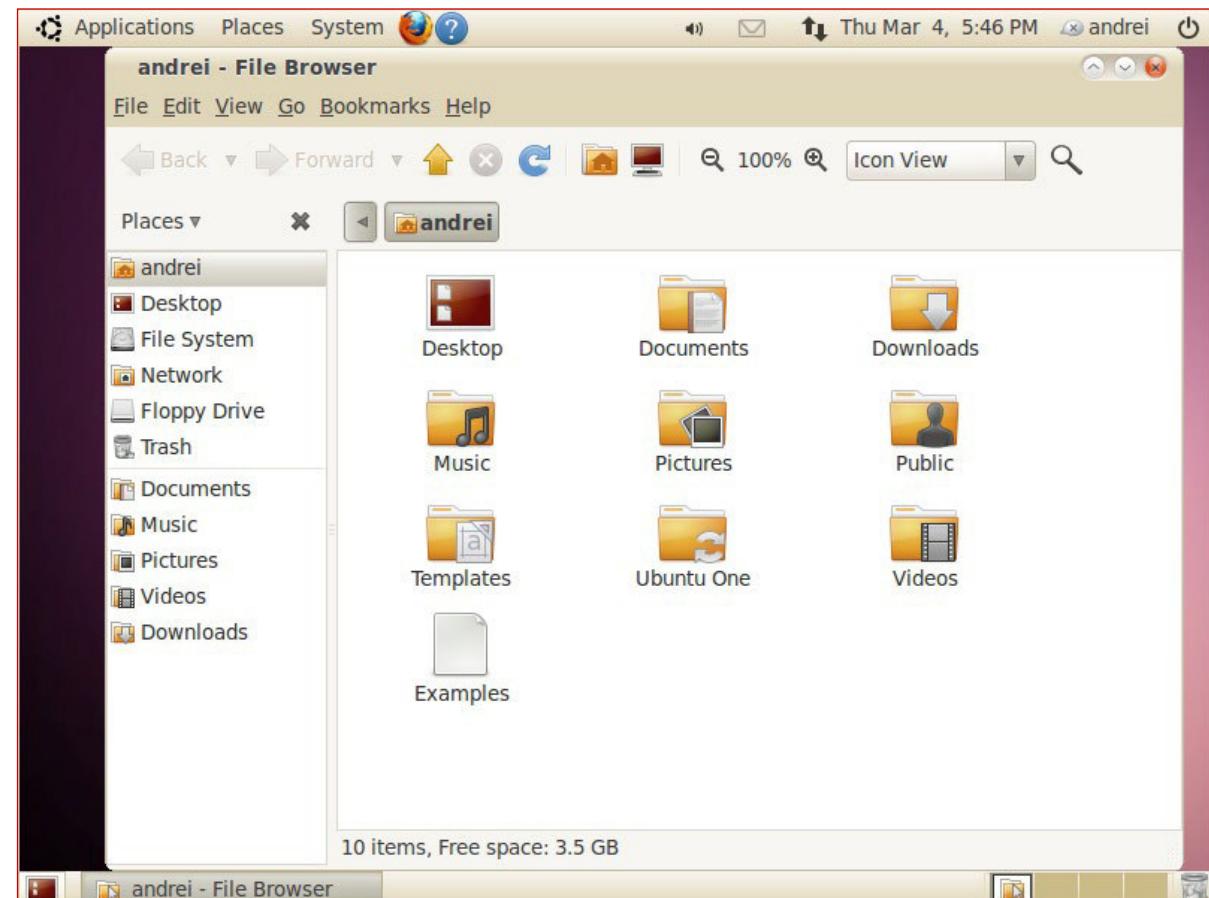
Target domain: Website, app, etc.

Source: ui-cloud.com/toggle-switches-ui-elements/

Cultural Factors: Metaphor - Organizing

> An **organizing metaphor**, on the other hand, would be for instance the classic desktop metaphor, where a computer „desktop“ does not function literally in the same way as a real life desktop, but the visual cues, for instance icons designed as documents, folders, trashcan and so on provide a frame of reference indicating to the user how he/she can interact with them. Another example would be, organizing the items in an online store according to the rooms of a house, where you find items for cooking in the kitchen, etc.

An organizing metaphor provides cues to elicit a mental model of an already known environment or situation to make it easier for the user to intuitively orient him/herself in the digital space.



Organizing metaphor: "Desktop"

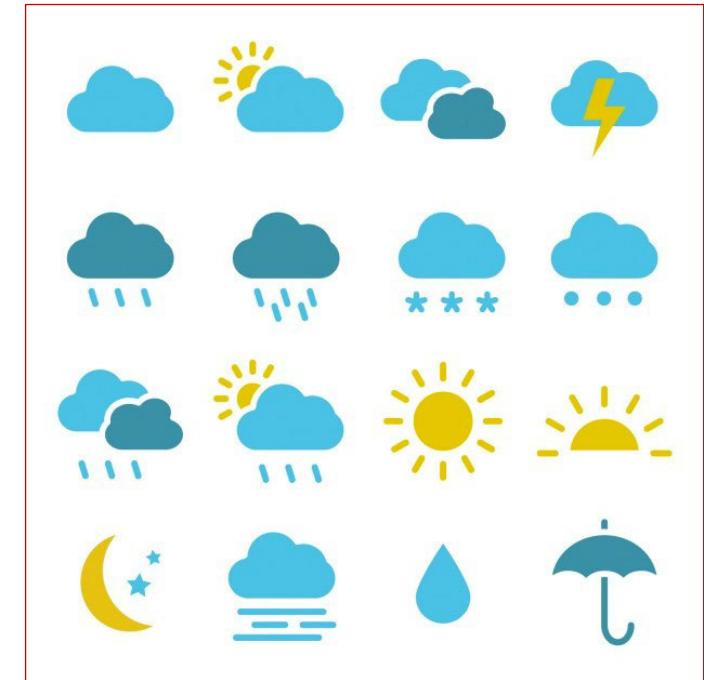
Source: www.webupd8.org/2010/03/new-ubuntu-1004-light-and-dark-themes.htm

> Finally, a **visual metaphor** like the image of a stop-sign or images of the sun and the moon may not have any functional or organizing resemblance with the physical world, but serve as an easily understandable signal on a symbolic level, as to how to interpret the information at hand and what interaction may be appropriate in the corresponding situation.

A visual metaphor functions on the symbolic level.



Visual metaphor: alert



Icons symbolizing night, day and different types of weather

Source: www.freepik.com/titusurya

3.3 Cultural Factors and Metaphors

Regional User Conventions

Beside metaphors from the physical world, platform and industry conventions from other common digital services are important to consider and these may also differ significantly between cultural and geographic regions.

> For instance, users in China are much more accustomed to using QR-codes than users in most other places. Here you see an example of a fruit-stand in a market environment, where customers can scan the QR code to access more information about the produce for sale.



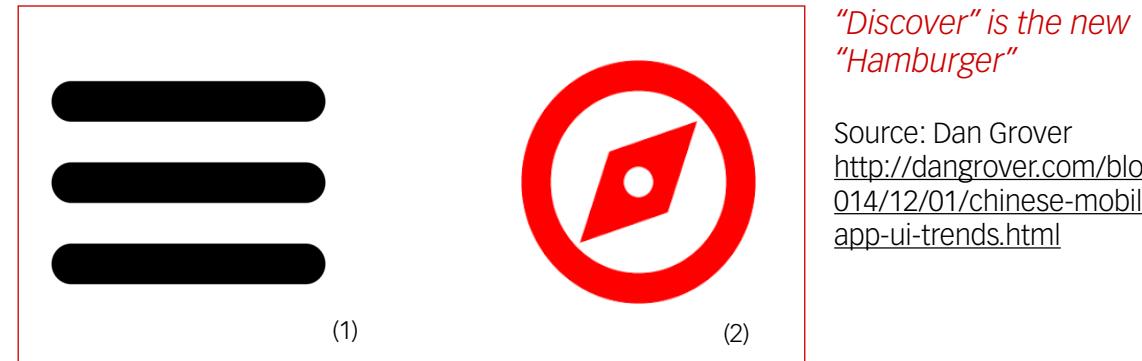
Source: Timmy Shen / Technode

User conventions may also differ significantly between cultural and geographic regions.

Cultural Factors: Regional User Conventions

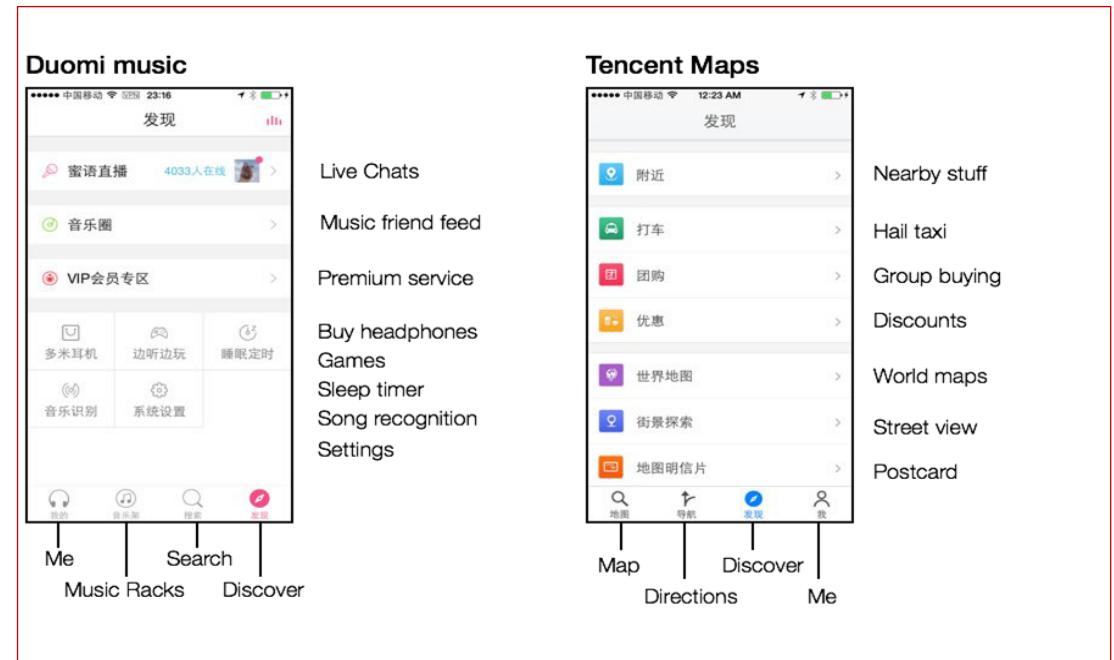
When designing a user interface and interaction flow, it is important to take into account such **regional conventions** that users in different locations may be more or less accustomed to.

- > As a further example: Such a „hamburger menu“ symbol (1) with three horizontal bars, as you see here, has become an established mobile interface convention in western countries – by tapping the icon, the user can easily gain access to the most relevant functions of the app.
- > However, in China, the compass symbol titled „discover“ (2) has instead become the predominant convention for providing the same type of orientation to the user.



“Discover” is the new “Hamburger”

Source: Dan Grover
<http://dangrover.com/blog/2014/12/01/chinese-mobile-app-ui-trends.html>



3.4 Cultural Factors and Metaphors

Cross-Cultural UX

What we learned about metaphors and interface conventions all brings us to the issue of "**cross-cultural UX**" or "Intercultural User Interface Design". Already 25 years ago, Jakob Nielsen with his colleague Elisa del Galdo wrote that: "It is no longer enough to simply offer a product translated in ten to twenty different languages. Users also want a product that acknowledges their unique cultural characteristics and business practices."

When designing and adapting a software to different cultures and locations, there is an important main distinction to make:

- > First of all, the concept of **internationalization** means designing the software from the outset in such a way that it is well prepared to be adapted to various languages and regions without having to make radical changes to the code each time a new cultural context is added.
- > **Localization** instead means the process of adapting the software to a particular region or cultural environment, taking into account such features as language, alphabet and text-orientation, date-, time- and number formats, units of measurement, calendar, color symbolism and national legal requirements such as privacy, liability, consumer labelling requirements, accessibility regulations, etc.

Users also want a product that acknowledges their unique cultural characteristics and business practices.

(Jakob Nielsen and Elisa del Galdo)

Cultural Factors: Cross-Cultural UX

Most elements of human cognition are universally valid, such as the "Gestalt Principles of Perception" that define the basic rules of how our visual system separates objects from their background, which visual details belong together, and so on. Other elements however are culturally dependent and may or may not vary between users in two particular cultural environments.

- > In general, the term "**culture**" means the commonly shared values of a specific group that enable communication between group members and shape behavior and cognitive processes of those same group members.



Source:
albionlanguages.com

Cultural Factors: Cross-Cultural UX - Internationalization

As an example, here you see an excerpt of the style guide for **software internationalization** provided by Microsoft. It shows recommendations for how to best apply text-input fields in combination with sentences.

- > The recommendation suggested here is to re-formulate texts in a way so that the input box can be visually separated from the sentence that it belongs to.
- > This will accommodate more different languages without having to adjust the design and layout each time, because the input field would otherwise end up in different positions depending on the local grammar rules.

UI Controls Within Sentences

The biggest problem with UI controls in terms of localizability is when programmers use them as part of a sentence. Localizers often have to either change the position of the controls (if they have access to a formatting tool) or settle for an improper sentence structure. For example, Figure 1 is designed with an edit control in the middle of a sentence. In its German localization, the edit control had to be repositioned so that what it represented could fit syntactically in the German translation. (See Figure 2.)

Reset 'Fail Count' to zero after day(s).

Figure 1: This edit control occurs in the middle of a sentence.

Fehlerzähler nach Tag(en) auf Null zurücksetzen.

Figure 2: When localized into German, the edit control had to be repositioned.

A better design is to rethink the whole phrase, so that the edit box can be removed from the sentence, so the localizer does not have to reposition the edit box. (See Figure 3.)

Reset 'Fail Count' to zero after how many days:

Figure 3: When localized into German, there is no need to reposition the edit control.

Style guides and design patterns: MS software internationalization

Source: <https://docs.microsoft.com/en-us/globalization/software-internationalization>

This example from Microsoft's **localization style guide** for Indonesia, shows suggestions for how to translate different common English terms using corresponding Indonesian expressions, while avoiding misunderstandings that may be caused by a simple literal translation.

- > Such publicly available catalogues and guidebooks by multinational brands are a very useful basic reference when designing software for cross-cultural use, as it saves you from making unnecessary mistakes that may require a lot of resources to change or adapt later on.

English term	Correct Indonesian translation
Oops, that can't be blank...	Ups, kolom ini tidak boleh kosong...
Not enough memory to process this command.	Memori tidak cukup untuk memproses perintah ini.

Indonesian style in error messages

Use consistent terminology and language style in the localized error messages, and not just translate them as they appear in the US product.

Standard phrases in error messages

When translating usual phrases, standardize. Note that sometimes the US uses different forms to express the same thing.

These phrases commonly occur in error messages. When you translate them, try to use the provided target phrases. However, feel free to use other ways to express the source meaning if they work better in the context.

Examples:		
English	Translation	Complete sentence
Can't ... Could not ...	Tidak dapat	Tidak dapat menghapus file
Failed to ... Failure of ...	Gagal	Gagal mengunduh file
Can't find ... Could not find ... Unable to find ... Unable to locate ...	Tidak dapat menemukan	Tidak dapat menemukan file
Not enough memory Insufficient memory There is not enough memory There is not enough memory available	Memori tidak cukup	Memori tidak cukup
... is not available ... is unavailable	... tidak tersedia	File tidak tersedia

Localization style guide by Microsoft for Indonesia

Source:
<https://www.microsoft.com/en-us/Language/StyleGuides?rtc=1>

3.5 Cultural Factors and Metaphors

Cultural Models

Finally, to address aspects of cultural differences that go beyond objective features such as language, laws and calendar, it is useful to look at **cultural models**. Different psychologists and anthropologists have developed models to diagnose and explain cultural differences.

- > The probably most well known is Dutch researcher Gerd Hofstede's **"Theory of Cultural Dimensions"**. Hofstede and his team based their research specifically on interviews with thousands of people worldwide, working for IBM. Hofstede developed his dimensional model primarily as a tool to improve intercultural communication within a management context.
- > Hofstede's cultural dimensions theory is a **framework for cross-cultural communication**. It shows the effects of a society's culture on the values of its members, and how these values relate to behavior, using a structure derived from factor analysis.

It is still quite controversial, what specific conclusions and design recommendations can actually be drawn from these comparisons of differences in cultural dimensions, as the underlying concepts are difficult to grasp and reality is messy. A lot of research is still being carried out.

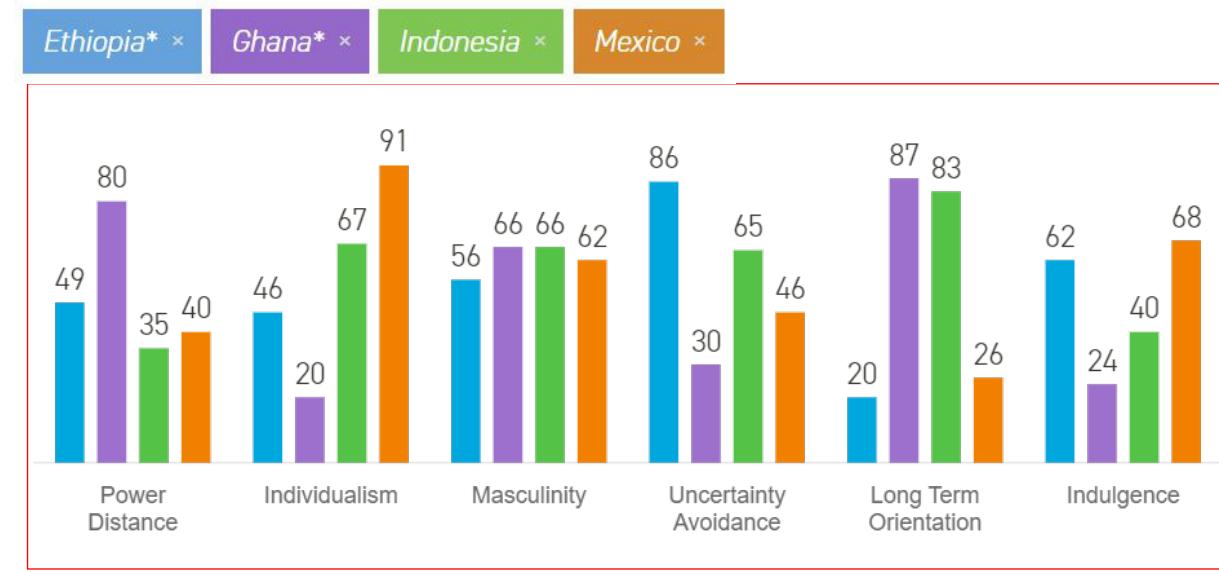
Hofstede's framework shows the effects of a society's culture on the values of its members, and how these values relate to behavior.

Cultural Factors: Cultural Models

You can access related information from Hofstede's website where you can also compare different national cultures to each other along six defined dimensions.

- > According to Hofstede, differences between national cultures can be well described by six main dimensions: **power distance, individualism, masculinity, uncertainty avoidance, long term orientation and indulgence.**
- > As you can see in this sample graph, different national cultures may differ significantly in some dimensions while being close to each other in relation to other dimensions.

Check the website <https://www.hofstede-insights.com>



Cultural Factors: Uncertainty Avoidance - Practice

Cross-cultural designer Jenny Shen shares her own insight from working for an international travel-booking website.

- > A major difference between German and Dutch culture lies in the dimension of “**uncertainty avoidance**” and the developers realized through testing of different formats with actual users, that Germans, who in general have high levels of uncertainty avoidance, are less inclined to complete a booking if they are not first provided detailed information about the included set of services and conditions.
- > Furthermore, to add user confidence in Germany, the display of so-called “trust labels” is effective, whereby well known German institutions certify that the website in question is operated by a trustworthy service provider.

Of course, the concept of “National cultures” is flawed per se, as one nation may contain many different cultures and sub-cultures, and a particular user in a country is often influenced by different global cultures, depending on his or her particular educational history and local living context.

Dutch version

TravelBird

Reserveren / Dit is de aanbieding

Bereed het mooiste van Ierland.

Tijdens deze fascinerende rondreis door Ierland vergaap je je aan magische kloven, steile rotskusten, prachtige natuur en aan steden als Dublin en Galway inclusief 7 nachten in 3*- en 4*-hotels, ontbijt, avond en huurauto.

Lees meer

Step 1 / Kies je vertrekdatum

Luchthaven van vertrek

Maar 2016 Jun 2016 Jul 2016

Aug 2016 Sep 2016 Oct 2016

Nov 2016 Dec 2016

Step 2 / Je bestelling

Step 3 / Persoonlijke gegevens

Step 4 / Betaal

Help

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German version

TravelBird

Reservieren / Das ist das Angebot

Strandurlaub in Lagos

Sonnige Algarve: 7 Nächte im Carvo Beach Hotel direkt am Strand mit täglichem Frühstück, Hin- und Rückflug und gratis WLAN im Hotel.

Mehr lesen

Schritt 1 / Bitte wählen Sie ein Abreisedatum

Nach Flughäfen sortieren

Düsseldorf-Weeze (DEW) von 380,00 €

Stuttgart (STR) von 419,00 €

Mannheim (MAM) von 380,00 €

Bremen (BRE) von 380,00 €

Düsseldorf (DUS) von 380,00 €

Hannover (HAH) von 375,00 €

Juni 2016 Jul 2016 Aug 2016

September 2016 Oktober 2016

Inklusive

- 7 Nächte im Doppelzimmer mit Frühstück oder Seewelt
- Tägliche Frühstück
- Gratis WLAN
- Hin- und Rückflug mit Germanwings von Hamburg (HAM) und Stuttgart (STR) bzw. mit Ryanair von Bremen (BRE), Düsseldorf-Weeze (DEW) oder Frankfurt-Hahn (HHN) oder mit TUIfly von Düsseldorf (DUS) oder München (MUC)
- Germanwings/Eurowings: 1 Handgepäckstück pro Person bis zu 5 kg (50x30x20 cm)
- Ryanair: 1 Handgepäckstück pro Person mit bis zu 10 kg (55x40x20 cm) + 1 kleine Handtasche (30x20x10 cm)
- TUIfly: 1 Handgepäckstück pro Person mit bis zu 8 kg (55x40x20 cm)

Exklusive

- Reservierungen
- Aufgegebene (Optional hinzuholbar)
- Transit (Optional hinzuholbar)
- Eur. Touriststeuer

Schritt 2 / Ihre Buchung

Schritt 3 / Persönliche Daten

Schritt 4 / Bezahlung

AGB Datenschutz

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TravelBird (Netherlands/ Germany)

Source: Example from Jenny Shen

<https://blog.prototypypr.io/ux-design-across-different-cultures-part-1-1caa12a50>

03

EXERCISES 03

Chapter 03 Exercises

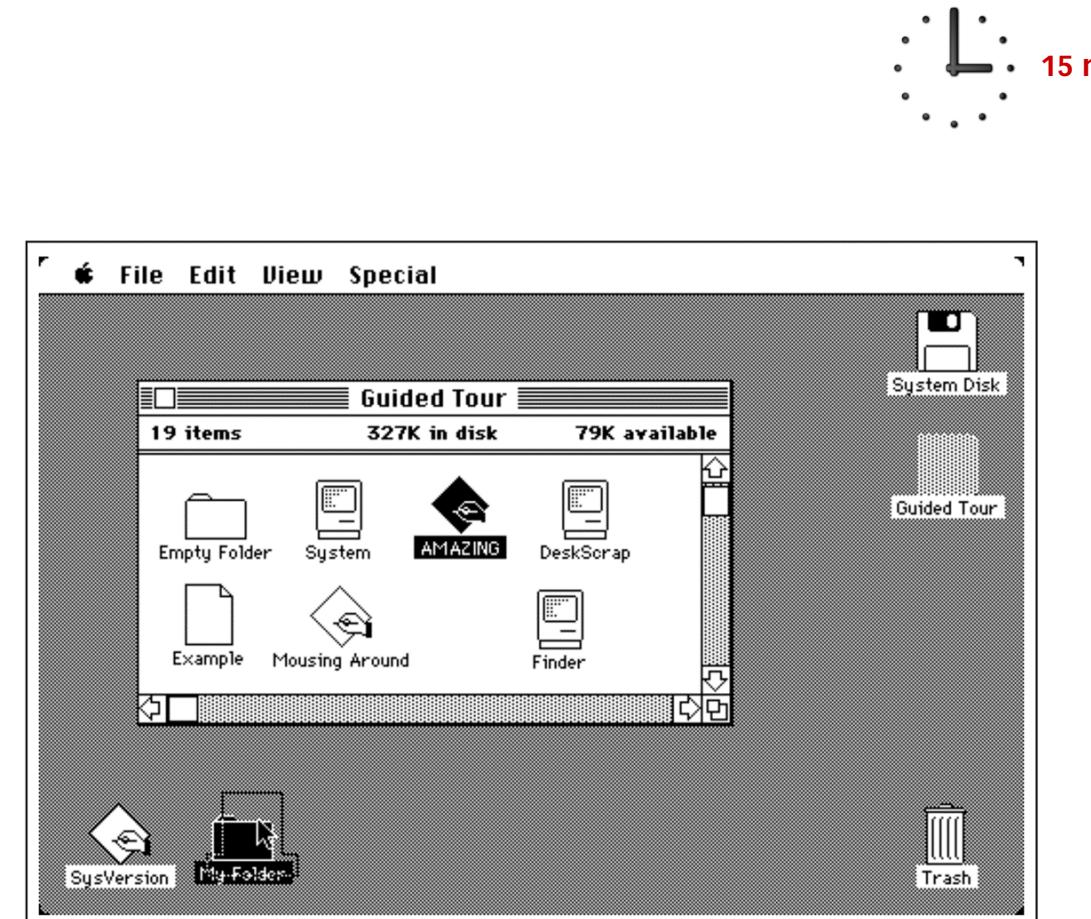
EXERCISE 6: Desktop Metaphor

The "desktop metaphor", invented half a century ago, revolutionized the way humans could interact with computers. For the first time, it allowed users to interact immediately with objects displayed on the screen by moving and clicking a mouse or track-pad, rather than learning a programming language and typing text-based strings of commands into the keyboard. Users could now drag-&-drop and click on visual icons representing different objects that were familiar to them from the physical office environment.

