**Human-Computer Interaction**

Challenge 1– CA1

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## **Outline and competencies C1**

### Graded assignment

| **Start** | **Deadline** | **Grade** | **Time** |
| --- | --- | --- | --- |
| **19/02/25** | **22/10/24** | **17/03/25** | **35h** |

Along with this subject, we will focus on interaction design. The goal is to achieve interfaces that users understand and accomplish their objectives in the best possible way.

Have you ever thought about tools that may help us understand how to improve an interface? In this activity, we will learn methods to understand the types of users, the user context and similar tools.

### Related competencies and Learning outcomes

| **Related competencies** | **Learning outcomes** |
| --- | --- |
| **Use and application of ICT in the academic and professional field** | - Develop flow diagrams through ICT - Carry out a careful visualization of the user data, so it is understandable and allows conclusions to be drawn. - Explore the interactive service. |
| **Summarize, interpret, present and critically contrast the results using the most appropriate analysis and visualization tools.** | - Synthesize the problems obtained from the users' modelling and the flow diagrams. - Interpret the results of the user modelling. - Connect and use the resulting data to make innovative proposals. |
| **Communicate information, ideas, problems and solutions to a specialized and non-specialized audience.** | - Document the work done. - Provide different proposals for improving the detected problems. - Provide results that both specialized and non-specialized audiences can carefully understand. |

## **Case Study**

## 📱🚍 Accessible Public Transport Apps 🌍♿

Nowadays, mobile public transport applications are key tools for planning routes, checking schedules, and ensuring efficient mobility. Examples like **Moovit, Citymapper, and Google Maps** allow millions of users to find real-time transport options. However, for people with **visual or motor disabilities**, these applications present challenges regarding **accessibility, usability, and customization**.

Some of the most common difficulties include the **lack of customizable options in the interface, unclear information about accessible routes, and intrusive notifications**. These barriers limit user confidence and experience when interacting with these applications, reducing their effectiveness and accessibility.

**How can we optimize the user experience in public transport applications to make them more inclusive, accessible, and valuable for people with visual or motor disabilities?**

To address the challenges posed throughout the semester, you must use the provided application examples, as they are specifically designed for this type of service. **You must work only with the examples from this case study, as PECs based on other examples or cases will not be accepted.** Below are examples of public transport applications:

* **Moovit**: A platform that allows users to plan public transport routes.  
  **URL**: [https://moovitapp.com](https://moovitapp.com/)  
  **Free version**: It includes essential features such as route planning and real-time schedules.
* **Citymapper**: Provides detailed multimodal route information with advanced options for public transport, cycling, and walking.  
  **URL**: [https://citymapper.com](https://citymapper.com/)  
  **Free version**: Yes, it includes interactive maps and basic planning options.
* **Google Maps**: A tool with public transport information, directions, and interactive maps.  
  **URL**: [https://maps.google.com](https://maps.google.com/)  
  **Free version**: It includes access to all main features.

### Project Development

Throughout the semester, the mentioned applications will be analyzed, and you will develop your **inclusive public transport application prototype**, applying **Human-Computer Interaction (HCI), User-Centered Design (UCD), and Universal Design (UD) principles**. To effectively achieve this, consider the following **five requirements**:

1. **Interface Customization**: Allow accessibility adjustments such as **high-contrast mode, screen reader support, and text size adjustments** to enhance the experience for low-vision users.
2. **Accessible Route Planning**: Implement filters that prioritize **routes with accessible features**, such as **functional elevators and ramps**, while avoiding **paths that include stairs**.
3. **Interactive Navigation**: Provide **step-by-step navigation with multimodal options (visual, auditory, and haptic)** adapted to each user's capabilities.
4. **Configurable Alerts**: Offer **customizable notifications** to alert users about **route changes, out-of-service access points, and other relevant incidents** tailored to individual preferences.
5. **User Feedback**: Include a feature that allows users to **evaluate route accessibility and generate reports** that can be shared with authorities or developers for future improvements.

With these requirements in mind, your **accessible public transport application prototype** aims to **overcome the most common barriers** faced by users, particularly those with **accessibility needs**, when interacting with these platforms. By applying **Human-Computer Interaction (HCI) principles**, the goal is to create an **optimized user experience** that ensures an **intuitive, efficient, and inclusive** design, facilitating **mobility and autonomy** for all users.