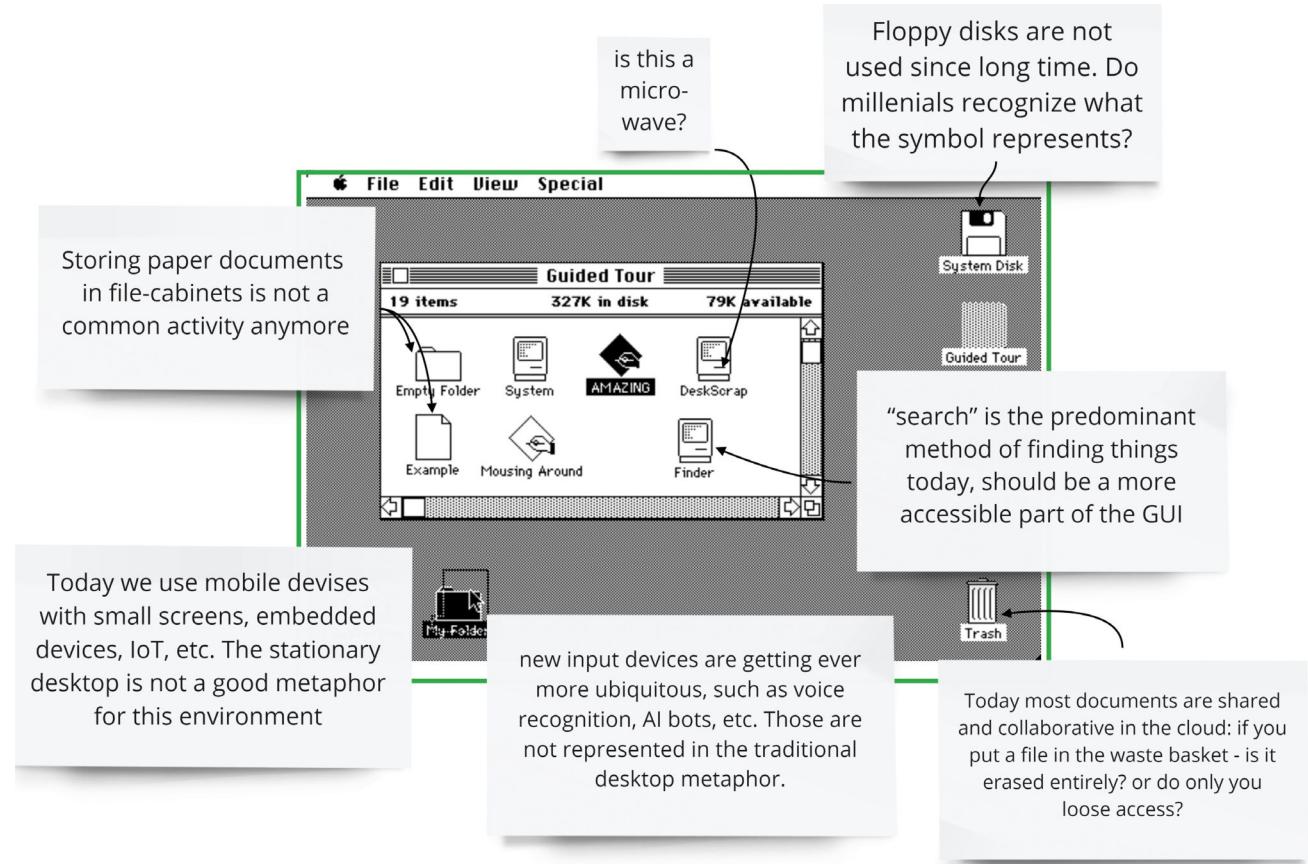
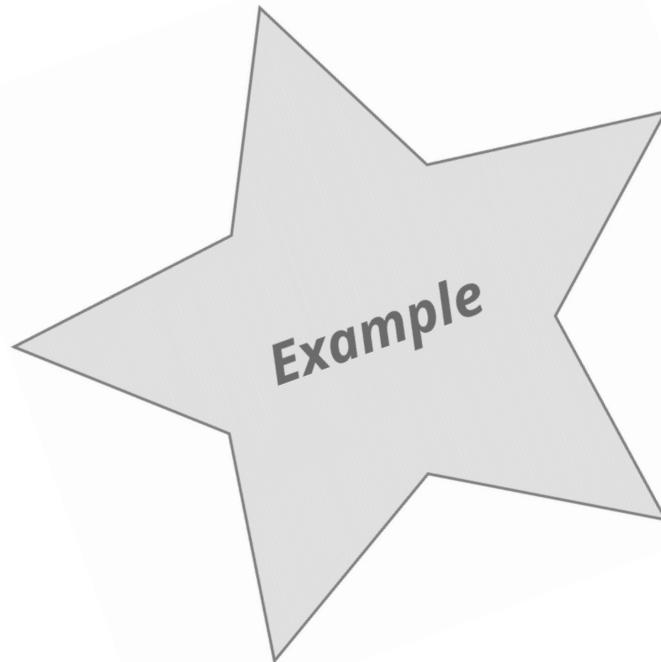
Your task:

Look at the classic Macintosh desktop GUI from 1984! What do you see?

- > How well does this metaphor scale into today's digital world? Are the icons still recognizable? Can they easily communicate the way digital devices function today?
- > As a millennial digital native, how would you interpret what you see in the screenshot here on the right?



EXERCISE 6: Desktop Metaphor - Example



EXERCISE 7: Cultural Dimensions

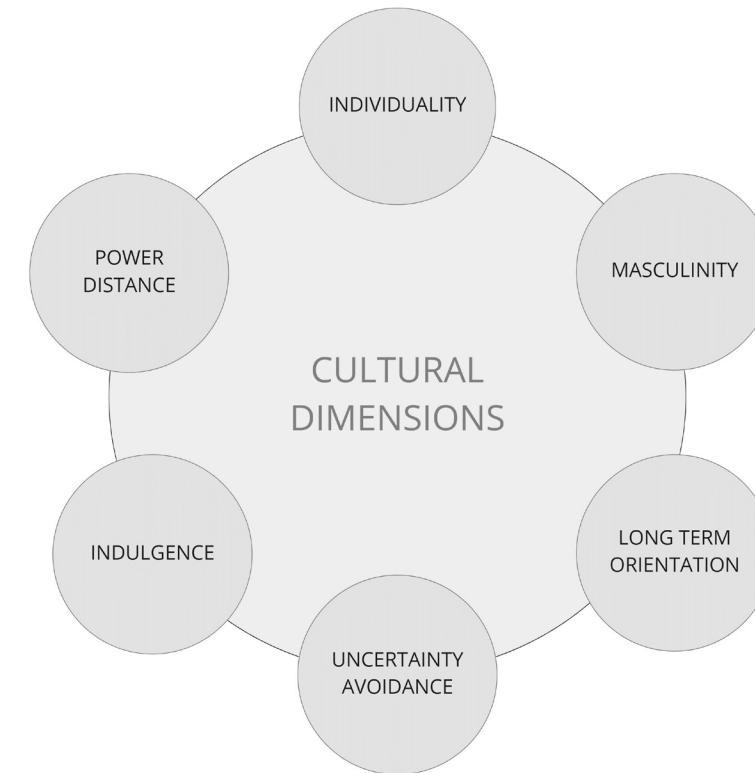
Your task:

Look at the graph and definitions on the next page comparing four national cultures (Ethiopia, Ghana, Indonesia and Mexico) based on Hofstede's six cultural factors.

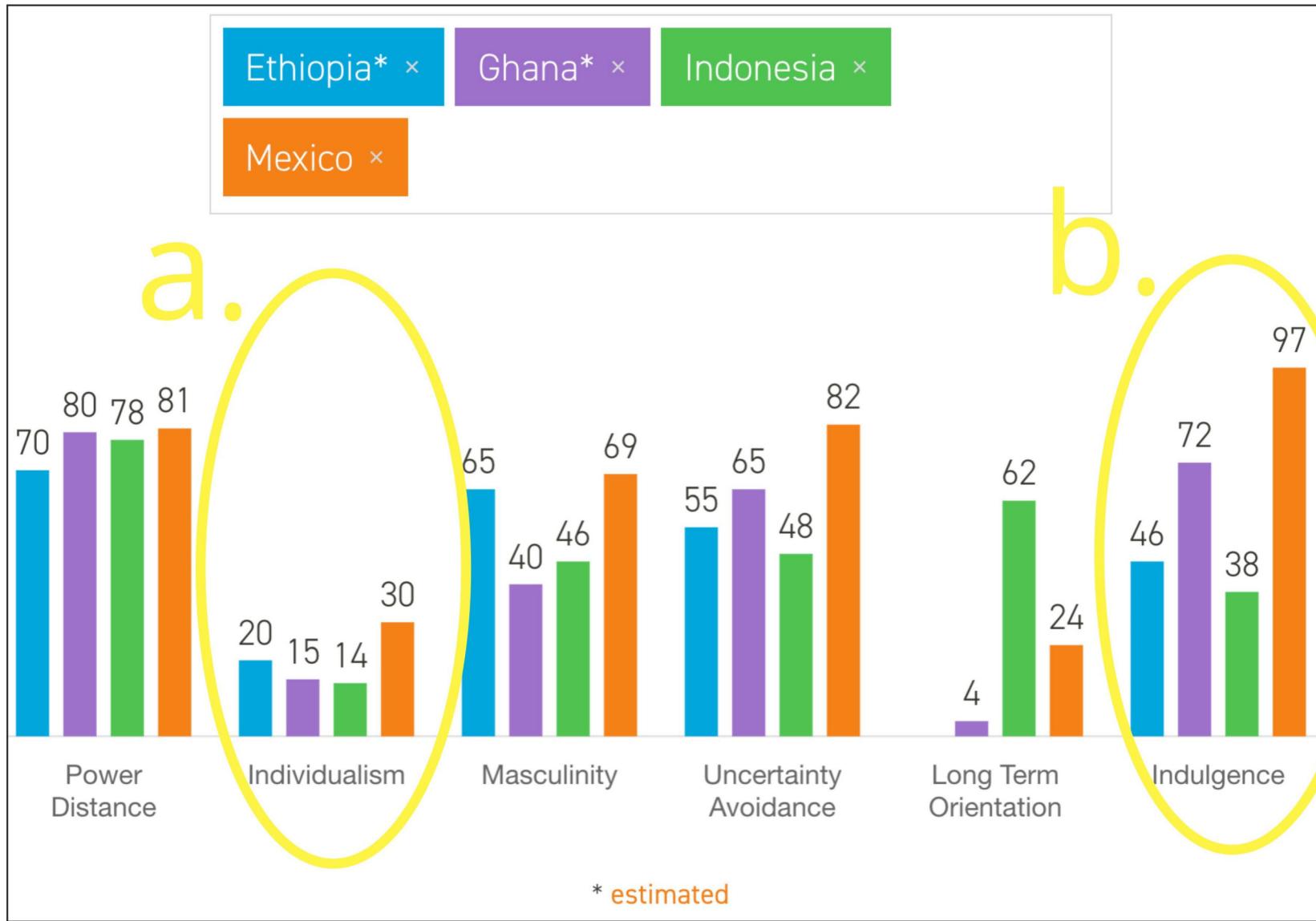
Step 1: First, take some time to study the definitions and bar graphs in the template page. Discuss the meaning of the terms. Are you comfortable with the way these national cultures are represented ?

Step 2: Discuss in detail two of the factors within your team:
Individualism (all relatively low, but MEX higher than the others)
Indulgence (ETH & IND low, MEX & GHA high)

Step 3: Discuss in your team one or two examples from your own experience that helps others to understand how your national culture scores on each factor? How can your peers or partners consider this when scaling their digital product to your cultural sphere?



EXERCISE 7: Cultural Dimensions



Hofstede Six Cultural Factors - Definitions

Power distance - The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.

Individuality - The degree of interdependence a society maintains among its members.

Masculinity - The fundamental issue here is what motivates people, wanting to be the best (Masculine) or liking what you do (Feminine).

Uncertainty avoidance - The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these.

Long term orientation - How every society has to maintain some links with its own past while dealing with the challenges of the present and future.

Indulgence - The extent to which people try to control their desires and impulses.

EXERCISE 8: Local and Regional Cultural Aspects

Cultural factors don't only matter on an international scale.

Your task:

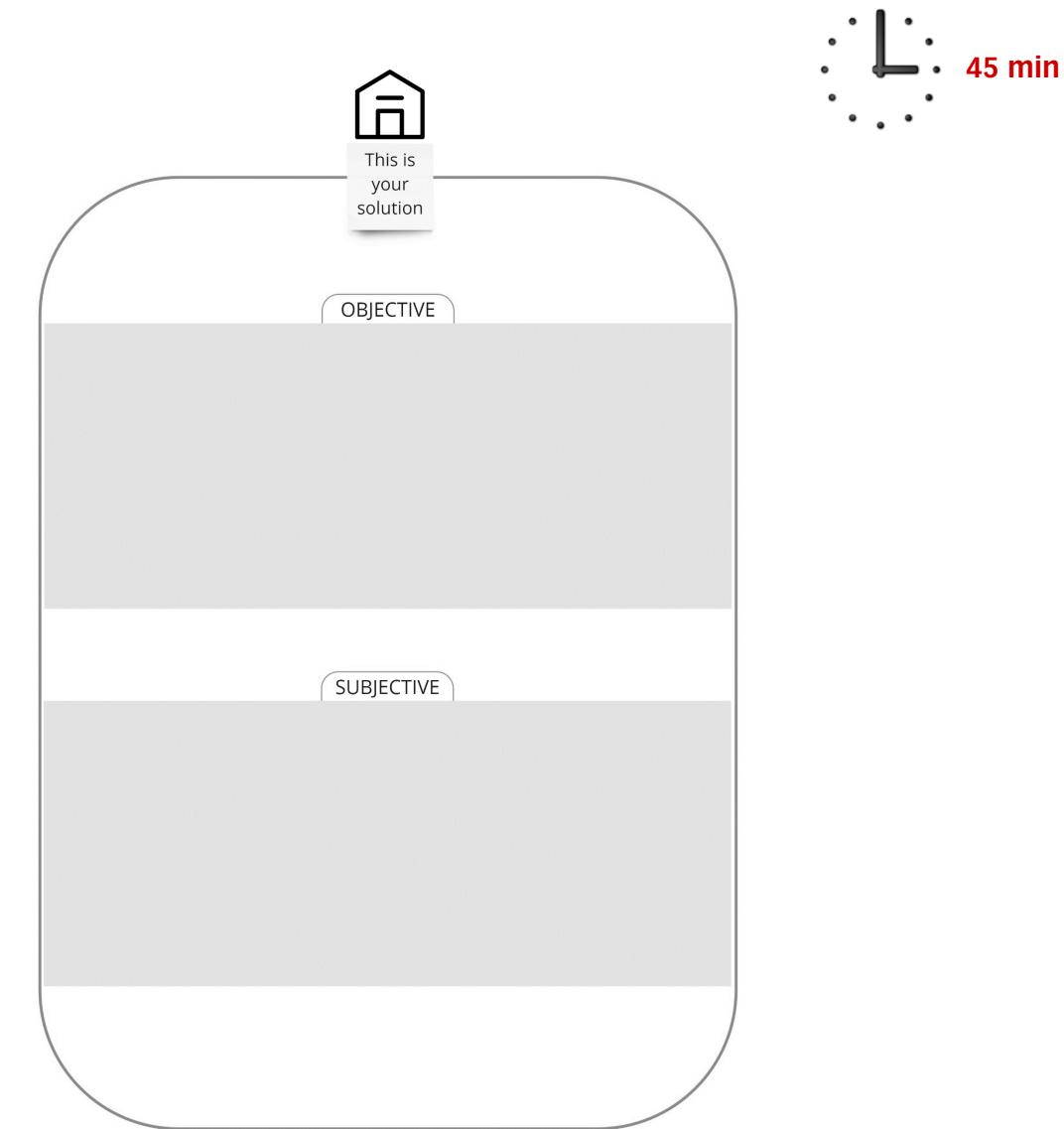
Discuss and map out the cultural aspects that you should consider when expanding your own product to other parts of the country (or neighboring countries in the same region).

> Think of how each feature impacts the design and implementation of your product?

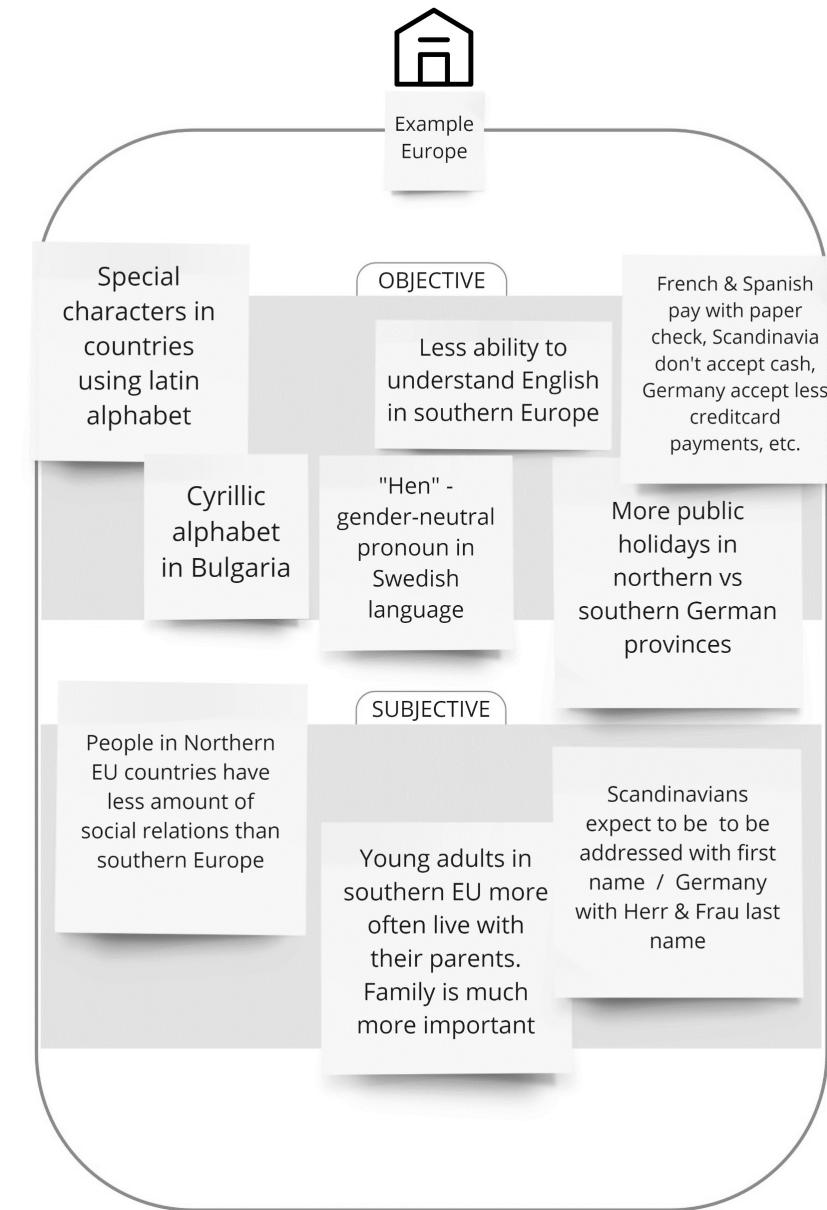
> Try to make a distinction between objective and subjective cultural features!

Objective cultural features: Language, alphabet, calendar, public holidays, laws, regulation, etc.

Subjective cultural features: Values, ethics, traditions, etc.



EXERCISE 8: Local and Regional Aspects - Example



Chapter 03

Final notes

Specific recommendations and inferences should always be taken with a grain of salt and every assumption concerning the behavior and values of a user group should in the end always be tested with members of that actual target user group. Nonetheless, a cultural model can be a very useful framework for formulating initial research hypotheses and can be a helpful tool for interpreting findings of usability evaluations that have been carried out in cross-cultural settings.

Recommendations based on cultural models should be applied as indicators rather than strict guidelines. However, cultural differences that may influence user behavior are to be expected, especially between user groups in different geographic locations and should therefore receive special attention in the design process.

Approaches and Methods

HCD – a process in iterative cycles

In our final chapter four we will have a closer look into the different stages of the human centered design cycle. We will start by looking at the scope of a system and give some tips for how best to plan a human centered design process. Then we have a closer look at context of use analysis and give a brief insight into the specification of user requirements. In the last part, finally, we will give you a very short overview of how solutions are designed and evaluated within an HCD framework.

4.1 HCD – a process in iterative cycles

Human Centered Design

In chapter one, we introduced human centered design as an approach to make interactive systems more usable. HCD is not one single method, it is a design and implementation process scheme that ensures that users and their use of the system are a main focus of the project management.

Systems designed using human-centered methods improve overall quality, for example by:

- > increasing the productivity of users and the operational efficiency of organizations
- > being easier to understand and use, thus reducing training and support costs
- > increasing usability (effectiveness, efficiency and satisfaction)
- > increasing accessibility (for people from a population with the widest range of user needs, characteristics and capabilities)
- > improving user experience and reducing discomfort and stress
- > providing a competitive advantage, for example by improving brand image
- > contributing towards sustainability objectives

Human centered design is an approach to design that aims to make interactive systems more usable by focusing on the use of the interactive system and applying usability knowledge and methods.

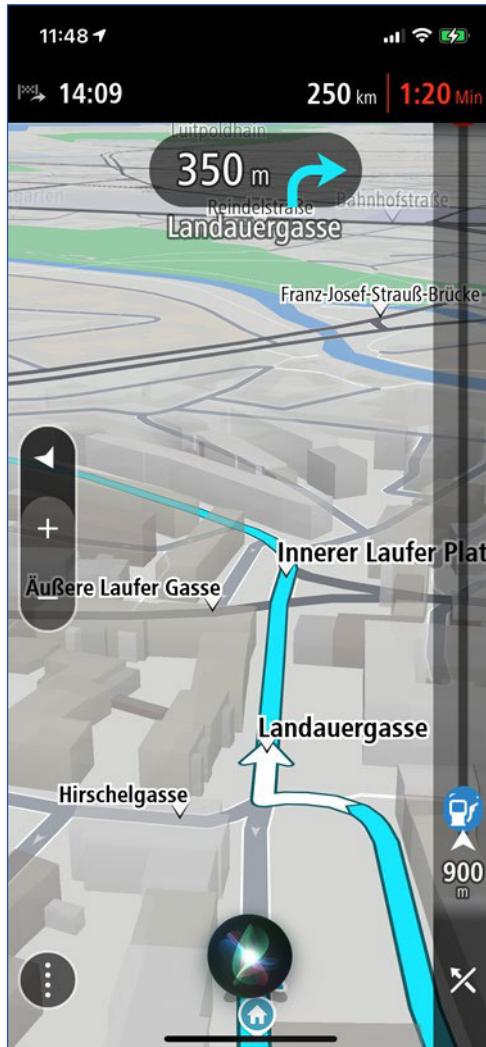
4.2 HCD – a process in iterative cycles

Scope of a system

Before we go deeper into the different stages of HCD it is worth to first look at the system we want to develop. It is of essence to be very clear about its scope. Very often the definition of system scope is easy, as demonstrated in the two examples described below and on the next page.

- > The first example concerns navigation software for cars. Certainly, the user group is diverse, but the context of use is very specific, and the number of tasks limited. The software will be running on a device that is in the car, as you can see on screenshot A on the next page.
- > But maybe you can recall a time when Google first decided to include pedestrians, bikers and public transports in Google maps? This turned out to be a severe change in the context of use. Pedestrians and bikers for example were offered extremely dangerous routes along highways, shortcuts on pedestrian ways or through parks were not shown etc., as illustrated in screenshot B on the next page.

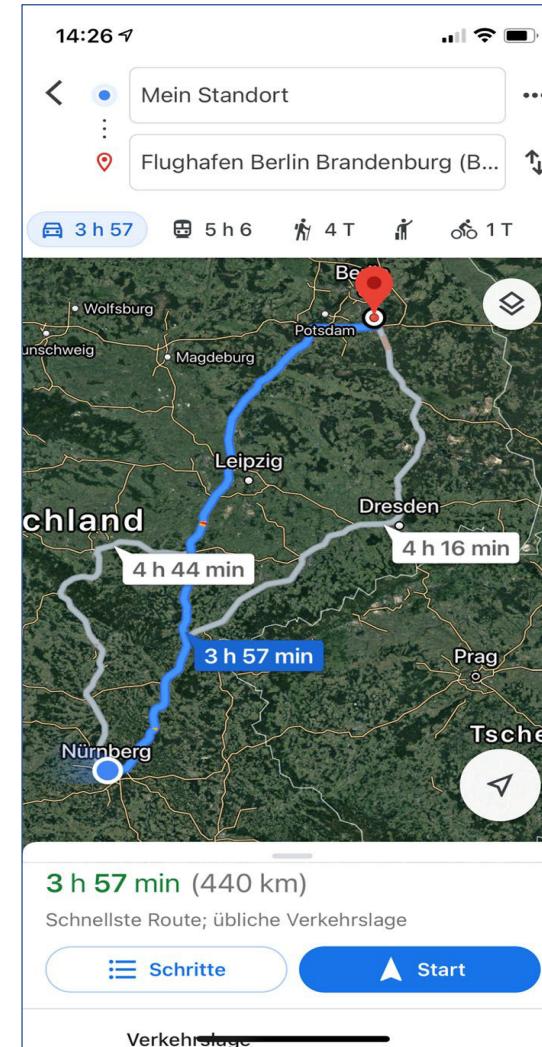
*Ask first: what is the **scope** of my system?*



A) Navigation for cars: Software on some device that is in the car

Tasks and context:

- Set up Navigation before driving
- Get directions while driving
- Show upcoming points of interests
- Show traffic incidents and offer alternative route
- User: everybody who drives a car to an unknown destination.
- World wide, depending on the installed map data



B) Navigation for every type of mobility: Software on some device that people carry when moving around

Tasks and context:

- Set up Navigation before moving
- Get directions while moving
- Show upcoming points of interests
- Show incidents that disturbed the route and offer alternative route
- User: everybody who moves to an unknown destination.
- World wide, depending on installed map data

SAMS - Smart Apiary Management Service: In this project that was dedicated to introducing IoT-sensors for beehives in tropical regions in order to help beekeepers to improve their beekeeping management, several products and services necessary to achieve all goals were identified through context of use analysis.

<https://sams-project.eu>

- > The hardware of beehives, sensor systems and computer had to be developed or rather adapted from what had originally been made for European contexts.
- > Several new software modules were identified that would be required to process the sensor data and make it more understandable.
- > And it became clear, that all of this would only work with support by human-to-human services.

As a result, several sub systems were defined by the team and each of these systems was developed following its own HCD process.

- 1) the beehive and sensor hardware,
- 2) the data warehouse
- 3) the decision support software for beekeepers
- 4) the knowledge base called SAMS wiki

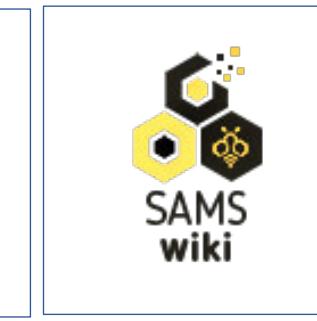
> If the scope is too large – define sub systems!



SAMS beehives with sensors



SAMS data warehouse



SAMS wiki as knowledge base



Hello, Koswara!

Here's your hives overview. You have :

200 hives in 3 locations

130 Hives
need urgent action!
Check Now →

20 Hives
Ready to harvest
3 days left
Check Now →

130 Hives
in a good condition

Overview Hives List My Profile

SAMS decision support system for Beekeepers

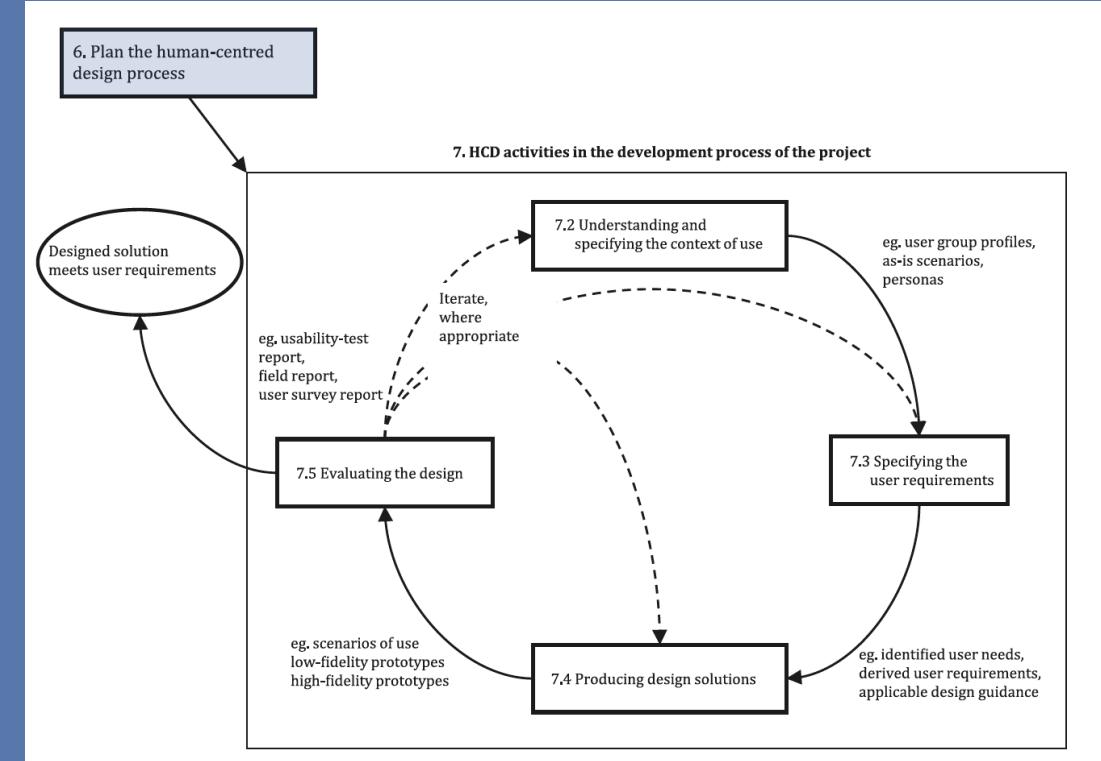
4.3 HCD – a process in iterative cycles

Planning the process

In most cases HCD has to be integrated in the project management culture of the respective company or project team. Therefore, planning always starts with analyzing this environment and finding synergies with existing resources.

- > Identify who is responsible and to what extent they will support HCD.
- > Identify appropriate methods and resources for HCD activities.
- > Set suitable timescales to allow iterations.
- > Agree on appropriate milestones.
- > Include HCD activities in your project planning.

HCD activities continue throughout the lifespan of a project!



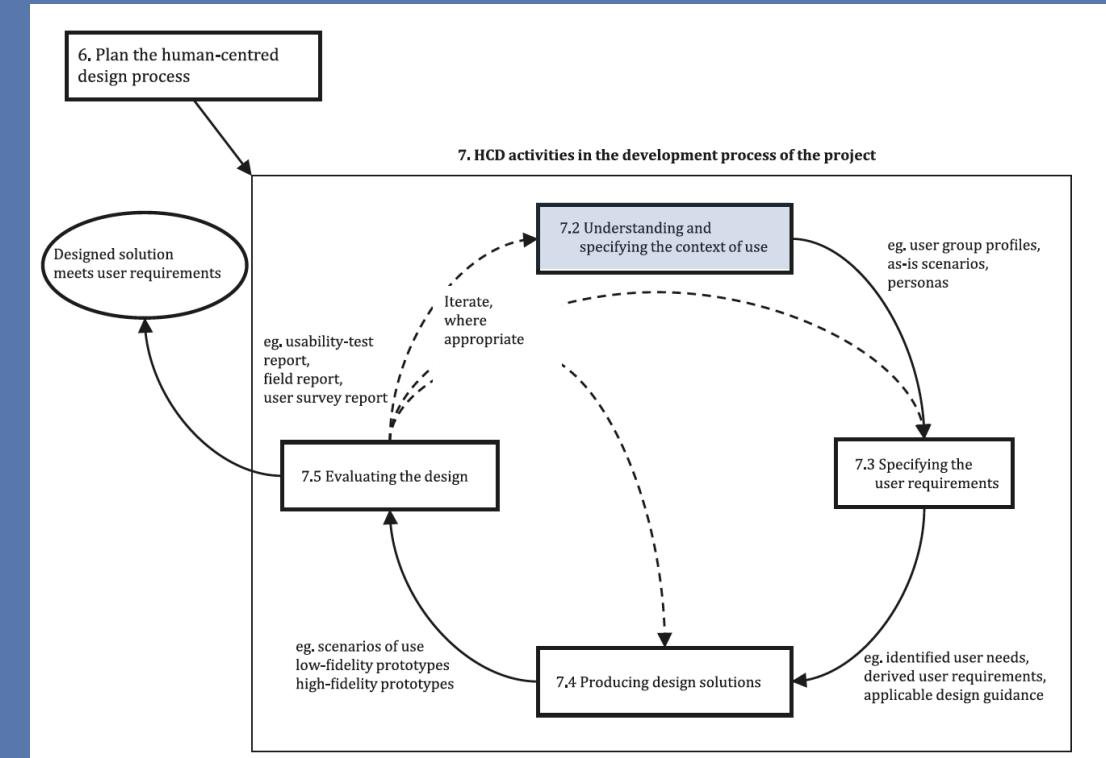
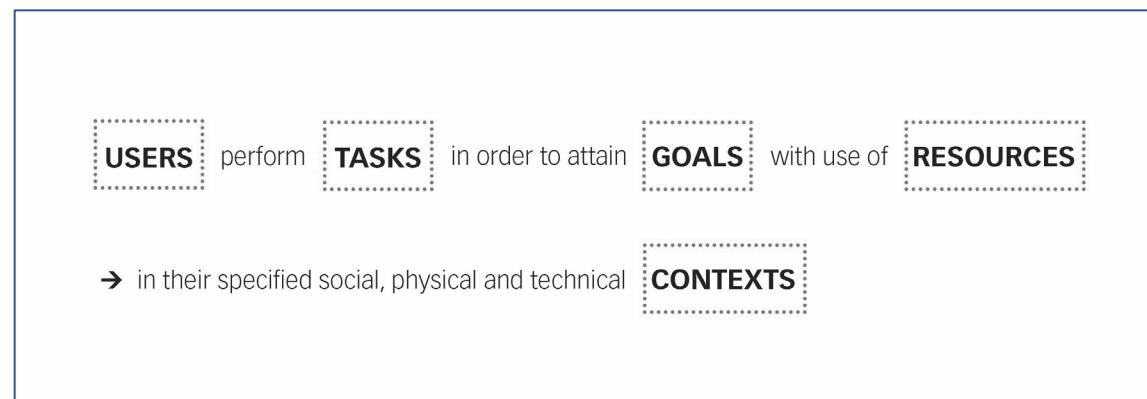
4.4 HCD – a process in iterative cycles

Analyze and Understand the Context of Use

To understand and specify the context of use, we need to analyze and document how users perform tasks in order to attain goals with the use of resources - in their *specified social, physical and technical contexts*.

This is what makes HCD unique compared to other product development approaches. Often, context of use analysis is rejected by management because they do not see value in time consuming and expensive user research. It is still a big challenge to explain the value of knowing what the users really need before implementing software they will not use.

Do not give up fighting for time to learn about your users!



Usually, research is most efficient when you do it on-site, where the real users are.

> To **observe and record** what is really happening is an essential first step. When an interview is conducted on-site, it is called a "contextual interview". If the situation-based interview can be combined with observation of the user's behavior, then the method is called "contextual inquiry". Formats of documentation for these methods are, of course audio- and video recording as well as all forms of written protocols.

> In case **on-site research is not possible**, or in addition to on-site research, focus group discussions with domain experts or users are valuable to explore open questions. A focus group is a focused discussion where a moderator leads a group of participants through a set of questions or statements on a particular topic.

> Further methods include surveys, workshops, analyzing and evaluating already existing systems, literature/web research, stakeholder interviews, etc.

Methods	Description	Documentation
(Contextual) Interviews	An interview for gathering context of use information that takes place at the location where the user's interaction with the interactive system usually takes place, for example the user's workplace.	Audio-/video-recordings, minutes, protocol from memory
Observations or Contextual Inquiries	A technique for gathering contextual information relating to user needs in which an observer watches users who carry out tasks that are related to the interactive system . The combination of "contextual interview" and " observation " is often referred to as "contextual inquiry".	Audio-/video-recordings, minutes, protocol from memory
Focus Groups	A focused discussion where a moderator leads a group of participants through a set of questions or statements on a particular topic.	Audio-/video-recordings, minutes, protocol from memory, white board results

HCD process: Document the Context of Use

User research methods generate enormous amounts of data. It is important to make the insights of the user **research readable or user friendly** for the implementation team.

Good documentation paves the way to well identified user needs. We will describe three methods a little bit more:

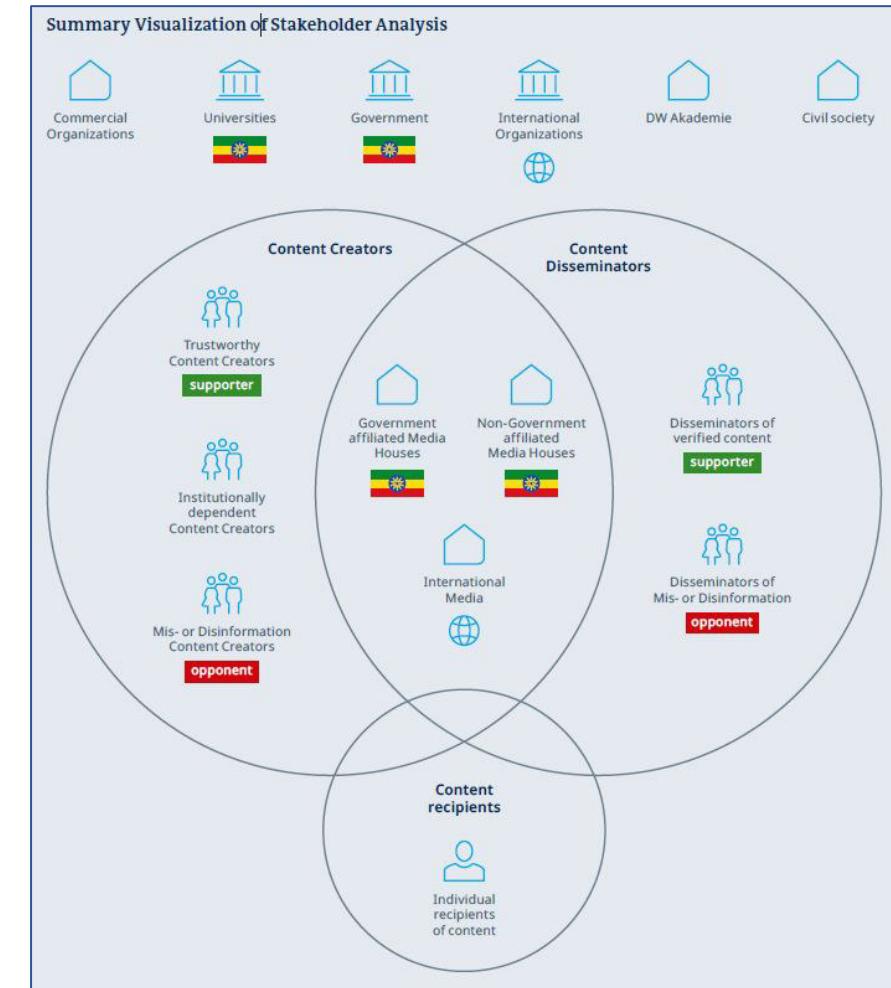
- > [User group descriptions](#) to identify the different types of users
- > [Persona](#) for each user group to document individual personalities of users
- > [\(As-is-\) scenario](#) to document which tasks are presently performed



A **user group** is a collection of users with the same or similar personal characteristics and context of use, related to the interactive system.

> It can often be useful to show user group descriptions [supported by graphics](#), in order to see their possible relation. In the example here on the right, you see the different stakeholders and user groups of a new fact-checking system to be implemented in Ethiopia. The position of the stakeholders within the different circles shows their relation to each other and to the system as a whole.

> For more detailed information about the most important user groups, of course, [a text table](#) format is more suitable, describing the context of use of each user group, as well as their user tasks.



Example user group mapping

Source: <https://www.dw.com/downloads/56629987/dw-akademie-fact-checking-case-study-ethiopia-2021.pdf>

HCD process: Document the Context of Use - Persona

A very popular method is **persona description**, of which we have already shown an example in chapter 2. Personas are a description of a user and what he or she intends to do when using an interactive system.

- > Personas are not real; rather they are examples invented to represent real users based on empirically determined data, for example from observations or interviews.

Quality factors for the development of personas are:

- > A persona is created by those people who performed the context of use analysis.
- > The persona description does not represent a real person but is equivalent to the description of a real person.
- > The persona combines characteristics of real users.
- > The persona description contains all important characteristics and the most important goals of a user group.
- > There is a risk that personas are created based on assumptions because there is not enough time for user research. We call an assumption-based persona proto persona.

The Traditional Beekeeper in Indonesia



KURT

Occupation: Beekeeper with other odd jobs

Location: Forest area

Age: 50 years old

Type of bees: Apis Cerana

Quantity of beehives: < 25

Economic security
● ● ● ● ● ●

Adaptability to technology
● ● ● ● ● ●

Readiness to learn
● ● ● ● ● ●

Optimism and confidence
● ● ● ● ● ●

Profile:
Kurt has long been a beekeeper, despite the limited control and resources on his beekeeping, he is still professionally and wholeheartedly practicing beekeeping as his passion. As a traditional beekeeper, Kurt feels that his breeding method is the best and can stand the test of time. This belief is based on Kurt's years of experience in beekeeping that can still deliver even though the methods have not changed much. He aspires to be a full-time beekeeper in order to live up to his passion at the same time fulfilling economic necessities. Kurt does also aspire to tutor many people who want to study beekeeping.
In his daily life, Kurt does a lot of things that are spontaneous for the needs of bees. For Kurt, the forest and everything in it is a toolkit that he can use to keep the bees. He aspires to be a full-time beekeeper, no more odd jobs to sustain his income.

Merits:

- Highly experienced in beekeeping (has been doing beekeeping for more than 7-10 years)
- Has no dependency on any special equipments
- Can manage beekeeping with limited resources
- Still actively producing honey and having high market demand
- Living closely with natural ecosystem that supports the beekeeping activities
- He has passion towards beekeeping

Challenges:

- Have difficulties in adapting to new technology and knowledge
- Having a lack of control in planning & managing the process also the result of his beekeeping activities
- Out of reach from support from relevant stakeholders, both from the bee community and the government
- Scarce from new information and knowledge
- Lack of awareness on beehives and honey hygiene
- Not having any control about the ecosystem that supports the beekeeping activities
- Having difficulties in scaling his business in beekeeping

Family Background:

- divorced 2 times and remarried
- 6 children from 2 different wives
- now lives with his latest wife with no children
- he owns a semipermanent structured bamboo house on his own land

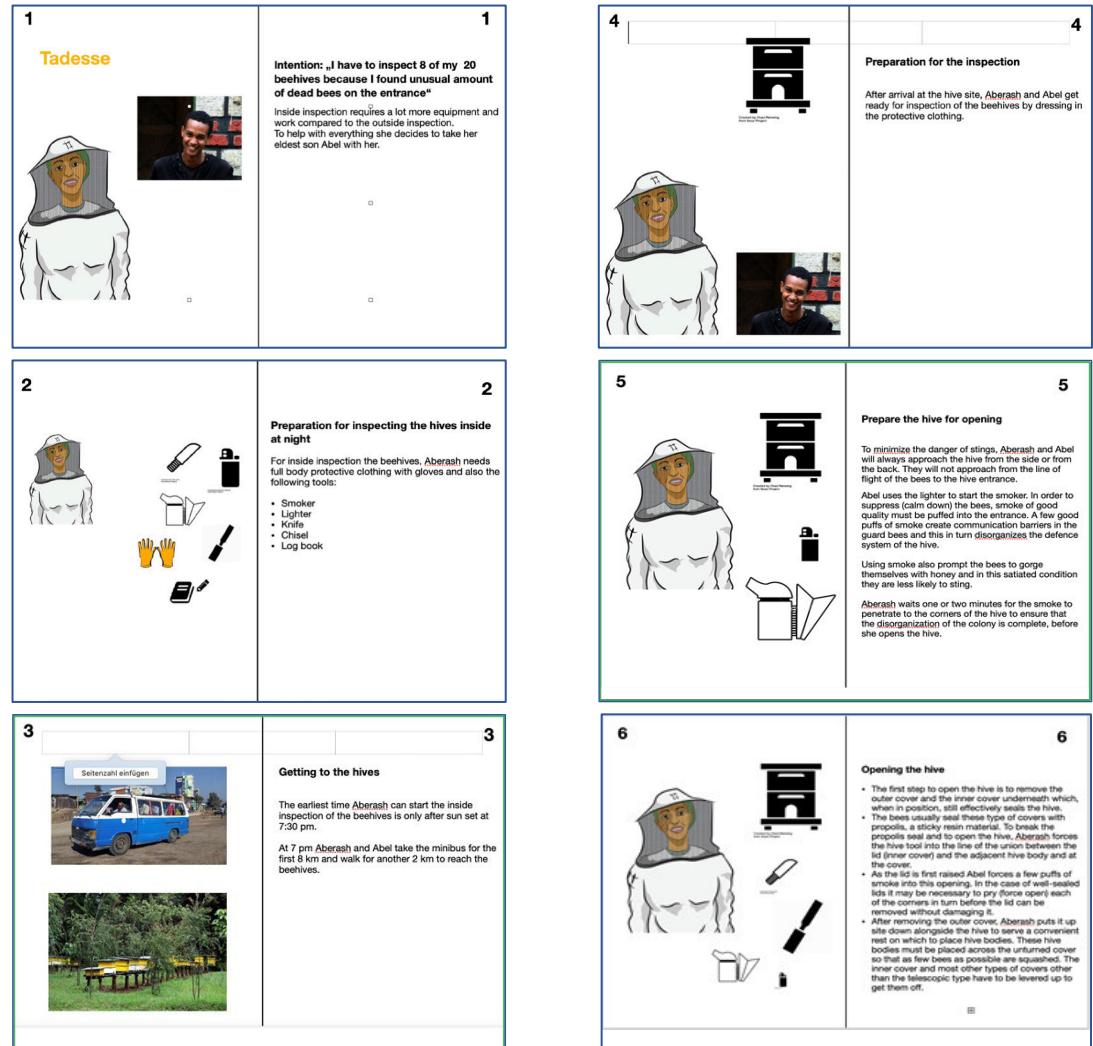
Mobile Phone:
Nokia 1100 feature phone, for SMS and calls to honey customers

Example - SAMS: A persona description of the identified user group Traditional Beekeepers showing combined characteristics of the group.

HCD process: Document the Context of Use - As-is-Scenario

To document how users perform their tasks, we use scenarios. An **as-is scenario** is a variant of a context-of-use description in the form of a narrative text describing how users currently perform their tasks.

- > By describing the **behavior of a user** in this way, an as-is scenario reveals problems that cause the execution of tasks to be less efficient than it could be.
- > Scenarios can be **text based**, but also **story boards**.
- > All the documentation of user research, is used to identify user needs that are by definition independent of the future system, as we show on the next page.



Example SAMS: an as-is-scenario describing the process

HCD process: Document the Context of Use - Understanding and Specifying

User group description	Context of use description	As-is-scenario	Persona
Beekeepers Persons who take care of beehives in order to protect and use them ...	In order to know if there is enough honey to have a profitable harvest, the beekeeper needs to open the hive regularly. Every time he opens the hive, the bees are disturbed. The beekeeper is in danger to get stings ...	<p>5</p>  <p>5</p> <p>Prepare the hive for opening</p> <p>To minimize the danger of stings, Abenash and Abel will always approach the hive from the side or from the rear. They will approach from the side of the right of the entrance to the entire hive.</p> <p>Abel uses the lighter to start the smoker. In order to suppress (calm down) the bees, smoke of good quality is needed. The smoke of bad quality or good puffs of smoke create communication barriers in the guard bees which in turn disorganizes the defense system of the hive.</p> <p>Using smoke also prompts the bees to gorge themselves with honey and in this satisfied condition they are less likely to sting.</p> <p>Abenash waits one or two minutes for the smoke to penetrate to the corners of the hive to ensure that the disorganization of the colony is complete, before she opens the hive.</p>	 <p>ABERASH <i>Mosés giving off light, shining' in Ashkenaz</i></p> <p>Occupation: Beekeeper Location: Countryside, Real Estate Age: 22 years old Type of bees: Honeybees Quantity of bees: 100,000 Family Background: married - 2 children - her husband works in a by government office Mobile devices: Samsung Galaxy S10+, iPhone X, iPad Pro, Kindle, Kipk and Tongoro. Community relates with friends in the city and abroad.</p> <p>Profile: She is familiar with the culture of beekeeping manner and does her work with three sources at hand. She is a full-time beekeeper and loves up her passion at the same time. She is a traditional beekeeper and loves to keep the tradition alive. She is still professionally and enthusiastically practicing beekeeping while living closely with traditional beekeepers.</p> <p>Challenges: x Previously experienced in modern beekeeping. She has been performing honeybee management and achieves various trainings in bee-keeping. x Advancing gradually to modern practices of beekeeping x Beekeeper availability is in the middle ground between traditional and modern beekeepers. This is a good vantage point for developing new technologies and improving circumstances in the beekeeping community. x Needs to touch with the traditional ways and lives close to the bees</p> <p>Economic security: Adaptability to technology</p> <p>Readiness to learn: Optimism and confidence</p>



USER NEEDS

Independent of the future system

- > The beekeeper needs information about the best time of harvest.
- > A beekeeper needs to know how much honey is allowed to be harvested in a colony, in order to harvest the honey in the right amount without harming the colony.

4.5 HCD – a process in iterative cycles

User Requirements

User need versus request, requirement and solution

The documented user needs form the basis for the next step of specifying the user requirements. A **user need** is a prerequisite identified as necessary for a user, or a user group, to achieve a goal, implied or stated within a specific context of use.

It is important to differentiate user needs from other, system related terms.