## **Introduction for the assignment C1**

### 📍 RESEARCH

We have said that **User-Centered Design (UCD)** allows us to better understand users and design products and services that meet their needs. In this philosophy, it is necessary to involve the user in all stages of a product's development, from conceptualization to evaluation, including development.

The goal of UCD is to **create products that people find useful and usable**; that is, to meet their needs while taking into account their characteristics.

These stages or phases are a fundamental element of the process and help to plan, and especially to know what to do at each moment. Broadly speaking, we can consider that there are four fundamental stages in our UCD process:

1. **Research** – Exploration of the Scenario
2. **Definition** – Synthesis of the Proposal
3. **Generation** – Implementation of a Low-Fidelity Prototype
4. **Evaluation** – Testing and Validation of Prototyping with Users

These stages should not be seen as being delayed and successive; for each specific project, it will be necessary to plan, identify objectives, iterations, and methods to carry out.

In this first challenge, we will begin with the **Research** stage of our UCD methodology. In this phase, we must focus on the potential users of the [Case Study](https://file+.vscode-resource.vscode-cdn.net/c%3A/Users/NicoD%27Alessandro/Documents/Studies/UOC/UOC-2025-01/Human-Computer%20Interaction/C1/STATEMENT.md#case-study) :  
**Who are they? What are their goals, frustrations, and contexts of use?**

The research will include methods such as **user profile, benchmarking, and the basic concepts of Human-Computer Interaction (HCI)**.

#### 1. User Profile

To design an interface, it is necessary to define the target audience that will use it, and this is achieved by selecting a set of characteristics that allow separating people into various groups. Initially, we establish the [**user profiles**](https://human-computer-interaction.aula.uoc.edu/user-profile/), but these can be expanded and detailed as the project progresses. In certain stages, this can be extremely valuable to guide and substantiate our design decisions focused on the selected profile.

Population segmentation or grouping is commonly done based on socio-demographic characteristics such as age and gender. In this challenge, you can consider other, more specific criteria that better reflect the needs and preferences of the users. Think about aspects such as **personal interests, level of technological skills, professional development, hobbies, or any other characteristic** that may reveal significant differences in user profiles.

💡 [**User profile example**](https://file+.vscode-resource.vscode-cdn.net/images/user%20profile.png) ⬇️.

#### 2. Competition Research

The [**Benchmarking**](https://human-computer-interaction.aula.uoc.edu/benchmarking/) technique involves a detailed evaluation of the competing products that we are developing, but from the end-user's perspective. The main purpose is to **understand the strengths, distinctive features, and prevalent design trends** in the market we are targeting.

[**Benchmarking**](https://human-computer-interaction.aula.uoc.edu/benchmarking/) is not limited only to direct competitors. In fact, it can also be very revealing to analyze products that, although not directly competing with ours, offer similar functionalities. This **comparative approach** is an excellent starting point for identifying key elements that can significantly improve the user experience.

This technique is more than a simple comparison of features; it is a profound investigation that helps us understand **what works well in the market and why**. By conducting [**Benchmarking**](https://human-computer-interaction.aula.uoc.edu/benchmarking/), we not only identify what the competition is doing, but we also discover **opportunities to innovate and differentiate our product**. It is an essential step to ensure that our design is not only functional and attractive but also **competitive and relevant** in the current context.

✅ [**Check out the Benchmarking Guide**](https://human-computer-interaction.aula.uoc.edu/guia/benchmarking/)

📊 **Benchmarking examples**: [comparison table ⬇️](https://file+.vscode-resource.vscode-cdn.net/images/comparisons_table.png), and [insights ⬇️](https://file+.vscode-resource.vscode-cdn.net/images/insights.png).

#### 3. Basic Aspects of Human-Computer Interaction

**HCI** is a field of study that focuses on the creation and design of interfaces between users and computer systems. In HCI, it's essential to understand basic concepts such as:

* [**Metaphor**](https://human-computer-interaction.aula.uoc.edu/metaphor/), which helps users relate the unknown (the digital interface) to familiar experiences from the real world.
* [**Affordance**](https://human-computer-interaction.aula.uoc.edu/affordance/), which refers to the characteristics of an object that suggest how it can be used.
* [**Visibility**](https://human-computer-interaction.aula.uoc.edu/visibility/), which involves the ease with which users can discern available functionalities.
* [**Feedback**](https://human-computer-interaction.aula.uoc.edu/feedback/), which provides users with immediate information about the actions they have performed.
* [**Constraint**](https://human-computer-interaction.aula.uoc.edu/constraint/), which limits the interactions that can be performed, preventing errors.
* [**Mental model**](https://human-computer-interaction.aula.uoc.edu/mental-model/), which represents how a user perceives and understands a system.