> Request or user want

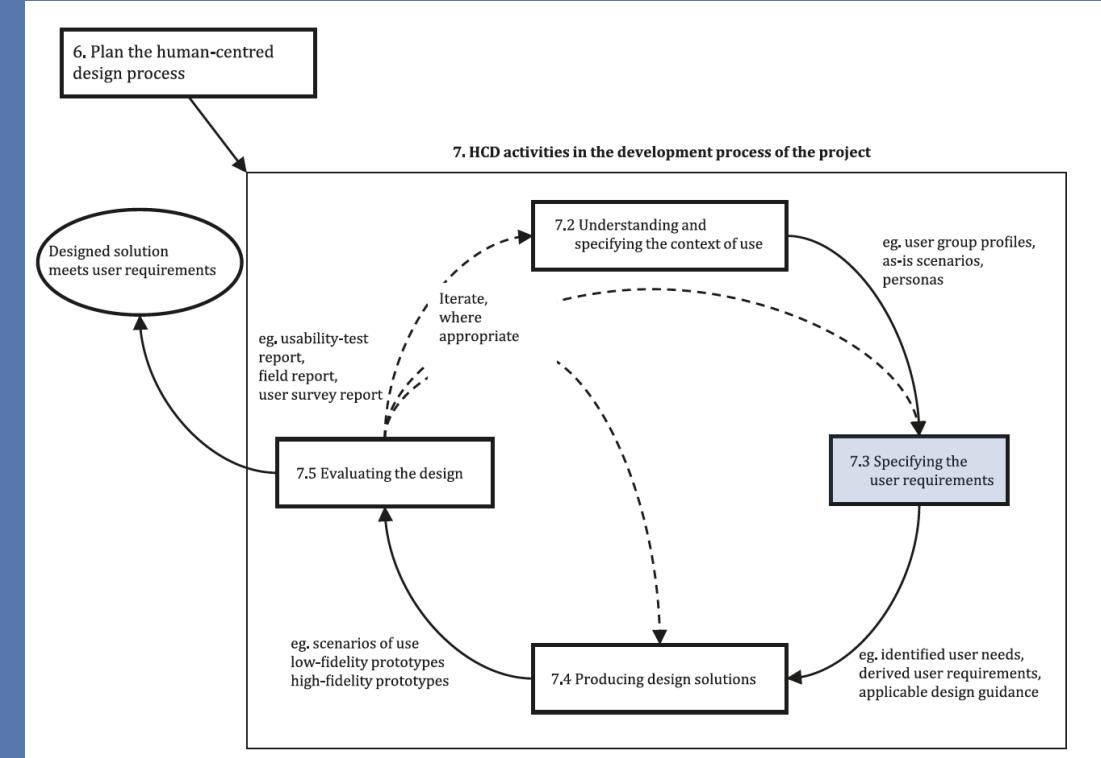
A user's wish or a stipulation stated by one or more stakeholders of the interactive system.

> Requirement

A condition or capability that must be met or possessed by an interactive system to satisfy an agreement, standard, specification or other formally imposed document.

> Solution

One or several related product characteristics that are specified or implemented and are supposed to fulfill one or more requirements.



A **user requirement** is a statement of what users must be able to locate, recognize, understand, select or input as part of performing a task with the interactive system.

> In many agile processes, they are expressed in form of **user stories**:
As a <type of user>, **I want** <some goal> **so that** <some reason>

> To identify user requirements for a system, we start by analyzing the user needs by **describing how the system will be used** in different contexts, for example by use scenarios. This will also help the implementation team to understand how the system will work.

- A use scenario is a description of how a user performs tasks with the (future) interactive system.
- Use scenarios are based on task models.
- Use scenarios can be described in different forms (narrative text, table, diagram).
- Use scenarios are used to create low-fidelity prototypes.

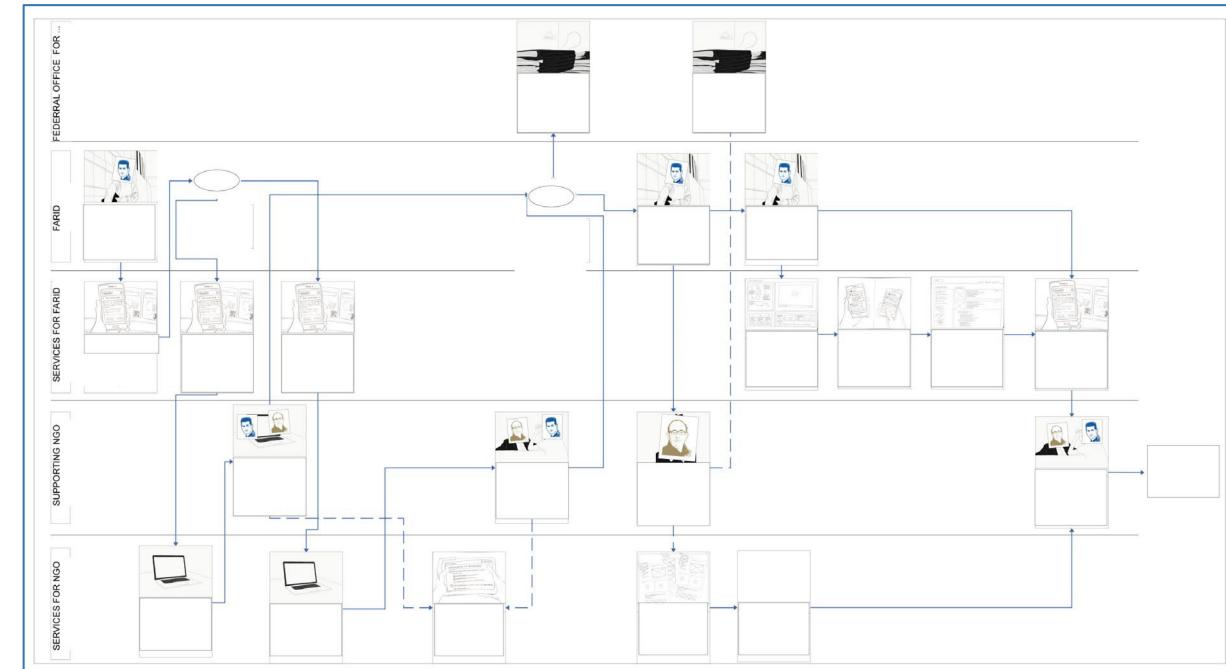
As a Beekeeper I want to be informed about the best date and time of my next honey harvest so that I can avoid disturbing the bees unnecessarily.

System: SAMS Decision Support System for Beekeepers

As a beekeeper, I want to know how much honey is allowed to be harvested in a colony, so that I can harvest the honey in the right amount without affecting the colony.

System: SAMS Wiki

Example SAMS - user story



Example use scenario in form of a user journey: The swim lanes represent the user, the software system, a second user in a different role, who is interacting with the first user and a second software system that the second user needs for fulfilling certain tasks. It is not intended to read the details, just check the main idea of swim lanes in the scenario.

4.6 HCD – a process in iterative cycles

Design Solutions

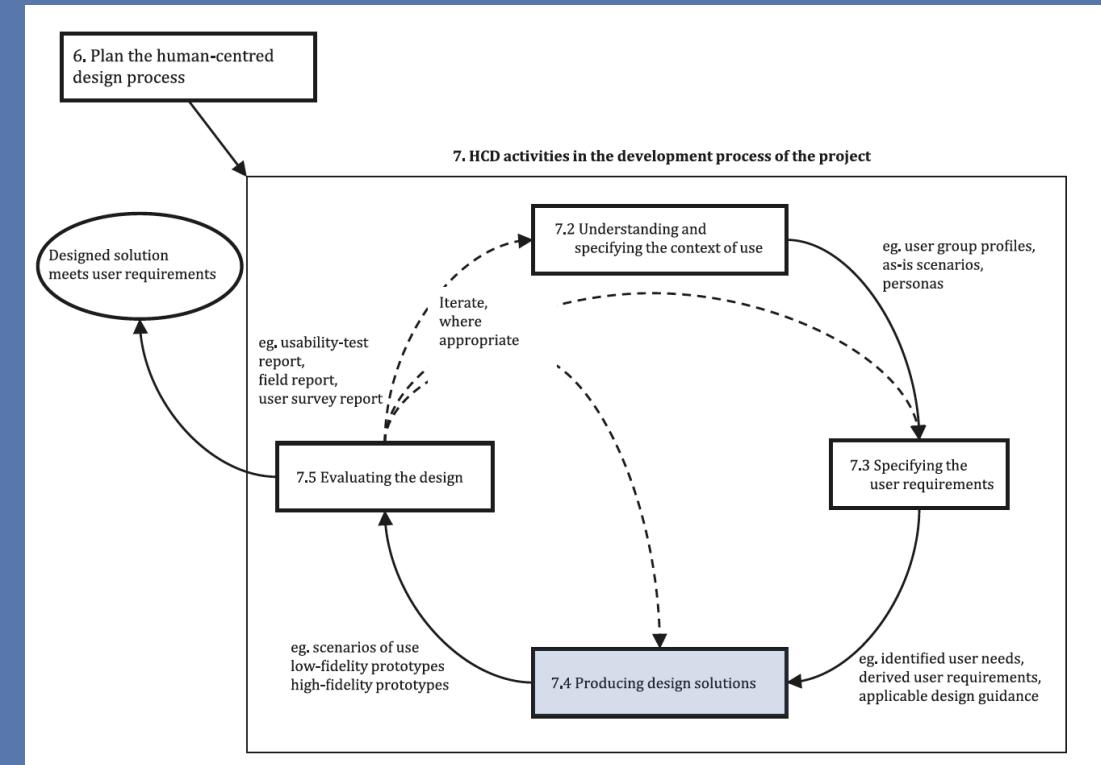
Once the user requirements have been defined, design solutions can be produced.

When producing design solutions, a few things are useful to consider:

- > Prototype before you implement.
- > Do it collaboratively.
- > Start with paper prototyping.
- > Do not try to be a visual genius, the idea is important.



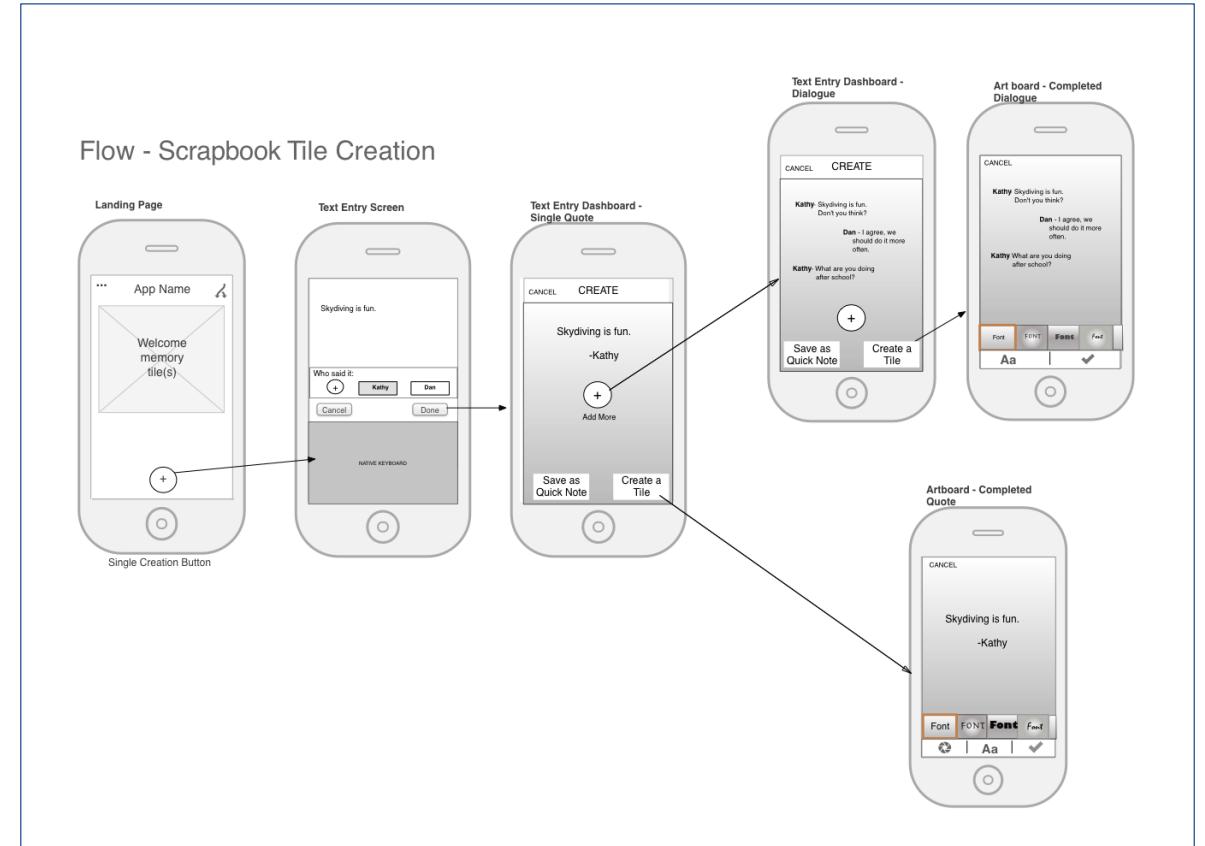
Designing solutions for the SAMS project in Indonesia



HCD process: Design Solutions - Wireframes

In the prototyping stage, you start creating single screen designs. It is a very good idea in this phase to focus on the functional design rather than the visual design. For this purpose, the **use of wireframes** is recommended. With them you can create fast variations and use those to describe interactions by flow diagramming, showing the relation between screens. This is also called wire flows.

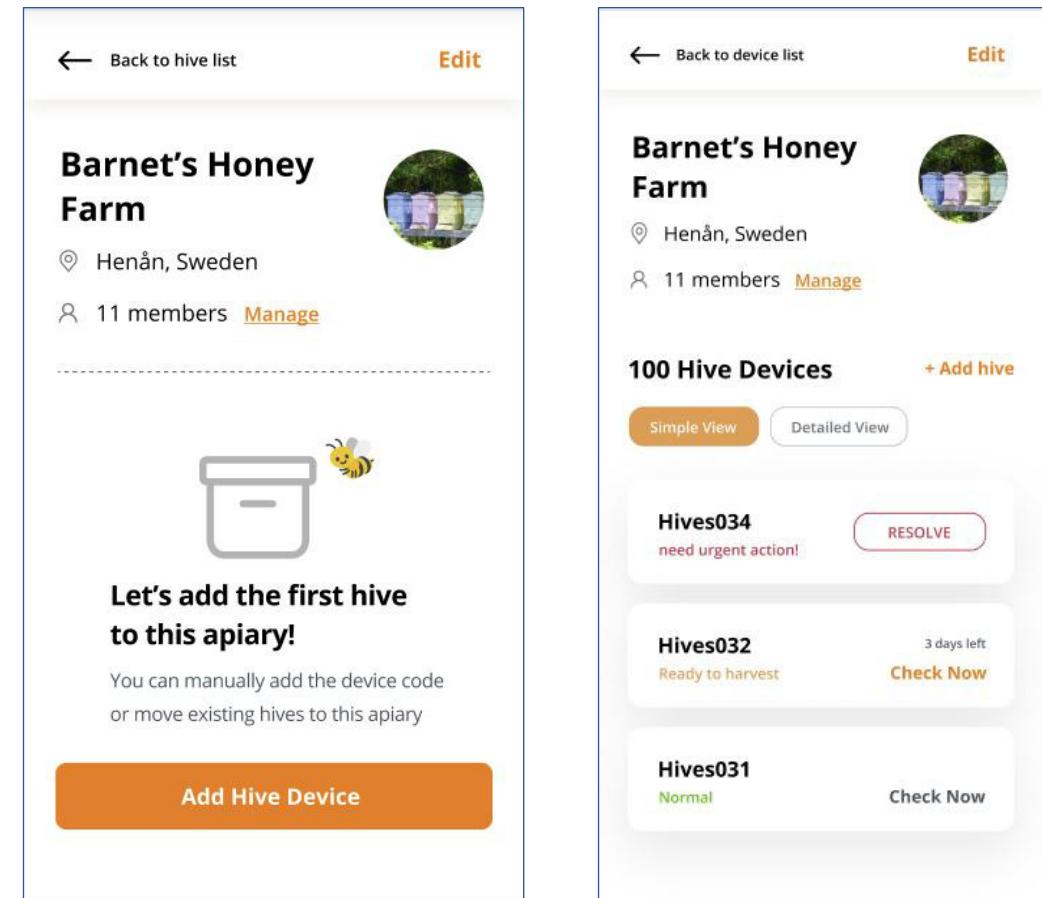
- > Wireframes are skeletal models in which only lines, areas and vertices are represented.
- > A screen wireframe shows the real use of space presently planned for the interface elements without showing any design.
- > Use wireframes to plan interaction flows.
- > Wireframes can be transformed to interactive prototypes for usability tests.
- > Tools: Axure, Balsamiq, Adobe XD, figma ...



Example "wire flow" connecting individual wireframes into an interaction workflow
Source: <https://www.nngroup.com/articles/wireflows/>

The screen design can be developed in parallel. It includes:

- > Presentations of possible final design in which details are elaborated.
- > They focus on visualization of typical elements.
- > They can be used for interactive prototyping, but usually that is too time consuming.
- > Screen designs elaborate:
 - Arrangements and spacing
 - Typography
 - Colors and contrasts
 - Icons, pictograms, pictures



Example SAMS: different screen designs

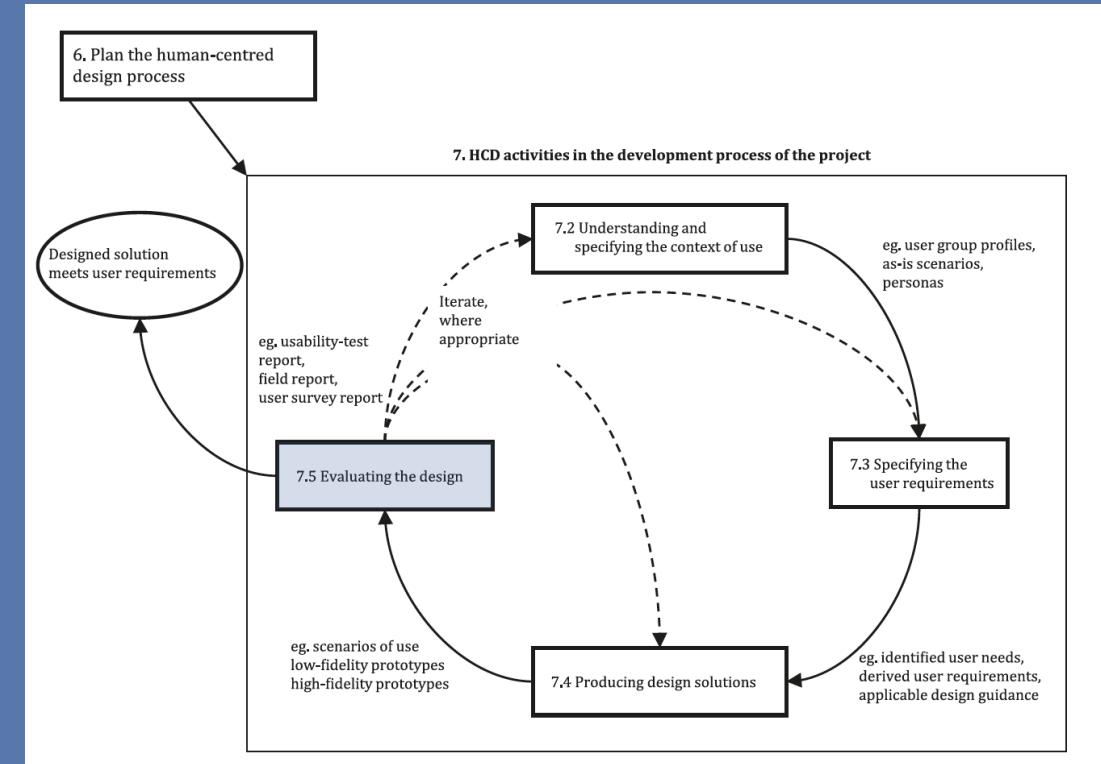
4.7 HCD – a process in iterative cycles

Evaluating the Design

Finally, designed prototypes need **to be evaluated**, in an ideal case with user participation. A usability evaluation involves representative users performing specific tasks with the interactive system to enable identification of usability problems or the measurement of effectiveness, efficiency, and user satisfaction.

One example is the Usability test:

- > A usability test consists of a number of usability test sessions. In each session, a usability test participant attempts to carry out representative usability test tasks using the interactive system or a prototype of the interactive system.
- > Usually, usability test sessions are moderated by a moderator and observed by a number of observers, who are often stakeholders. A note-taker records important usability findings.
- > Testing may occur at any time during human-centered design, from early analysis to interactive system delivery and beyond. Testing may be based on paper sketches or display mock-ups, as well as on interactive systems under design and completed interactive systems.

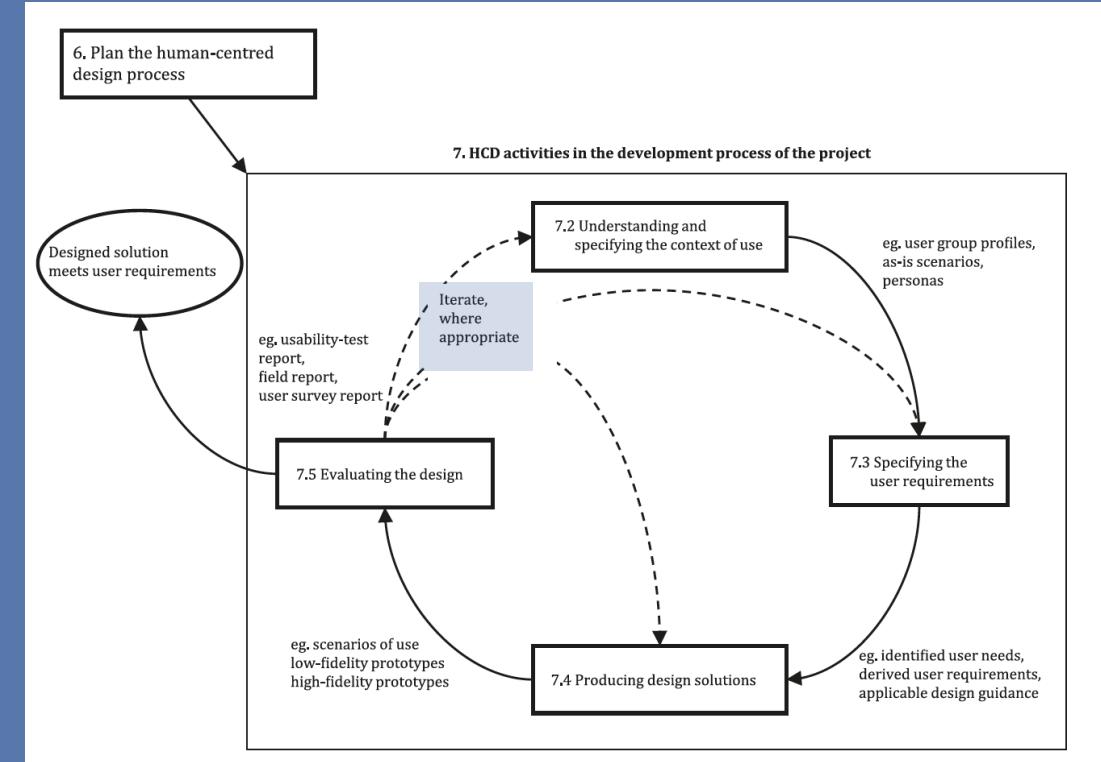


4.8 HCD – a process in iterative cycles

Iteration

Evaluation shows, whether the design solution does already meet the user requirement, or not. In case the answer is yes, the HCD process is successful. **In case the answer is no, the HCD process needs further iterations.**

- > The best possible situation is, that the iteration goes back to improving the design solution.
- > In some cases however, you realize that the user requirements are not yet complete, so you need to return to that step of the cycle.
- > In the worst case, the usability evaluation shows, that your context of use analysis was incomplete or even wrong and you have to go back to understanding more of the context of use.
- > Iterate until all user requirements are met !



EXERCISES 04

Chapter 04 Exercises

EXERCISE 9: HCD Process Documentation

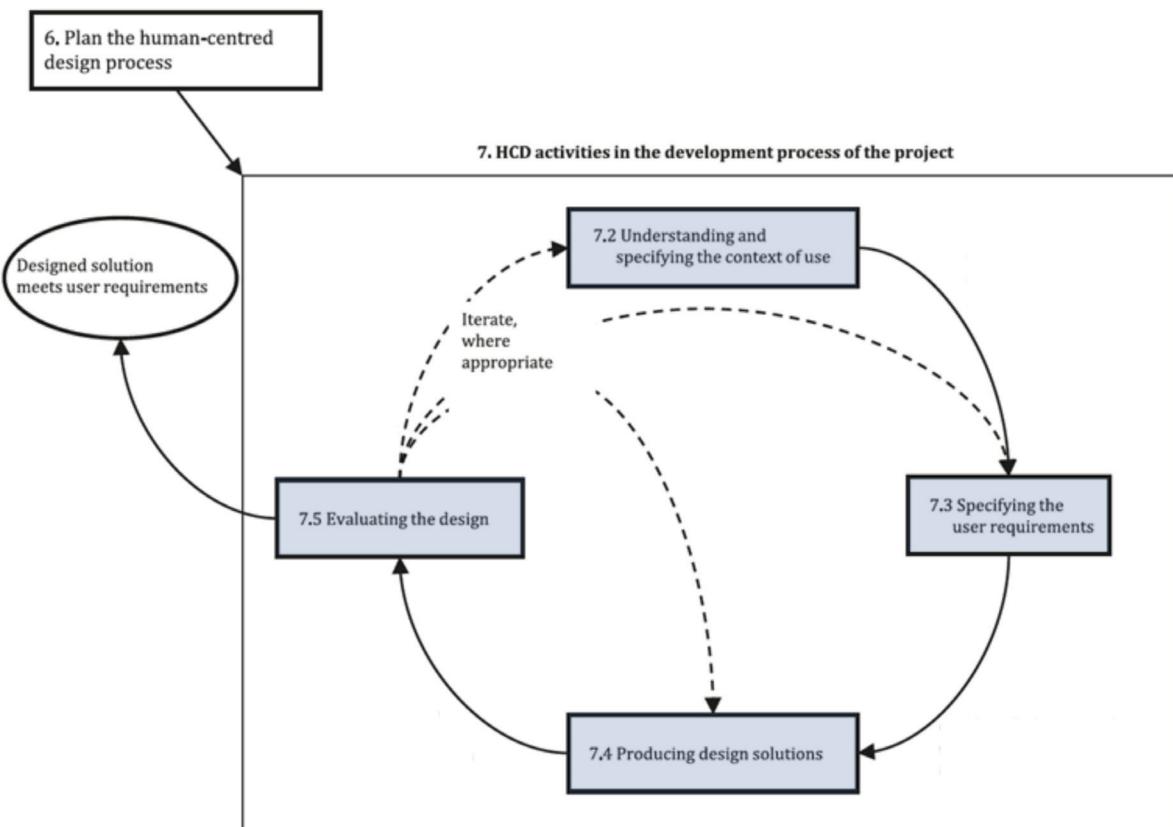
CHAPTER 04
Exercise 09
HCD process

Your task:

Identify and discuss tools and methods of documentation!

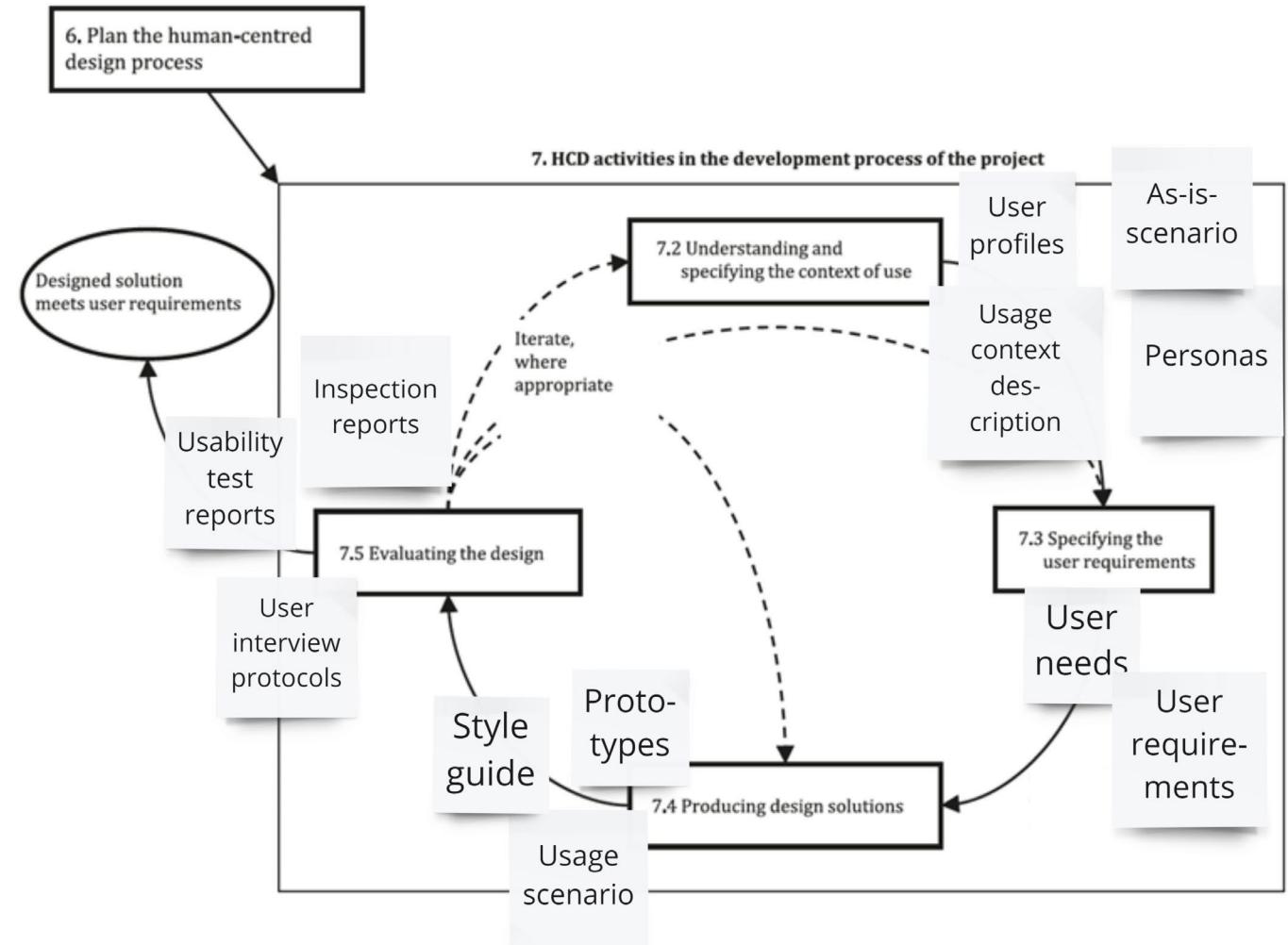
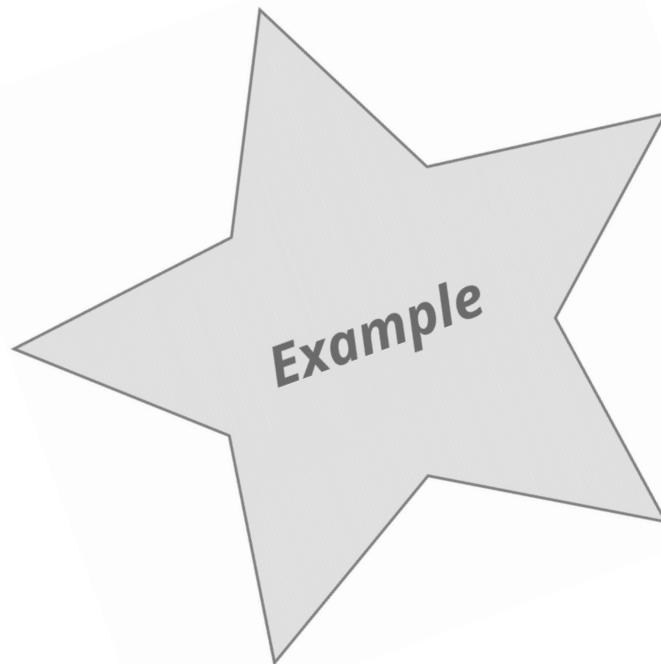
The HCD process is organized into five distinct phases of an iterative cycle, as depicted in the diagram here on the right.

- > Go through each of the steps and discuss what methods and documentation formats can be applied to each?
- > Document the results on the template!



EXERCISE 9: HCD Process Documentation - Example

CHAPTER 04
Exercise 09
HCD process
Example

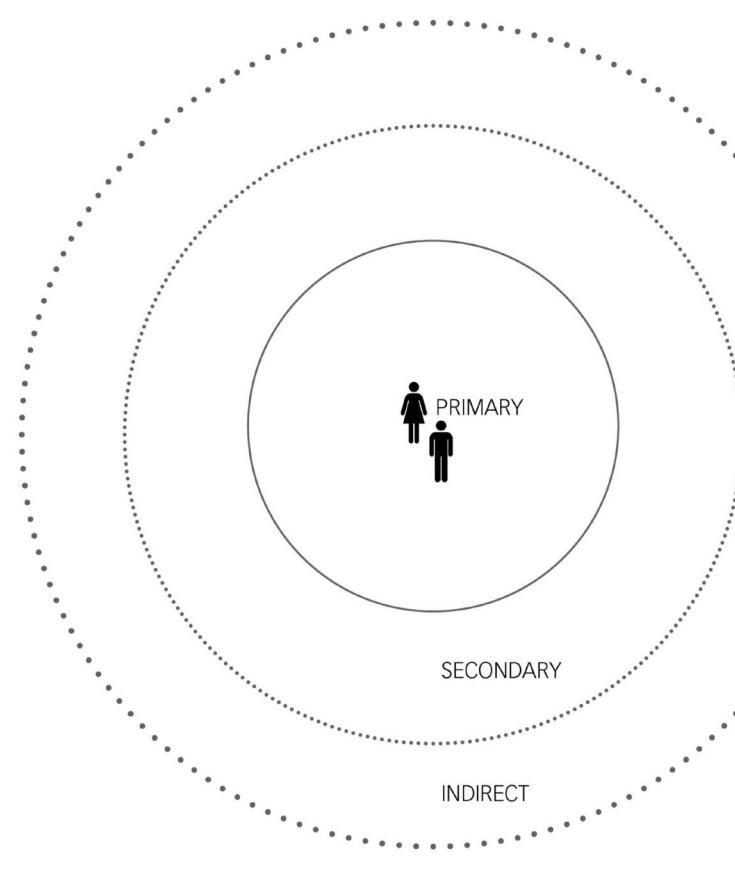


EXERCISE 10: User Group Mapping

Your task:

Based on your knowledge of the users of your product/ solution, please map the main user groups onto the canvas below.

Place post-it notes for each user group in one of the three circles (sub user groups can be placed close to each other).



A user is one of the following:

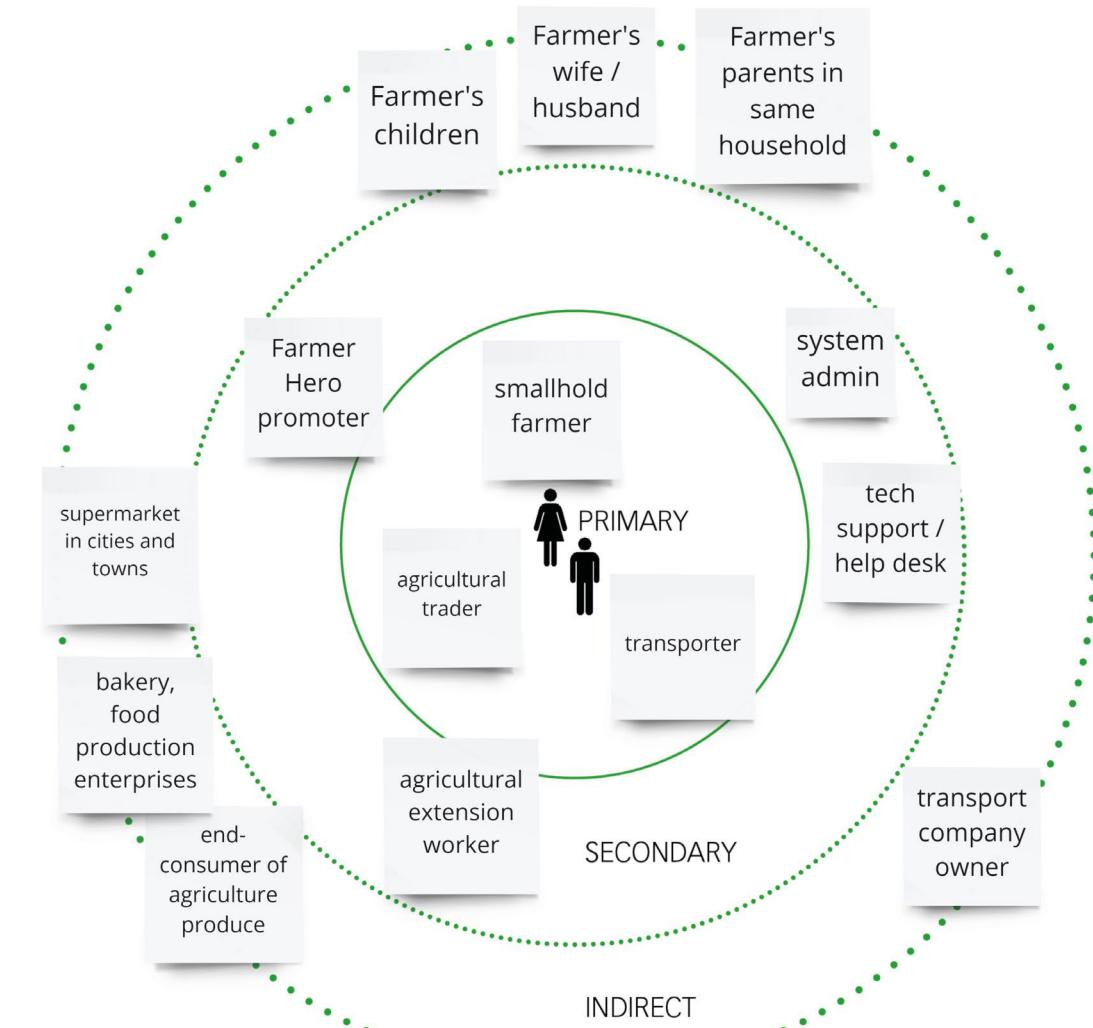
Primary user: a user who uses the interactive system for its intended purpose.

Secondary user: a user who carries out support tasks with the interactive system, for example to maintain it or to train primary users.

Indirect user: a user who uses the output of the interactive system, but who does not interact directly with it.

EXERCISE 10: User Group Mapping - Example

CHAPTER 04
Exercise 10
User Groups
Example



EXERCISE 11: Persona

CHAPTER 04
Exercise 11
Persona

Your task:

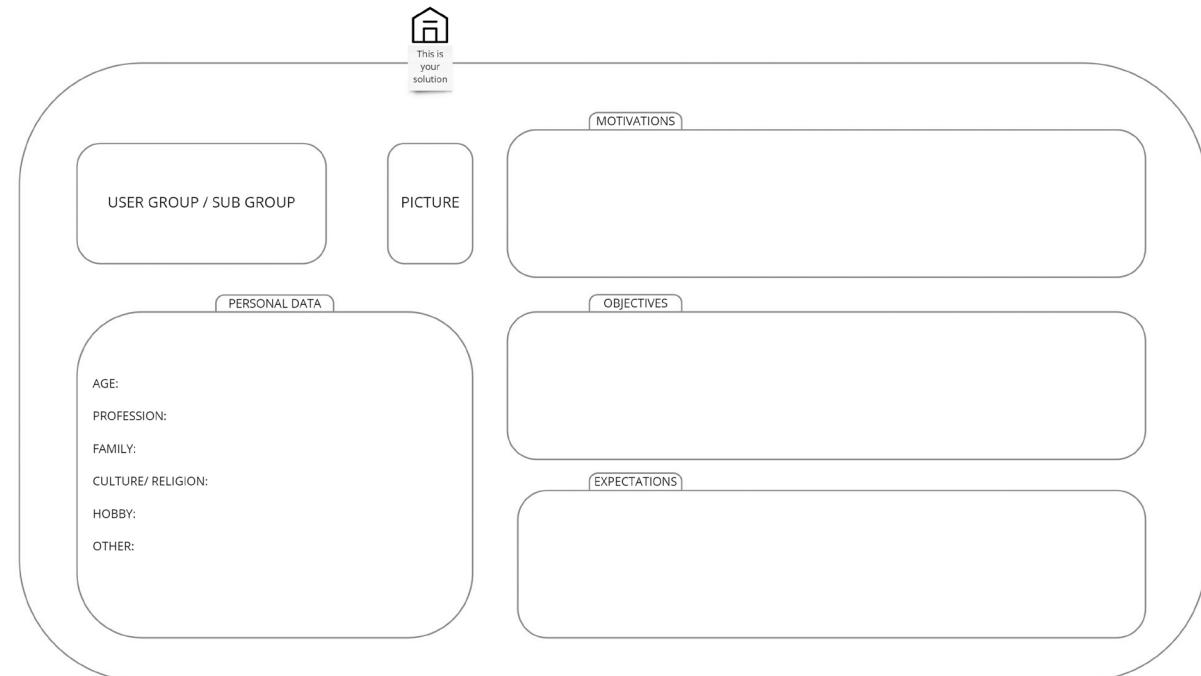
Draft a persona of a specific user group!

- > Pick one of the user groups you have identified in exercise 10 for your own digital solution and start drafting a first "proto-persona" to represent that user group.
- > Fill out the fields of the template by adding post-it notes.
The idea is to make the persona as relatable as possible by adding personal details.

Personas:

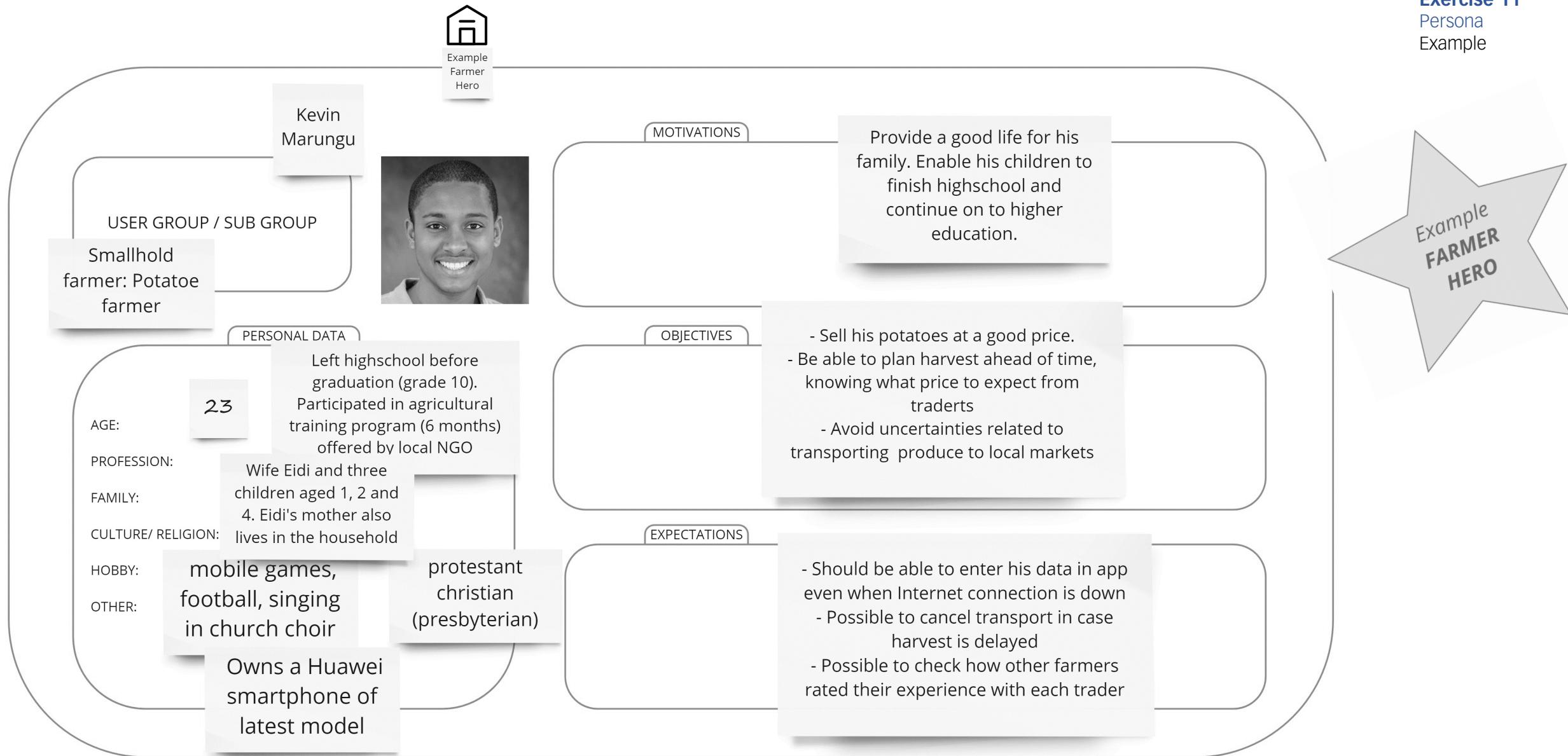
A **persona** is a description of a fictitious but realistic user and what they intend to do when using an interactive system. Personas are not real people; they are realistic representations of users, constructed from empirically determined data, for example from observations or interviews.

A **proto-persona** is an adapted tool from "Lean UX" that helps verify assumptions in a step-by-step process, starting with initial assumptions about the user groups, that then need to be verified and amended through user research.



EXERCISE 11: Persona - Example

CHAPTER 04
Exercise 11
Persona
Example



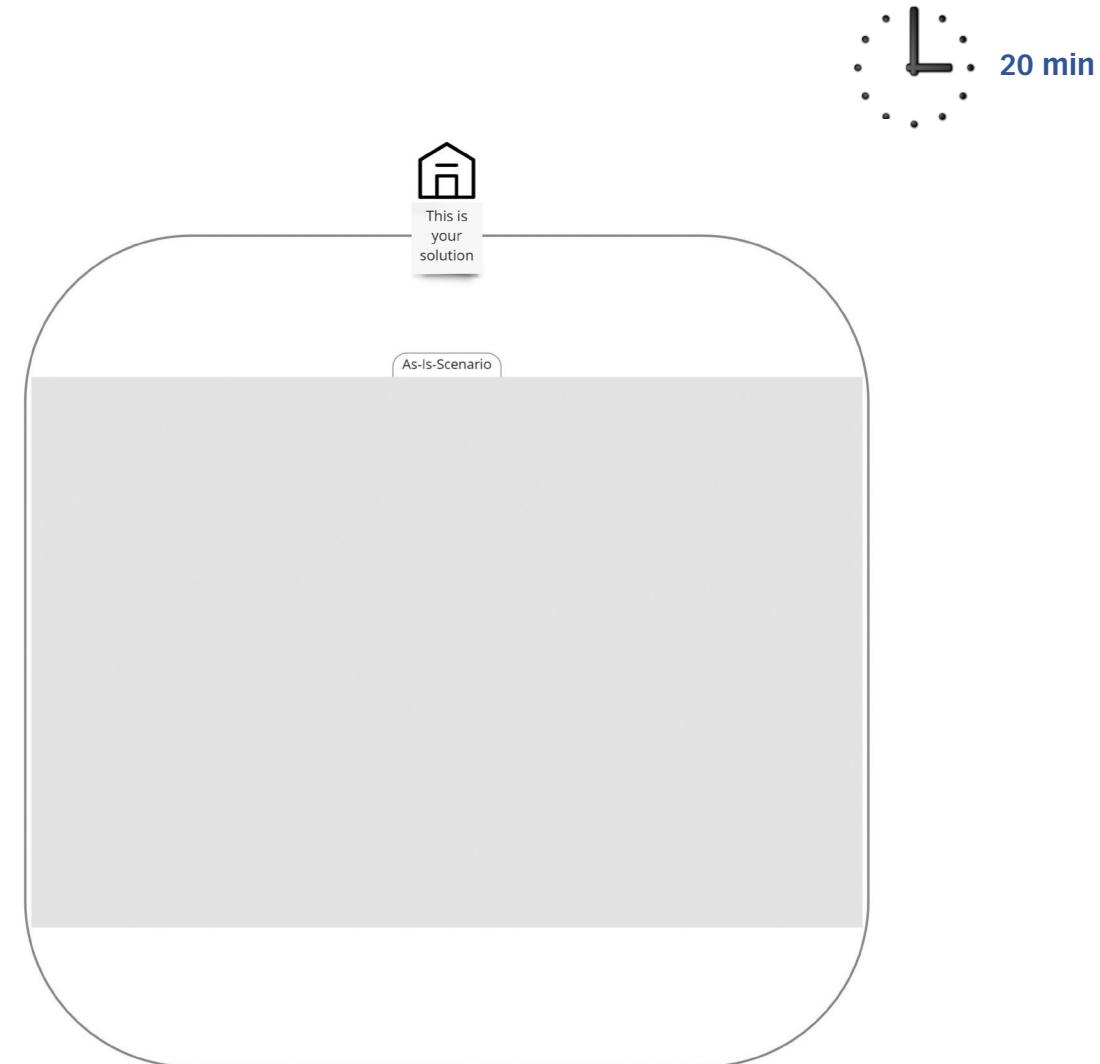
EXERCISE 12: As-Is-Scenario

Your task:

- > **Draft a short as-is-scenario** featuring a member of your main user group (before the person has heard of your service)

Scenarios are narratives that describe an intended usage situation with the interactive system under development. The purpose of scenarios is to provide a very early, tangible basis for discussions about what the future interactive system could be like for the user, before prototypes are constructed.

As-Is-scenario: A narrative text description of the procedure a specific user currently follows to complete one or more tasks. As-is scenarios are created by a user experience professional based on results from observation and contextual interviews. They are reviewed by users to detect misunderstandings that may have occurred during a contextual interview.



EXERCISE 12: As-Is-Scenario - Example

CHAPTER 04
Exercise 12
As-Is-Scenario
Example



Example
Farmer
Hero

As-Is-Scenario

Kevin Marungu is a potato-farmer living with his wife and three kids in the village Ndiara, 50 km from Nakuru in Kenya. When the rainy season is ending and time for harvest is getting nearer, Kevin starts planning the sale of his potatoes, hoping this year to get a good price, which has been increasingly difficult in the previous years. To get an idea of what price to expect in the market, Kevin tries to follow news and announcements on the regional farming radio channel. It helps for getting a general idea of the national market but the information transmitted does not completely match the reality on the local level where prices fluctuate rapidly depending on many factors. He also asks fellow farmers who sometimes travel to the markets in nearby Nyahuru and further away in Nakuru.

Based on the sparse information he has managed to gather, Kevin makes a decision to begin his harvest and arranges with a fellow community member to use his truck to transport the potatoes to the market in Nakuru. Finally arriving in the market place, Kevin realises that many other potato farmers from the surrounding have followed the same intuition as he had and he ends up waiting until the next morning in a long line of potato trucks, until he finally manages to sell his load at a price well below what he had hoped for. Tired and frustrated, Kevin returns home to his wife and tells her the bad news.