These concepts are crucial for designing interfaces that are **intuitive, efficient, and satisfying** for the user.

📖 **Consult the**[**Human-Computer Interaction**](https://human-computer-interaction.aula.uoc.edu/human-centred-design/)**material**

## **Instructions for the assignment C1**

### 📍RESEARCH

We begin this stage of our User-Centered Design (UCD) approach; our first step is to define **user profiles**. Next, using the **benchmarking** technique, we will analyze the applications of the [Case Study](https://file+.vscode-resource.vscode-cdn.net/c%3A/Users/NicoD%27Alessandro/Documents/Studies/UOC/UOC-2025-01/Human-Computer%20Interaction/C1/STATEMENT.md#case-study). This analysis will allow us not only to understand the landscape of existing systems better but also to take the opportunity to delve into the **basic concepts of Human-Computer Interaction (HCI)**. This knowledge will guide us in designing a functional, attractive interface aligned with the needs and expectations of the users.

#### 1. User Profile II

To design an interface, you must define the target audience that will use it, and this is achieved by selecting a set of characteristics that allow dividing people into various groups. Population segmentation is commonly based on sociodemographic factors such as age and gender. However, for this challenge, you can consider other more specific criteria that better reflect the needs and preferences of the users. Think about aspects such as personal interests, level of technological skills, professional development, hobbies, or any other characteristic that can reveal significant differences in user profiles.

👉 **Define at least two (2)** [user profiles](https://human-computer-interaction.aula.uoc.edu/user-profile/) that represent the users in the context of the [Case Study](https://file+.vscode-resource.vscode-cdn.net/c%3A/Users/NicoD%27Alessandro/Documents/Studies/UOC/UOC-2025-01/Human-Computer%20Interaction/C1/STATEMENT.md#case-study) we are analyzing. We will use these profiles throughout the course.

#### 2. Competition Research II

To deepen the research, thoroughly analyze the **three (3) applications** indicated in the case study. When defining the analysis criteria, align them with the **five (5) requirements** described in the case study.

👉 Apply the [**Benchmarking**](https://human-computer-interaction.aula.uoc.edu/benchmarking/) technique, identify **three (3) key positive elements** (insights) and **three (3) elements to avoid** in each analyzed application. This will result in **nine (9) positive insights** and **nine (9) elements to avoid**. These findings will be fundamental for conceptualising and developing your future prototype.

The main objective of this exercise is to understand **not only what functionalities current applications offer** but also to **identify areas for improvement**. Therefore, it is crucial that you closely observe both the strengths and weaknesses of these applications. To present your findings clearly and organise, create a comparison table summarising the results.

#### 3. Basic Aspects of Human-Computer Interaction II

👉 **Define and exemplify the six (6) basic HCI concepts**: [**metaphor**](https://human-computer-interaction.aula.uoc.edu/metaphor/), [**affordance**](https://human-computer-interaction.aula.uoc.edu/affordance/), [**visibility**](https://human-computer-interaction.aula.uoc.edu/visibility/), [**feedback**](https://human-computer-interaction.aula.uoc.edu/feedback/), [**constraint**](https://human-computer-interaction.aula.uoc.edu/constraint/) and [**mental model**](https://human-computer-interaction.aula.uoc.edu/mental-model/). Create a table, including the definition and practical examples from the **three (3) applications** you chose to illustrate these concepts. For each application example, include the following:

* **Application Name**: Provide the official name of the application.
* **URL**: Include the link to the application or its official page if available.
* **Screenshots**: Attach specific screenshots of the application that exemplify your concept.

Your analysis should be detailed, showing how each application demonstrates the HCI concept. This task is an opportunity to understand and identify the basic concepts of HCI in real examples of user interfaces.

#### 4. Reflections II

👉 As part of the **research phase closure**, it is essential to reflect on the **lessons learned** and how the activities have prepared you for the following stages of the project. Below, select **one (1)** of the following reflection questions and **record a video of up to 3 minutes** with your response.