EXERCISE 13: Use Scenario

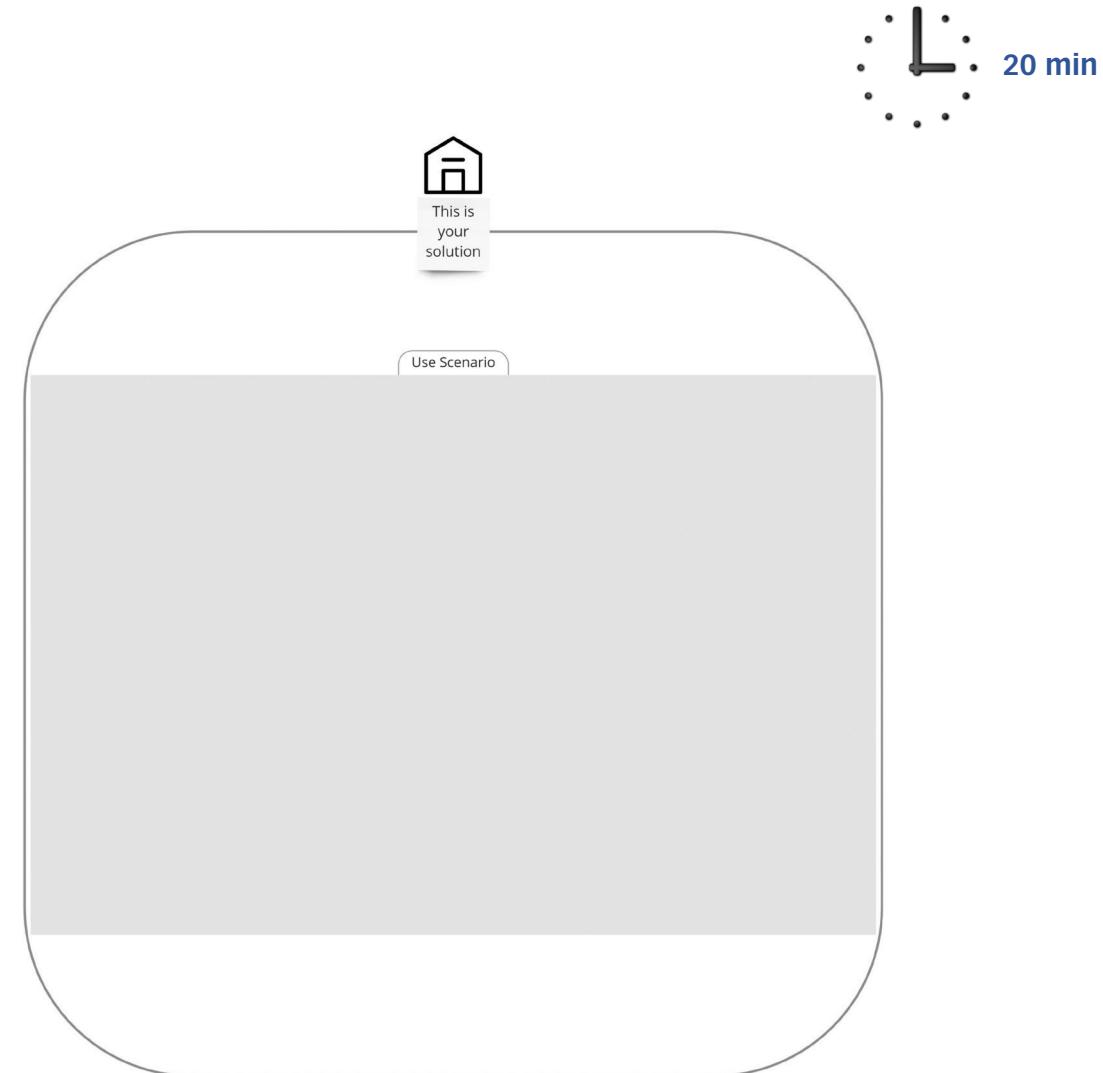
CHAPTER 04
Exercise 13
Use Scenario

Your Task:

Draft a use scenario!

- > As already discussed in exercise 12, scenarios are narratives that describe an intended usage situation with the interactive system under development, before prototypes are constructed. Now we focus on writing a use scenario.
- > Draft a short use scenario featuring a member of your main user group (before the person has heard of your service)

Use scenario: A narrative text description that describes an intended usage situation with the interactive system under development. The purpose of use scenarios is to provide a very early, tangible basis for discussions about what the future interactive system could be like for the user, before prototypes are constructed. Use scenarios are based on a deep understanding of the context of use, user needs, user requirements as well as discussions with users and stakeholders.



EXERCISE 13: Use Scenario - Example

CHAPTER 04
Exercise 13
Use Scenario
Example



Example
Farmer
Hero

Use Scenario

Kenyan potato farmer Kevin Marungu has recently started using "Farmer Hero", a new market information app that the regional agricultural extension worker recommended and helped him install onto the Huawei android smartphone that Kevin had bought second hand last year.

Kevin is not yet very experienced with using many apps - he mostly uses WhatsApp to write short messages and send photos to his cousins in Nairobi, but he found the Farmer Hero app quite easy to understand, as the interface is visual with simple icons and symbols to direct him. Now that the rainy season is coming to an end, Kevin starts planning his harvest.

To find out when would be the best time to begin harvesting, Kevin opens up the Farmer Hero app. From the start screen he selects the "market price" icon and sees a dashboard with information adapted, based on his current location and previous activities. In a graph he sees a prediction of how market prices are likely to change over the next four weeks and he can click on the names of different towns in the region to see the different predictions for each market. Confident that he has found the optimal timespan for selling his potatoes at a good price, Kevin starts harvesting.

Once the potatoes are out of the ground, Kevin opens up his app again and now selects the "sell" icon on the home screen. He then enters the quantity and quality of his produce into a form and within minutes he receives five different purchase offers to his message inbox. Two of the offers include pick-up, so he selects the one of those that offers a higher payment, then schedules and confirms the pick-up appointment for the next day. The transporter arrives on time, guided by the directions provided through the app. Once everything is loaded, the driver confirms the pick-up and the agreed upon payment is automatically transferred to Kevin's MPESA account.

Kevin is happy to have gained a good earning from his potatoes this year and even without the hassle of travelling to the city.



EXERCISE 14: Missing Information

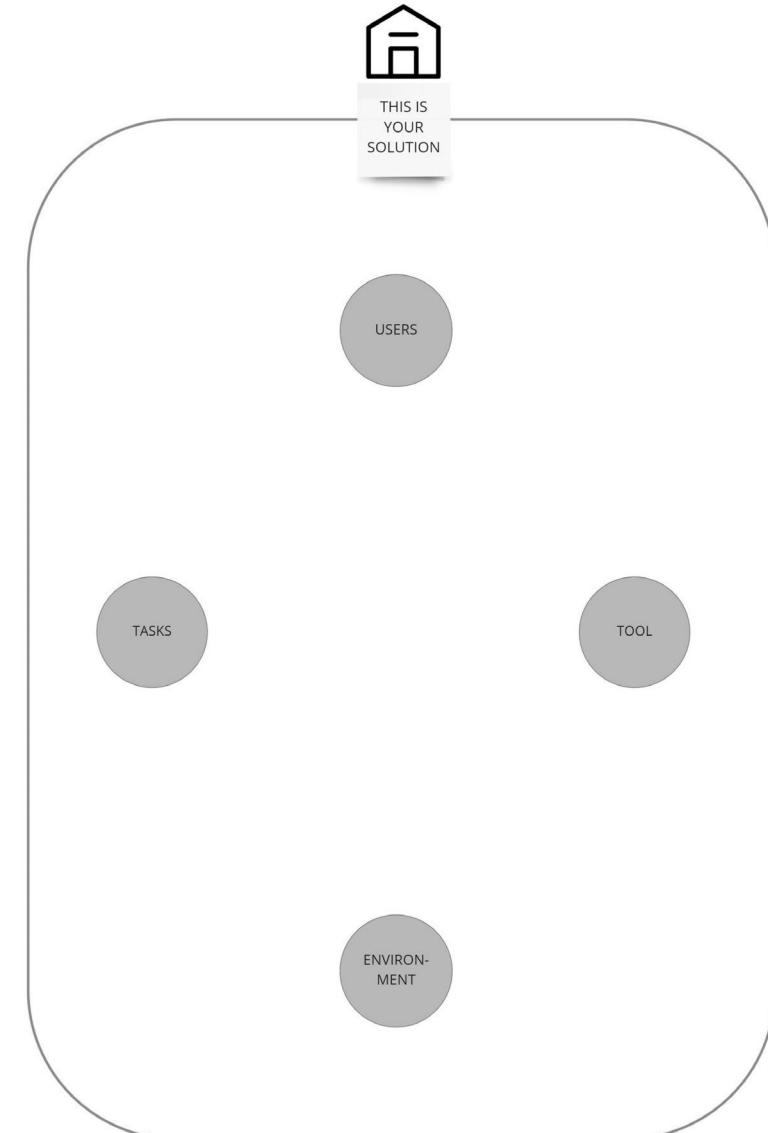
As we have over the last chapters gone through basic concepts, terms and tools of HCD, now it is time to start discussing how you could develop your own HCD strategy for your digital solution. Start by mapping out the aspects of context of use that are most relevant for you to research in the current stage of your project. You may already have carried out different activities of user research previously while developing and implementing your system. Now let's focus on issues that you have previously missed or that deserve to be explored in more detail.

Your Task:

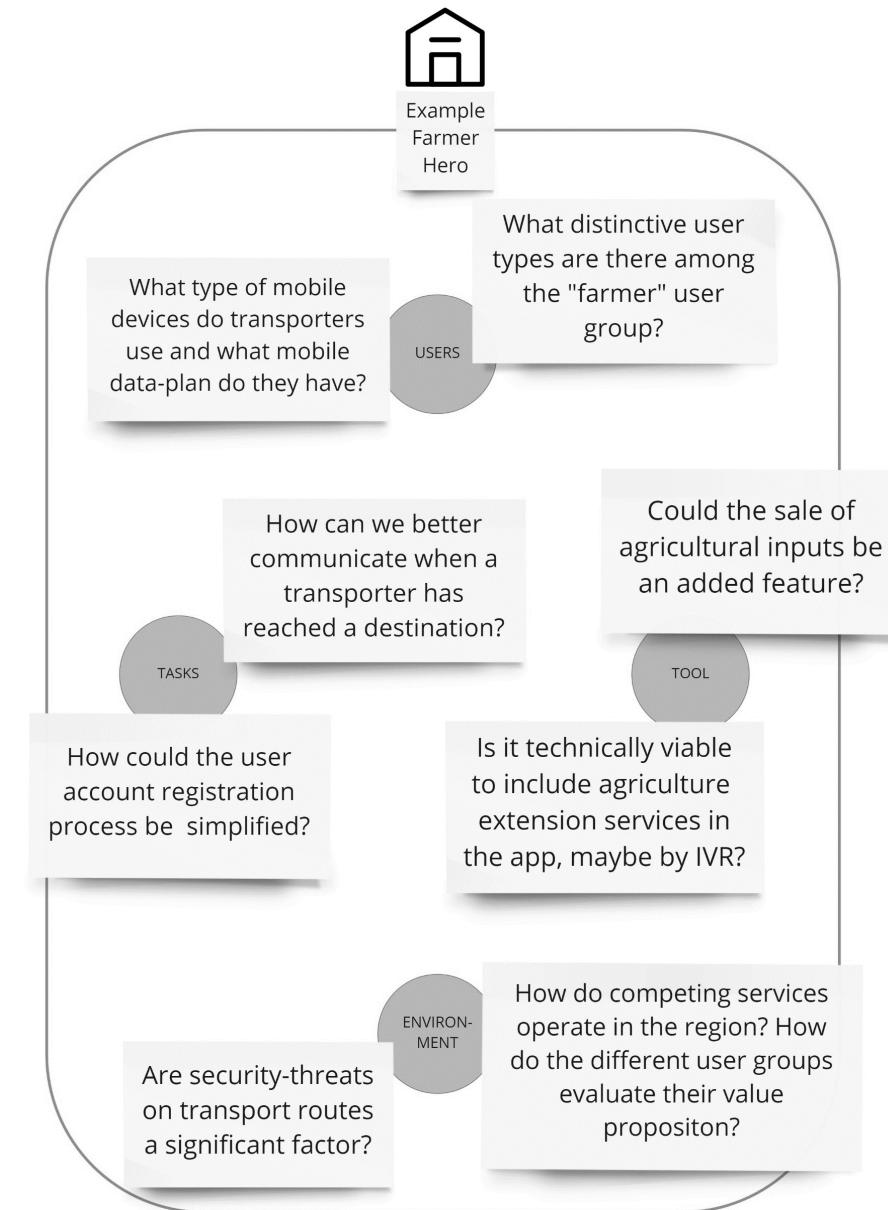
Brainstorm as many open questions about your user groups as you can think of. Take notes on post-its and arrange your identified research questions according to the four fields of the template.

Some guiding questions:

- Who are your users, how can you describe them, what motivates them?
- What aspects of your users' (physical, social and technical) environment affect how they use your service?
- Which of your user groups' specific objectives/goals are you aiming to support through your system?
- What specific tasks do they need to accomplish to achieve their objectives?
- How well do users currently understand and use your service?



EXERCISE 14: Missing Information - Example

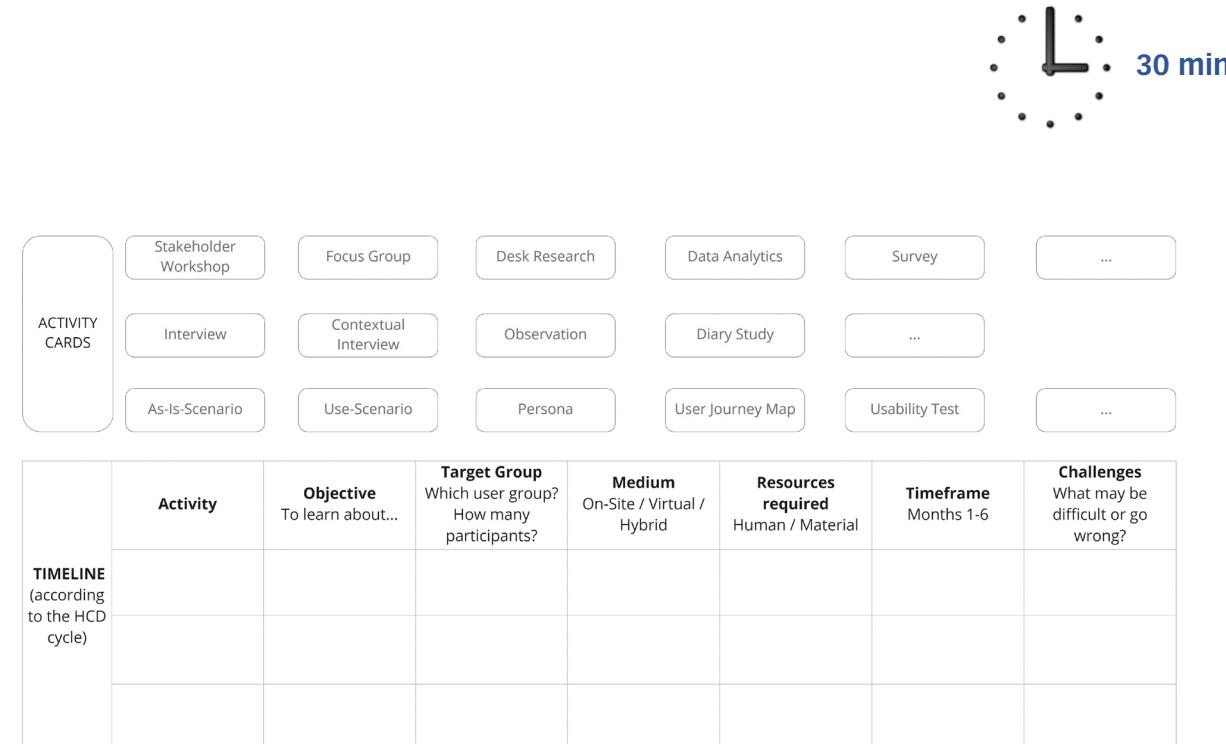


EXERCISE 15: Planning the HCD Cycle

Your Task:

Think about a pilot project of your solution or service in another context, like in a different district of your country or for new user groups that you don't know so far.

- > Start drafting activities of user research! With the research questions from the previous exercise #14 in mind, define a collection of HCD research activities that help you better understand the identified primary user groups.
- > Choose an action among the activity cards and transfer the measure to the template table. Then fill out the other data fields, corresponding to the activity you selected.
- > Then continue with a next one, etc.



EXERCISE 15: Planning the HCD Cycle - Example

CHAPTER 04
Exercise 12
 HCD Planning
 Example

TIMELINE (according to the HCD cycle)	Activity	Objective To learn about...	Target Group Which user group? How many participants?	Medium On-Site / Virtual / Hybrid	Resources required Human / Material	Timeframe Months 1-6	Challenges What may be difficult or go wrong?
	Contextual Interview	the direct experience of the snail farms in his/her environment in Senegal to observe and to consult the interaction with our mobile marketing app and the context of use.	User is the snail farmer. A small-holder farmer who owns this sideline business.	<ul style="list-style-type: none"> • on-site • in addition hybrid 	<ul style="list-style-type: none"> • on-site: 1 researcher speaks local language • on-site: video recording • expert fee/ travel and accomodation • hybrid: our digital household survey tool that documents main facts and daily processes of the farmer via an icon based diary 	<ul style="list-style-type: none"> • on-site: 4-5 days • hybrid: 3-4 weeks 	<ul style="list-style-type: none"> • farmer is not reliable • preparations and knowldege by the expert are not sufficient • external factors influence the daily processes (unusual weather, market crisis, etc.) • failures while using the household survey app or the recording

Chapter 04

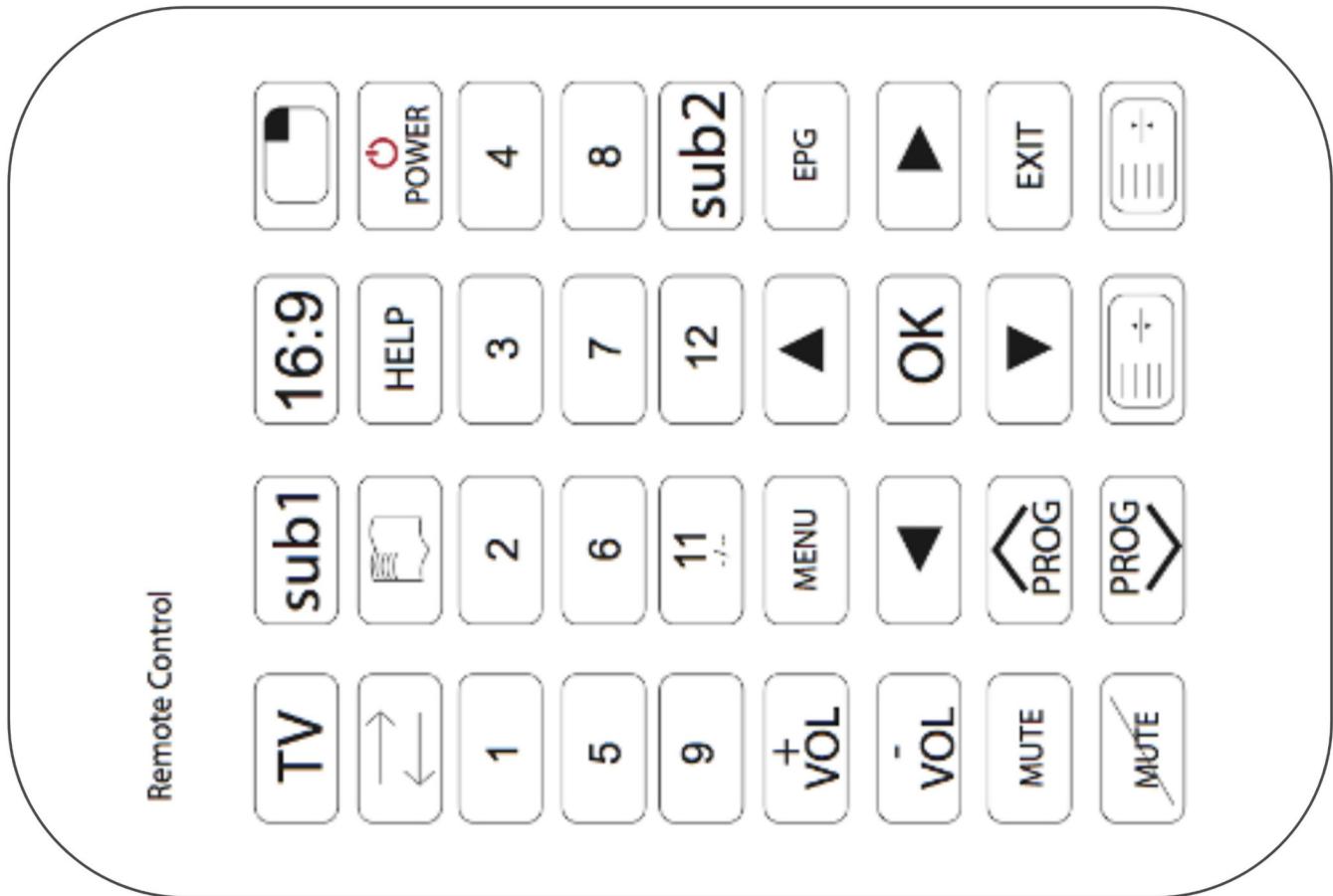
Final notes

Congratulations, you have now reached the end of our HCD Playbook! Throughout the four chapters, we have tried to explain the main concepts and terms related to the field of HCD, including what to pay attention to when developing or adapting a solution in a new or culturally different context of use. We advice you to start out by planning your development process according to the four steps of the iterative HCD cycle. And, of course, keep educating yourself and practice to find the formats and methods that best function in your particular project situation.

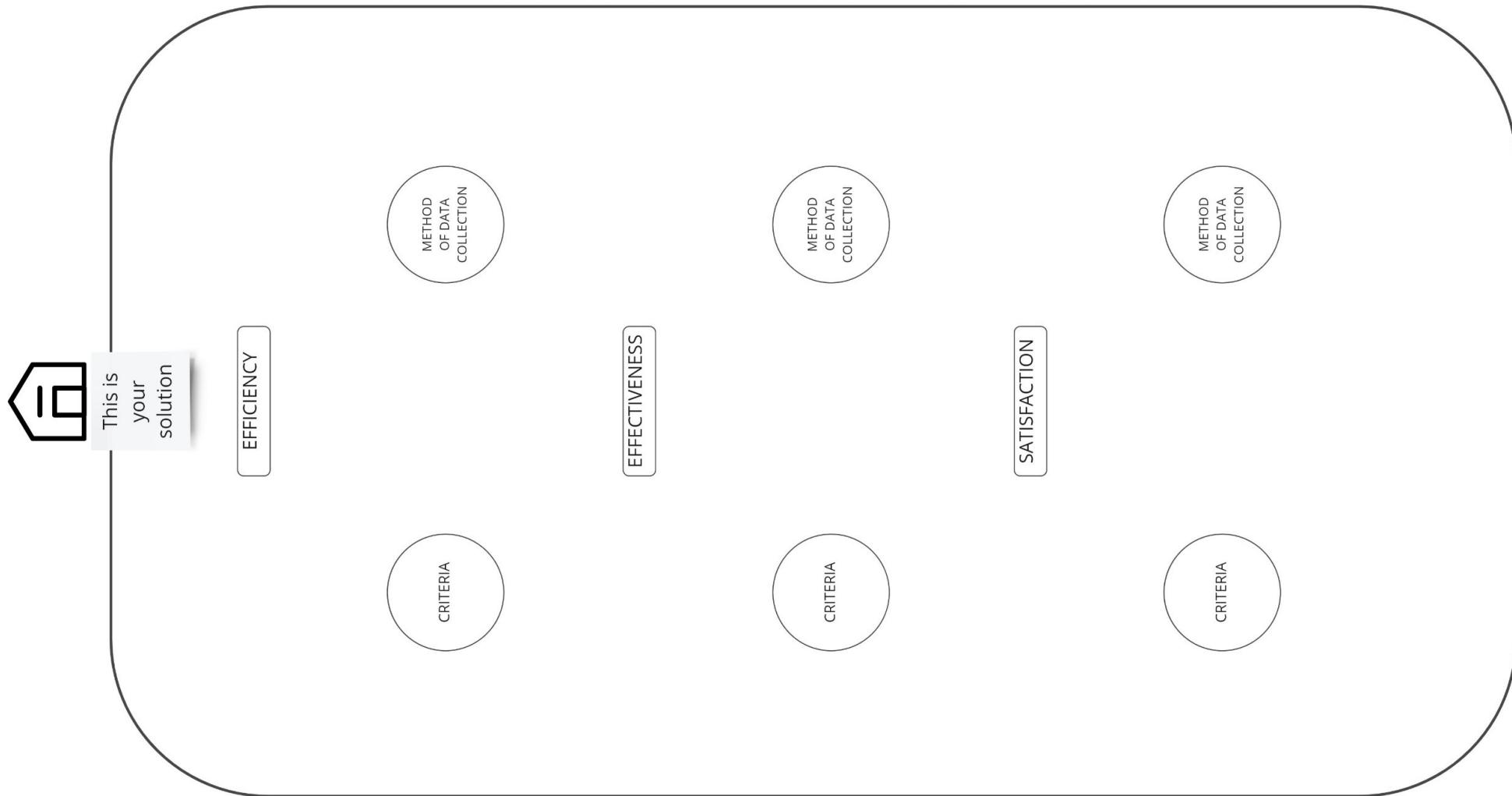
ANNEX A

Annex Templates for Exercises

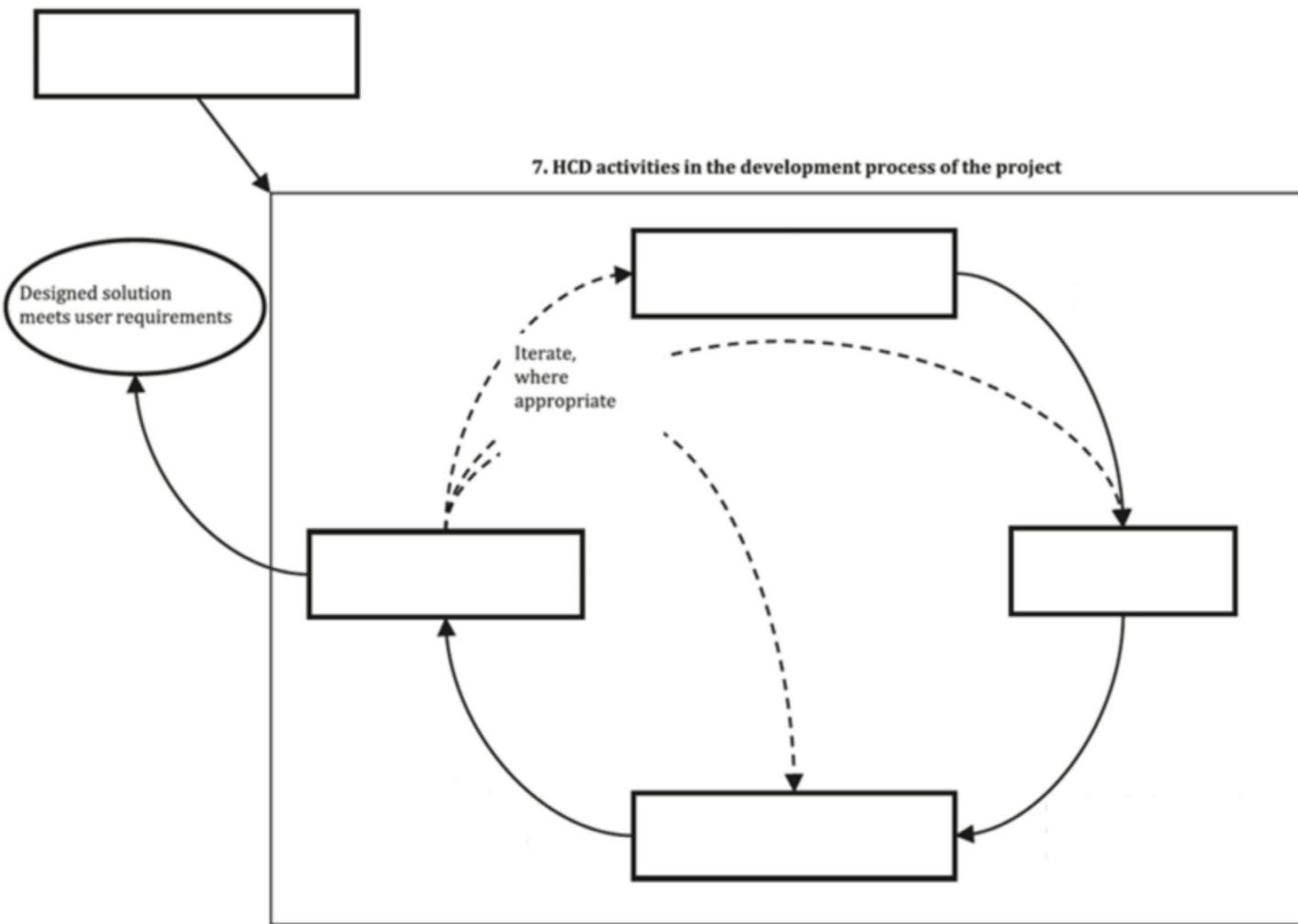
EXERCISE 1: Homemade Disasters – Template 1



EXERCISE 2: Usability Evaluation – Template 2



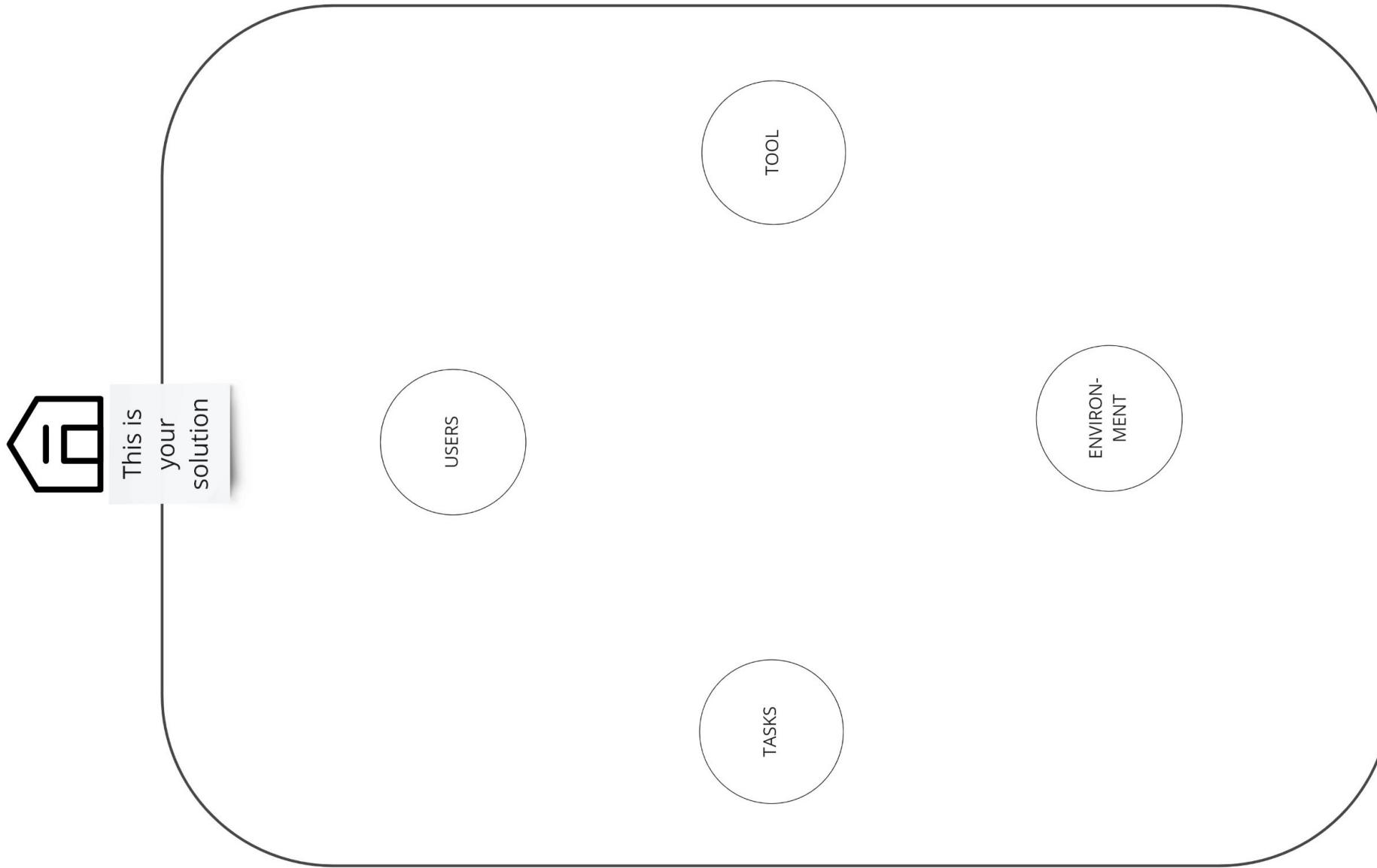
EXERCISE 3: HCD step by step – **Template 3**



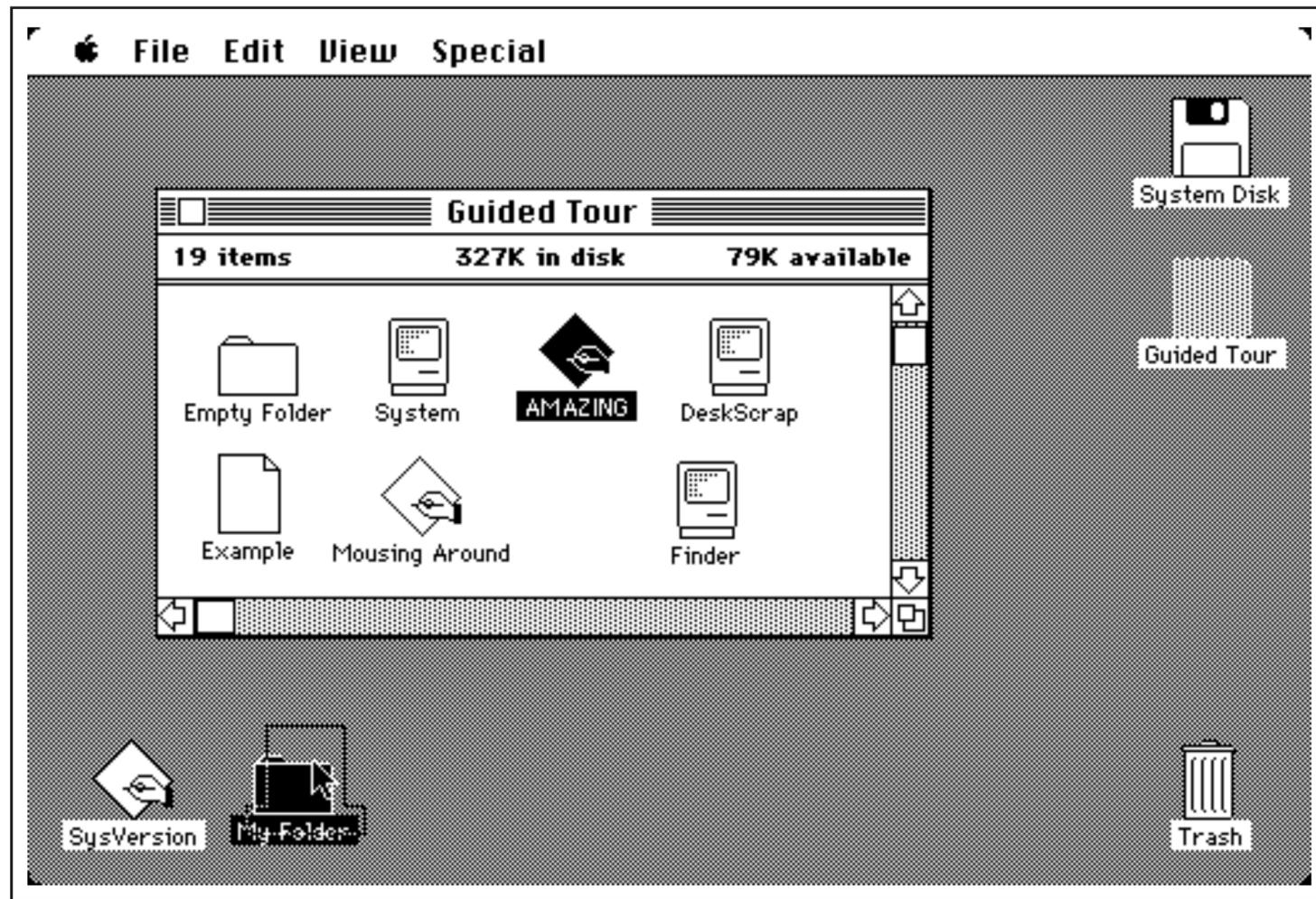
EXERCISE 4: Environments – Template 4



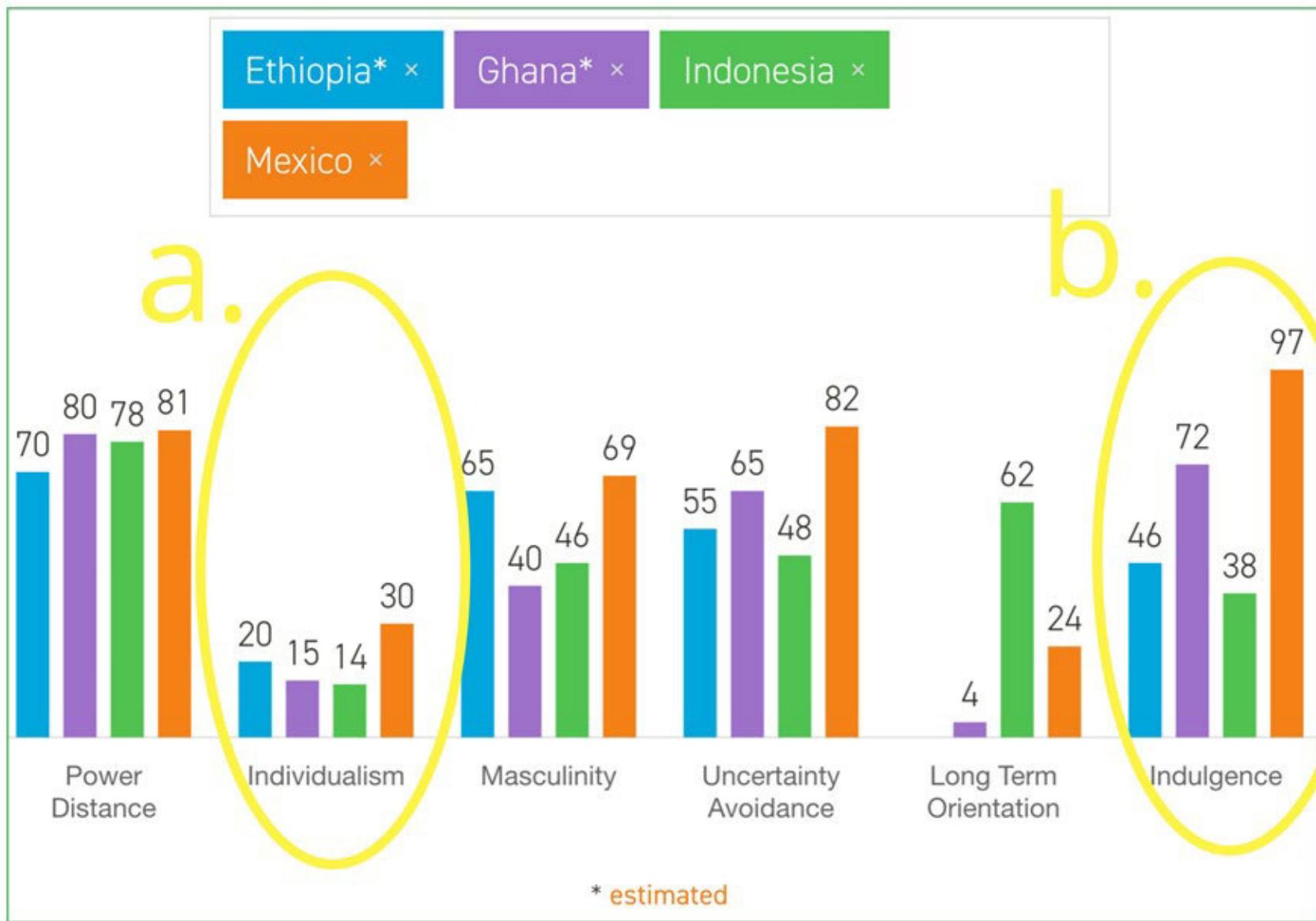
EXERCISE 5: Usability Evaluation – Template 5



EXERCISE 6: Desktop Metaphor – Template 6



EXERCISE 7: Cultural Dimension – Template 7



Hofstede Six Cultural Factors - Definitions

Power Distance - The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally.

Individuality - The degree of interdependence a society maintains among its members

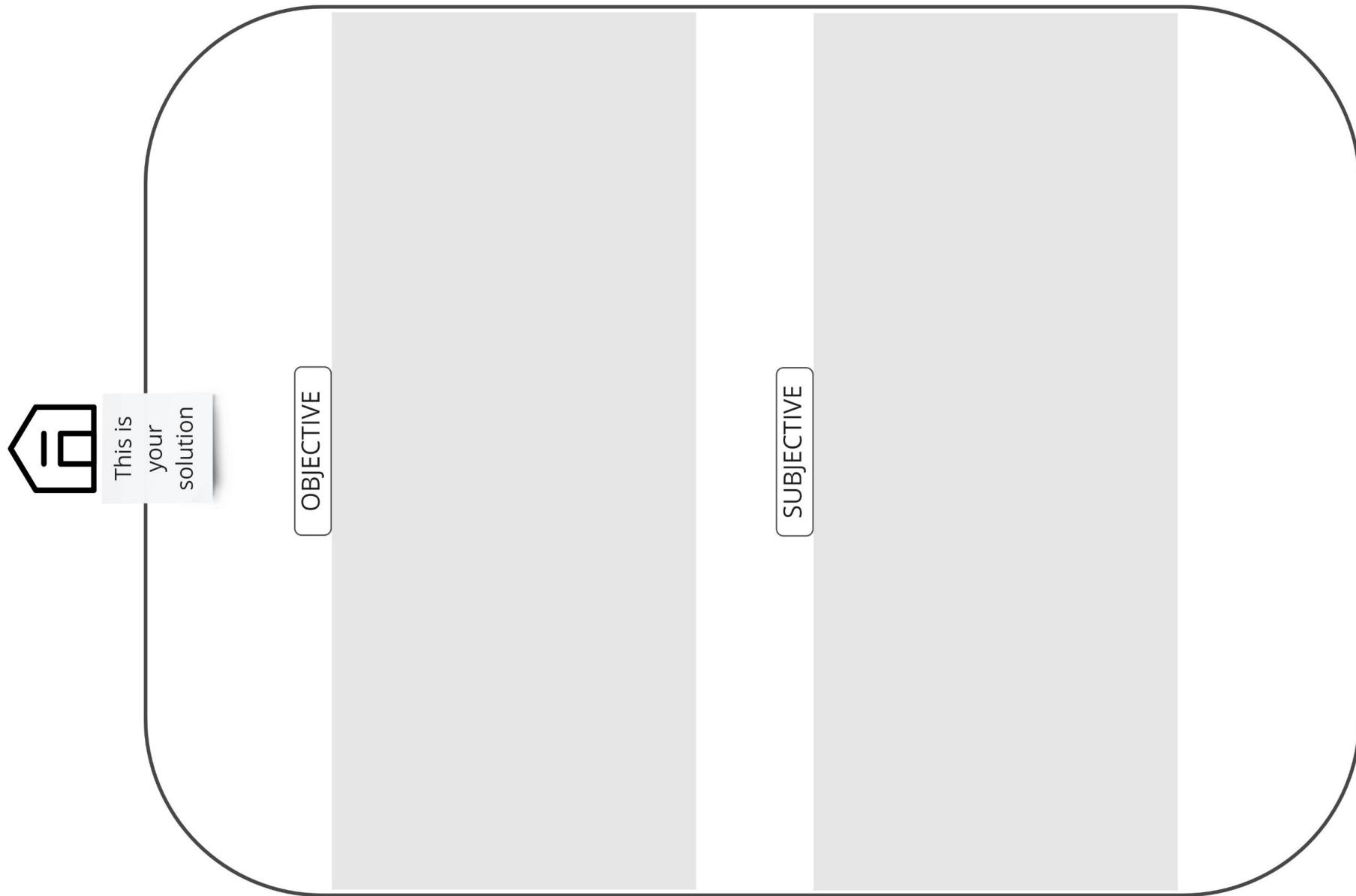
Masculinity - The fundamental issue here is what motivates people, wanting to be the best (Masculine) or liking what you do (Feminine).

Uncertainty Avoidance - The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these

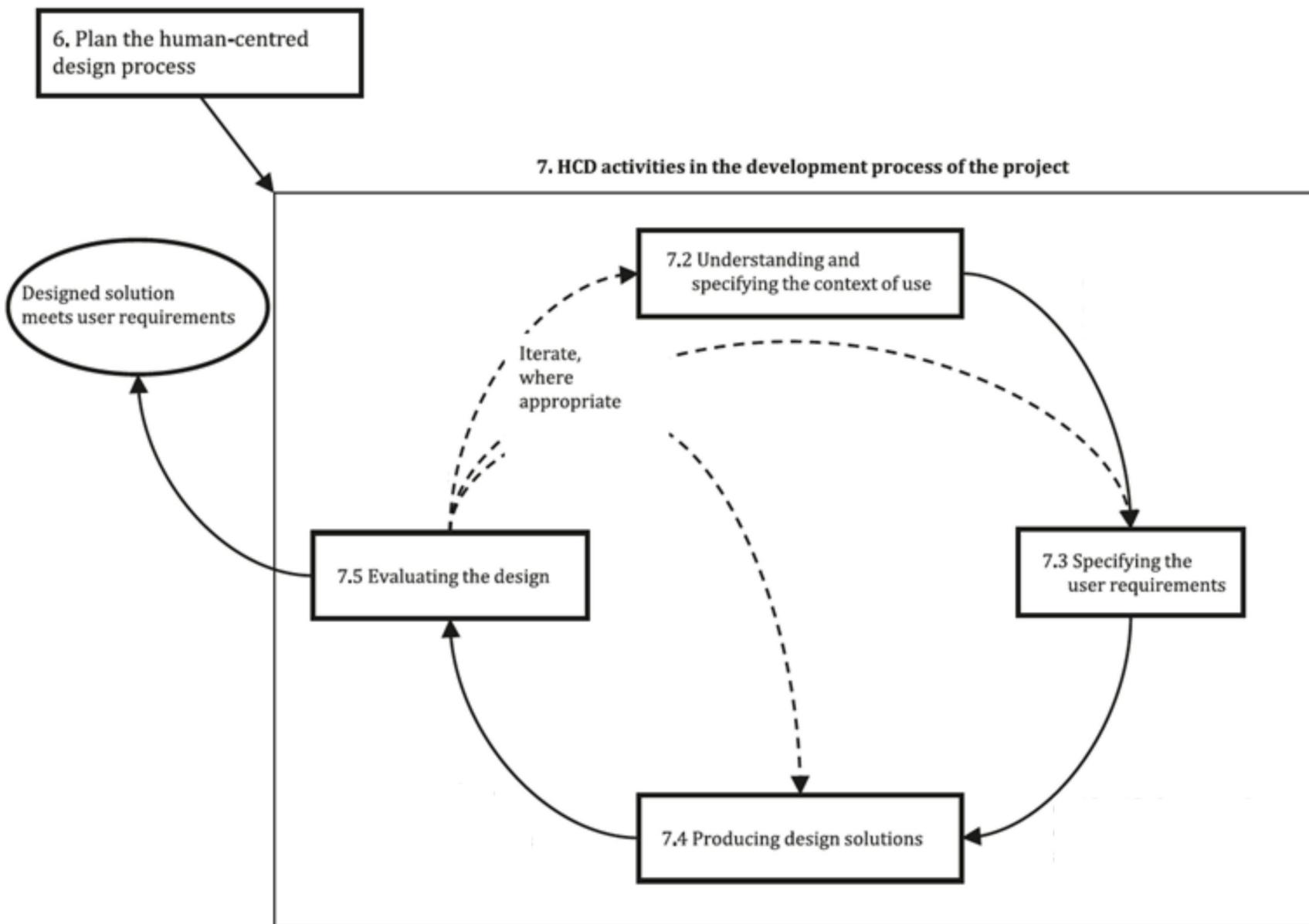
Long Term Orientation - How every society has to maintain some links with its own past while dealing with the challenges of the present and future

Indulgence - The extent to which people try to control their desires and impulses.

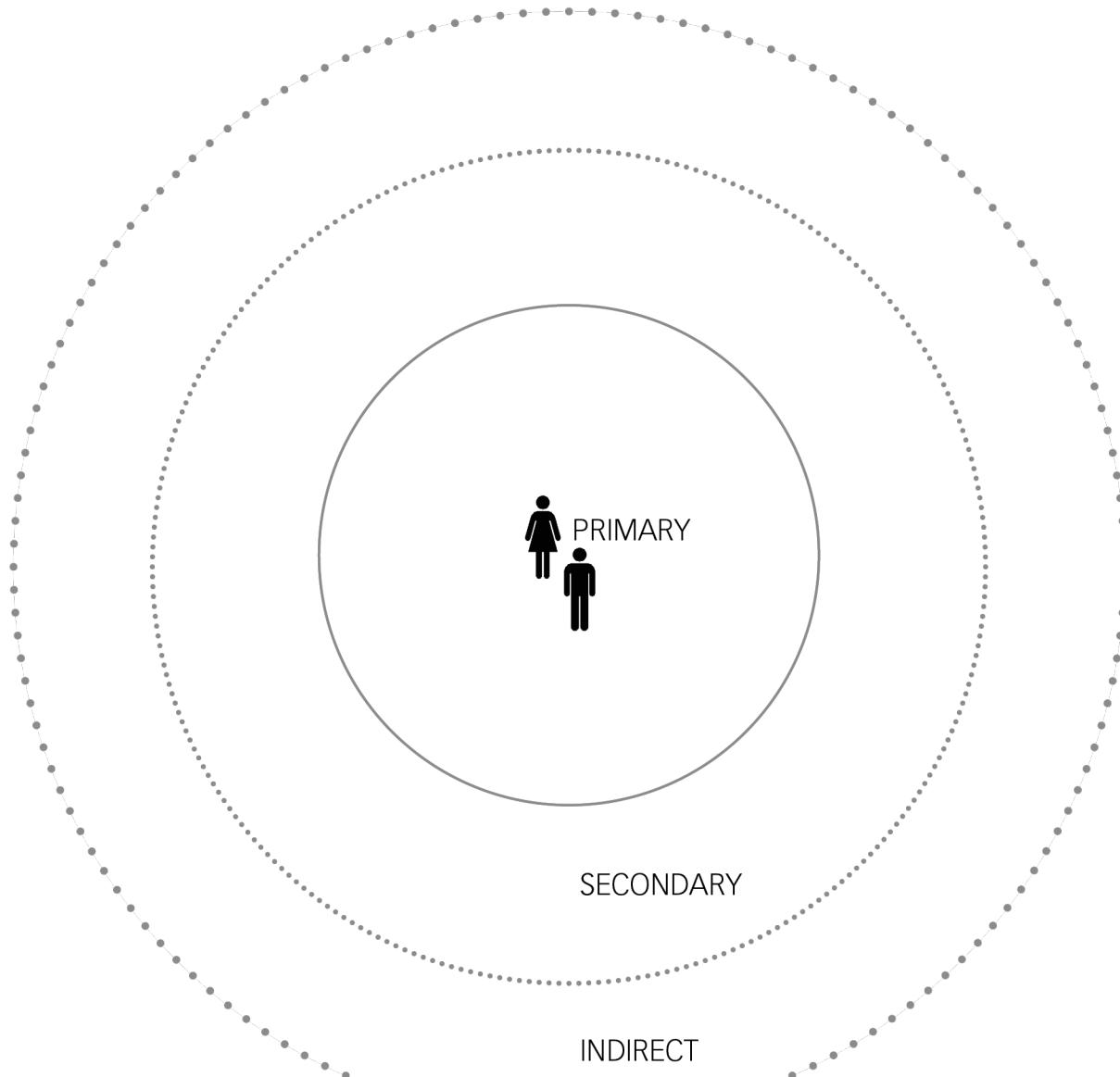
EXERCISE 8: Local and Regional Aspects – **Template 8**



EXERCISE 9 : HCD Process Documentation – Template 09



EXERCISE 10: User Group Mapping – Template 10



EXERCISE 11: Persona – Template 11



This is
your
solution

USER GROUP / SUB GROUP

PICTURE

MOTIVATIONS

PERSONAL DATA

AGE:

PROFESSION:

FAMILY:

CULTURE/ RELIGION:

HOBBY:

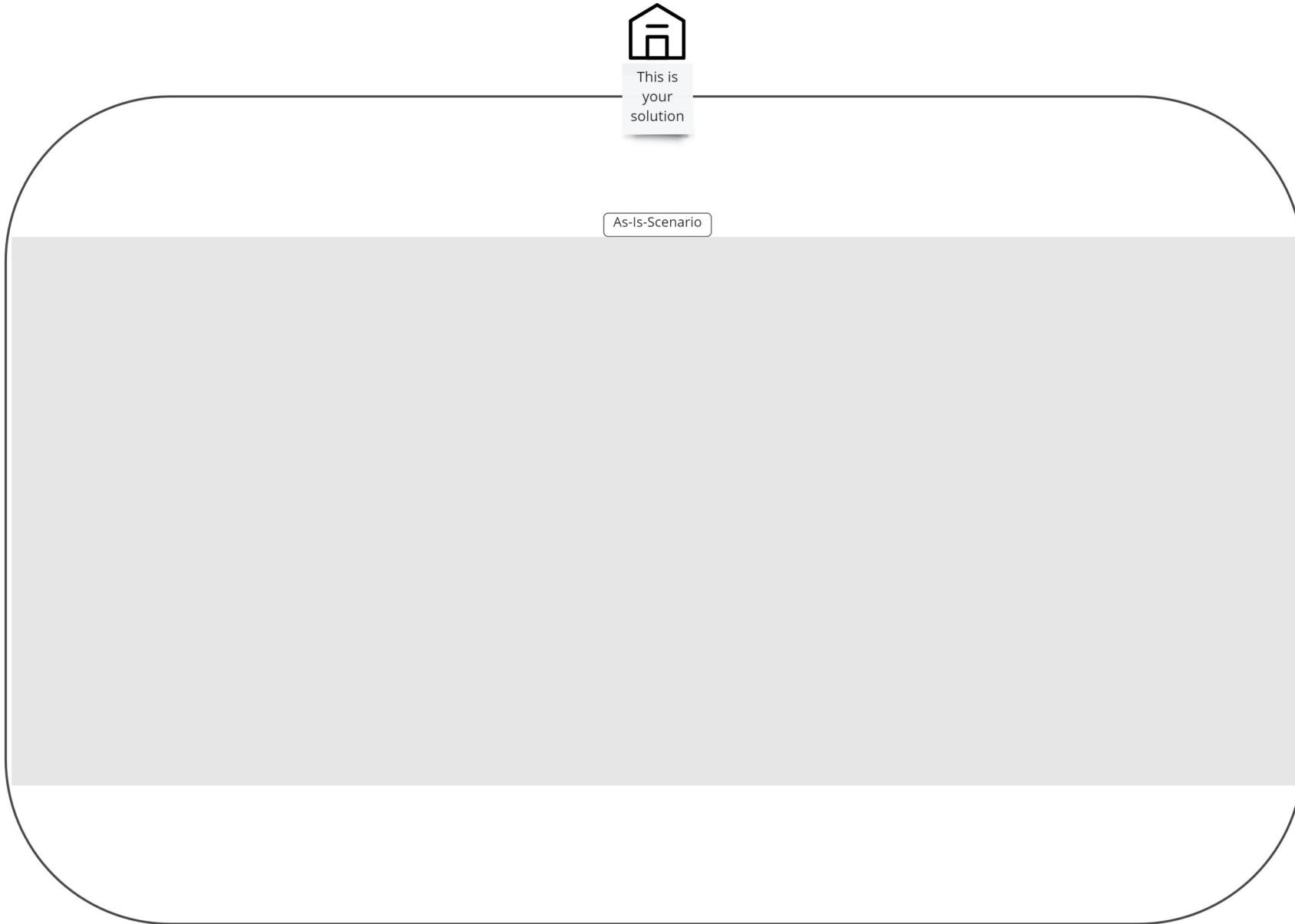
OTHER:

OBJECTIVES

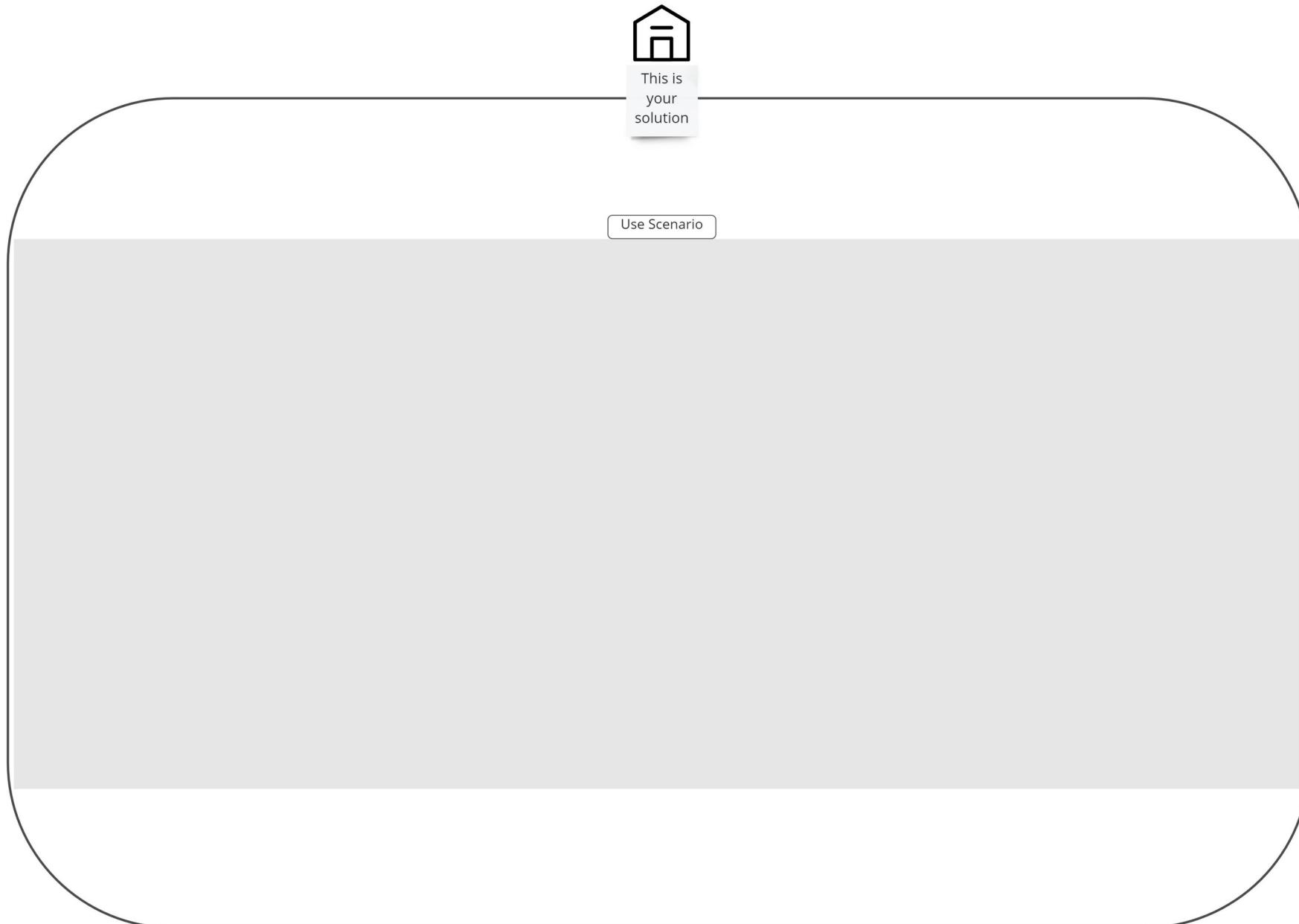
EXPECTATIONS

The template consists of a large central oval containing several rectangular input fields. At the top left is a box for 'USER GROUP / SUB GROUP'. To its right is a box for 'PICTURE'. Above the main oval is a box for 'MOTIVATIONS'. Below the main oval are two boxes: 'PERSONAL DATA' on the left and 'OBJECTIVES' on the right. The 'PERSONAL DATA' box contains fields for 'AGE', 'PROFESSION', 'FAMILY', 'CULTURE/ RELIGION', 'HOBBY', and 'OTHER'. Below the 'OBJECTIVES' box is another box for 'EXPECTATIONS'. A small house icon with the text 'This is your solution' is positioned at the top center.

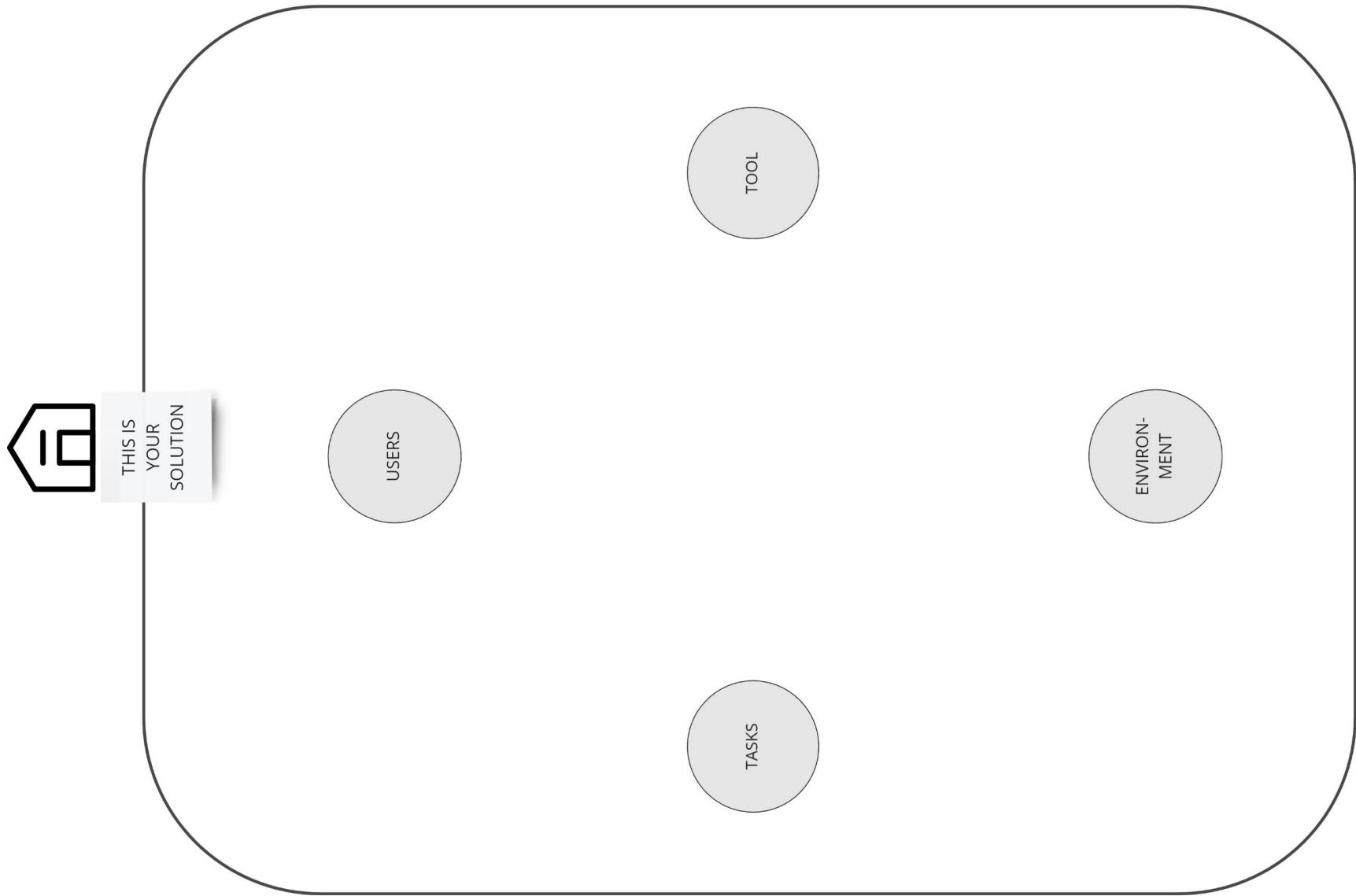
EXERCISE 12: As-Is-Scenario – Template 12



EXERCISE 13: Use Scenario – Template 13



EXERCISE 14: Missing Information – Template 14



EXERCISE 15: Planning the HCD cycle – Template 15



↓ TIMELINE (according to the HCD cycle)	Activity	Objective To learn about...	Target Group Which user group? How many participants?	Medium On-Site / Virtual / Hybrid	Resources required Human / Material	Timeframe Months 1-6	Challenges What may be difficult or go wrong?

ANNEX B

Annex B Glossary

COLLABORATION MATTERS!

SOURCES OF KNOWLEDGE AND GLOSSARY

June 2021

On behalf of the GIZ-Innovation Factory.
Curriculum development and workshop facilitation by icebauhaus.

www.icebauhaus.com
www.innovation-factory.info



RESOURCES

Sources of knowledge

Principles of Digital Development

<https://digitalprinciples.org>

The Principles for Digital Development Cooperation are nine guidelines that should help to use digital technologies in development cooperation projects more efficiently, effectively and sustainably. The international principles were developed in 2014 and are based on earlier approaches such as the UNICEF innovation principles. In 2016, the United Nations Foundation's Digital Impact Alliance (DIAL) became steward of the Principles for Digital Development to help facilitate their adoption. DIAL advances digital inclusion to achieve the Sustainable Development Goals (SDGs).

ISO 9241

<https://www.iso.org/>

https://en.wikipedia.org/wiki/ISO_9241

ISO 9241 is a family of standards covering human-centred design. It includes standards related to:

- Software ergonomics;
- The human-centred design process;
- Displays and display related hardware;
- Physical input devices;
- Workplace ergonomics;
- Environment ergonomics;
- Control centres.

CPUX-F, -UT, -UR curricula by UXQB

<https://uxqb.org>

CPUX-F, -UT, -UR curricula by UXQB: The International Usability and User Experience Qualification Board (UXQB®) is an international consortium of usability and user experience experts. The goal of UXQB is the further development and administration of the certification program "CPUX – Certified Professional for Usability and User Experience". CPUX is an international standard for qualification of usability and user experience professionals. Currently, three certificates are available:

- Foundation level (CPUX-F);
- Advanced level User Requirements Engineering (CPUX-UR);
- Advanced level Usability Testing and Evaluation (CPUX-UT).

Hofstede Insights

<https://www.hofstede-insights.com/>

Hofstede Insights: Hofstede's cultural dimensions theory is a framework for cross-cultural communication, developed by Geert Hofstede. It shows the effects of a society's culture on the values of its members, and how these values relate to behavior, using a structure derived from factor analysis.

RESOURCES

Definition of Terms

Accessibility Accessibility is the extent to which an interactive system enables users to interact with it, regardless of their level of vision, hearing, dexterity, cognition, physical mobility, etc.

Affordance An aspect of an object that makes it obvious how the object could be used.

As-is scenario A narrative text description of the procedure a specific user currently follows to complete one or more tasks. As-is scenarios are created by a user experience professional based on results from observation and contextual interviews. They are reviewed by users to detect misunderstandings that may have occurred during contextual interview.

Context of Use A combination of users, goals, tasks, resources, and environments. The context of use is determined by interviewing users or by observing them carry out tasks. The results from focus groups, observation and contextual interviews are described in the context of use description. The context of use description is the basis for identifying user needs and tracing them back to their source.

Contextual Interview An interview that takes place at the location where the user's interaction with the interactive system usually takes place and focuses on the context of use of the user.

Cross-Cultural Usability Cross-cultural design is designing technology for different cultures, languages, and economic standings. Ensuring usability and user experience across cultural boundaries.

Design Thinking A keyword used to describe an approach for human-centred design with a heavy focus on the development of creative ideas through teamwork. A comprehensive and in-depth understanding of the problem space as well as a non-restrictive creative exploration of solution ideas are at the core of design thinking. The solution ideas are then adapted to the problem context. This approach emphasizes three important components:

- People: Multi-disciplinary collaborating teams that act fast using their collective intelligence and creating their own effective work process, thereby achieving unique results.
- Places: The best environment for ideas to unfold is an open and flexible work environment with variable project rooms, movable tables and walls, a lot of space for visualisations and a great variety of materials for illustrating ideas, thoughts and work products.
- Process: The team navigates through the solution space based on an open "error culture" following an iterative, six-stage design process (understand, observe, define point of view, generate ideas, prototype, test).

Design thinking is a special way of working out a solution that corresponds to the problem context. But user requirements are considered only implicitly in this approach, they are not explicitly formulated or documented for later use.

RESOURCES

Definition of Terms

- Environment** The physical, social and technical conditions in which a user interacts with an interactive system. The social conditions include the organisational conditions.
- Human-Centred Design (HCD)** An approach to design that aims to make interactive systems more usable by focusing on the use of the interactive system and applying human factors, ergonomics and usability knowledge and methods. Human-centred design is an approach to design that aims to make interactive systems more usable by focusing on the use of the interactive system and applying usability knowledge and methods.
Human-centred design is based upon an explicit understanding of users, goals, tasks, resources and environments. Users are involved throughout the design. The design is driven and refined by usability evaluation. The process is iterative – that is, it continues until the user requirements are met. The design addresses the whole user experience (UX).
- Lean UX** Lean UX is an approach to human-centred design that focuses on a fast, iterative approach through early usability evaluation and lightweight deliverables. Lean UX informs and supports Agile development, where working but incomplete software is delivered early and frequently, to enable quick feedback.
- Mental Model** The perception people have of themselves, others, the environment, and the things with which they interact. I.e., a person's thought process about how something works in the real world. People form mental models through experience, training and instruction. The mental model of an interactive system is formed largely by interpreting its perceived actions and its visible structure. Expectations resulting from the use of other or similar systems are also of importance. If a user's mental model of an interactive system is incomplete or contradictory, then the user cannot easily use the interactive system.
- Metaphor** A metaphor is a mental model of an already known situation or concept, transferred onto a different, but analogous, domain. By mapping the model of the already familiar object (the source domain) onto a new one with a similar structure (the target domain), it can be much easier to understand the new situation.
Metaphors occur very often in natural language and frequently have their origin in the experience of interaction with the physical world. They are also often used intentionally as a design technique, especially in the domain of human computer interfaces.
- Persona** A description of a fictitious but realistic user and what they intend to do when using an interactive system. Personas are not real people; they are realistic representations of users, constructed from empirically determined data, for example from observations or interviews.
Personas typically have a name, age, some background, goals and aspirations. A persona description should include information about the persona's knowledge about and interest in the subject matter of the interactive system. Including a photo in a persona description helps to create the illusion of a real person.

RESOURCES

Definition of Terms

Prototype	A representation of all or part of an interactive system that, although limited in some way, can be used for analysis, design and usability evaluation. <ul style="list-style-type: none"> - <u>Lo-fi prototype</u>: A low-cost, simple illustration of a design or concept used to gather feedback from users and other stakeholders during the early stages of design. - <u>Hi-fi prototype</u>: A software prototype of the user interface to the interactive system that is being designed. A high-fidelity prototype more closely resembles the finished interactive system.
Resource	All means required to use an interactive system. Resources can be: <ul style="list-style-type: none"> - <u>Reusable</u> – for example: equipment, information and available human-based and system-based support; or - <u>Exhaustible</u> – for example: time, human effort, financial resources and materials.
Stakeholder	An individual or organisation with an active interest in an interactive system. All users are stakeholders, but not all stakeholders are users.
Task	A set of activities undertaken in order to achieve a specific goal. A <u>task model</u> is a description of the subtasks within a task that have to be carried out in order to reach the user's goals. It describes a task's contextual preconditions, the steps needed to carry out the task, and its intended outcomes
Usability	Usability is the extent to which an interactive system is effective, efficient and satisfying to use in a specified context of use: <ul style="list-style-type: none"> - an interactive system is <u>effective</u> if it supports what users need to do to reach their goals, and if users can figure out how to do it. - an interactive system is <u>efficient</u> if it supports users in carrying out their tasks using as few resources as possible. In most cases, this means that users must be able to complete their tasks quickly. - an interactive system is <u>satisfying</u> if it is pleasant to use. <p>Technical defects may lead to <u>usability problems</u> if they prevent users from solving their tasks effectively or efficiently.</p>
Usability Maturity	The level of understanding and implementation of a systematic human-centred design process within an organisation. An organisation's receptiveness to usability activities and findings may be influenced by its usability maturity. Usability maturity can be expressed in a model with 4 levels: <ul style="list-style-type: none"> - <u>Incomplete</u>: The human-centred design process is not implemented, or fails to achieve its process purpose. At this level there is little evidence of any systematic achievement of the process purpose. Product managers may say that they care about usability, but when it comes to spending budgets or making otherwise inconvenient decisions to achieve usability, nothing happens. Usability is fine if it comes for free, but no one is committed to delivering it.

RESOURCES

Definition of Terms

- Performed: The human-centred design process achieves its process purpose. Usability is achieved by enthusiastic individuals using ad-hoc processes.
- Managed: The human-centred design process is implemented in a managed fashion, and its work products are appropriately established, controlled and maintained. The process is planned, monitored and adjusted.
- Innovating: The human-centred design process is continuously improved to respond to change aligned with organisational goals. Process innovation objectives are defined that support the relevant business goals.

The usability maturity model is based on the process measurement framework for process capability in ISO 33020.

Usability Test A usability evaluation that involves representative users performing specific tasks with the interactive system to enable identification and analysis of usability problems, or the measurement of effectiveness, efficiency, and user satisfaction. Usability tests may occur at any time during the human-centred design process, from early analysis through interactive system delivery and beyond. Usability tests may be based on paper sketches or display mock-ups, as well as on interactive systems under design and completed interactive systems.

Use Scenario A narrative text description that describes an intended usage situation with the interactive system under development. The purpose of use scenarios is to provide a very early, tangible basis for discussions about what the future interactive system could be like for the user, before prototypes are constructed. Use scenarios are based on a deep understanding of the context of use, user needs, user requirements as well as discussions with users and stakeholders.

User Experience (UX) User experience (UX) considers satisfaction before, during and after use (whereas usability considers satisfaction only during use). User experience before use may be influenced by company branding, customer reviews, previous interactions, etc. User experience after use may be influenced by product delivery, post-sales support, recent interactions, etc.

A user experience professional is a person who has specific responsibilities associated with the human-centred quality of an interactive system. Their responsibilities include analysis of the context of use, specifying user requirements, producing design solutions – in particular prototypes – and carrying out usability evaluations.

User A person who interacts with an interactive system, or who uses the output of the system. A user is one of the following:

- Primary user: a user who uses the interactive system for its intended purpose.
- Secondary user: a user who carries out support tasks with the interactive system, for example to maintain it or to train primary users.
- Indirect user: a user who uses the output of the interactive system, but who does not interact directly with it.

RESOURCES

Definition of Terms

User Group A collection of users with the same or similar personal characteristics and contexts of use related to the interactive system. A user group profile is a generalized description of a user group.

User Interface All components of an interactive system (software or hardware) that provide information and controls for the user, to allow them to accomplish specific tasks with the interactive system.

User Journey Map A graphical or tabular description of all encounters users have with the interactive system covering all touchpoints that influence the user experience, making the overall user experience tangible for others. Besides depicting as-is scenarios or use scenarios, user journey maps can be used as a general communications medium to exemplify scenarios for stakeholders that extend beyond the pure interaction, for example from the discovery of the product to the purchase situation to the usage of the product. User journey maps are created during analysis to describe current encounters. They are also created or updated during design to describe intended encounters.

User Need A prerequisite identified as necessary for a user, or a user group, to achieve a goal, implied or stated within a specific context of use. The purpose of user needs is to serve as a helpful intermediate step in the transformation of the context of use information into comprehensive user requirements. A user need is independent of any proposed solution for that need. In other words, a user need must not reference, for example, "the system" or "the website". User needs are identified based on various approaches including interviews with users, observations, user surveys, usability evaluations, expert analysis, etc. User needs often represent gaps (or discrepancies) between what is and what should be.

User Requirement A requirement for use that provides the basis for design and evaluation of an interactive system to meet identified user needs. User requirements are derived from user needs. A user requirement can be a qualitative user requirement or a quantitative user requirement. Both qualitative and quantitative user requirements provide a basis for the design of the interactive system and can be verified by evaluating the interactive system. While qualitative user requirements address the way in which the interactive system is used to arrive at a user goal, quantitative user requirements set measurable goals for usability and user experience.

User requirements are distinguished from:

- Market requirements: a requirement for an interactive system based on marketing policy aimed at maximizing business opportunities, purchase and use.
- Organisational requirement: an organisational rule that users have to follow when conducting their tasks.

Together, user, market and organisational requirements make up Requirements on the interactive system. A requirement is a condition or capability that must be met or possessed by an interactive system to satisfy an agreement, standard, specification or other formally imposed documents. A requirement should have a determinable condition that makes it possible to validate it.