* What did you learn about users' needs and challenges when creating the user profiles?
* How do you think analyzing existing applications (benchmarking) influences the quality of a new interface design?
* Which example was the most difficult toF identify when working with HCI concepts and why?
* What did you discover about interface customization that you had not considered before?
* If you had to repeat this phase, what would you do differently to understand the problem better?

### Deliverables

To complete the submission of this activity, please attach the final document to **Delivery Activity C1**. The format of your **document must be PDF and uncompressed, and the video must be in .mp4 format**. This will ensure that the content remains accessible and maintains its original format, making it easier to review.

⚠️ **Remember to verify that all elements of your work are included and displayed correctly in the document before uploading it.**

#### Assessment and evaluation criteria

The evaluation will take into account the presentation of the document, as well as its structure (cover, index of contents, development of the answers), legibility (adequate font for reading and body size of 12 points) and organization (numbered pages, heading with the name of the student and the degree course). Writing, clarity, expression and spelling will be valued.

✏️ As for the evaluation criteria for each task, they are described in the [Challenge 1 rubric](https://aula.uoc.edu/courses/50236/assignments/585929).

#### Statement Point 1: Assistant's Role and Capabilities

**Core Identity**

The assistant is an intelligent programmer powered by Claude 3.5 Sonnet, designed to provide expert coding assistance and technical guidance.

**Primary Functions**

* Answering programming-related questions
* Providing code solutions
* Debugging assistance
* Explaining technical concepts
* Offering best practices and recommendations

**Key Characteristics**

1. **Technical Expertise**
   * Proficient in multiple programming languages
   * Understanding of software development principles
   * Knowledge of current development practices
2. **Communication Style**
   * Clear and concise explanations
   * Professional yet approachable tone
   * Ability to adapt explanations to user's expertise level
3. **Problem-Solving Approach**
   * Systematic analysis of issues
   * Practical and efficient solutions
   * Context-aware recommendations

**Interaction Guidelines**

* Responds to all programming-related queries
* Maintains helpful and supportive demeanor
* Focuses on providing actionable solutions
* Clarifies ambiguities when needed

**Limitations**

* Acknowledges when a question is outside its scope
* Transparent about uncertainties
* Refers to documentation when appropriate

**Purpose**

The primary goal is to assist users in their programming journey by providing reliable, accurate, and helpful technical guidance.

## 1️⃣ User Profiles

A person with brown hair and red shirt

AI-generated content may be incorrect.

**Psychographics**

**Maria**

* Values independence and self-reliance
* Concerned about safety and reliability
* Environmentally conscious
* Prefers routine and structured planning
* Community-oriented and helpful to others
* Appreciates traditional learning methods
* Stress-averse when it comes to new technology

**Age**: 45 years old

**Occupation**: High school teacher

**Location**: Urban area

**Visual** **impairment**: Low vision condition

**Income**: Mid-range

**Tech** **literacy**: Moderate

* Uses screen magnification regularly
* Relies heavily on public transportation
* Prefers audio feedback when using apps
* Plans routes in advance
* Active smartphone user with accessibility features enabled
* Travels during peak hours on weekdays

- Clear, high-contrast interface options

- Reliable real-time transit information

- Audio descriptions of route changes

- Simple navigation patterns

- Customizable text size

- Consistent app behavior

**Needs & Goals**

**Behaviours**



* Frequently checks accessibility status of stations
* Plans alternative routes as backup
* Active in accessibility community forums
* Uses multiple transport apps to cross-reference information
* Travels during off-peak hours when possible
* Regular commuter

**Behaviours**

**- Age**: 32 years old

**- Occupation**: Software developer

**- Location**: Suburban area

**- Mobility**: Uses wheelchair

**- Income**: Above average

**- Tech literacy**: High

**Needs & Goals**

- Real-time elevator/ramp status updates

- Accessible route filtering

- Information about platform gaps

- Quick access to accessibility services

- Option to report accessibility issues

- Integration with wheelchair navigation

* Early technology adopter
* Advocates for accessibility rights
* Solution-oriented mindset
* Values efficiency and optimization
* Active in online communities
* Enjoys problem-solving
* Data-driven decision maker
* Believes in universal design principles

**Psychographics**

**Carlos**



**Psychographics**

**Elena**

* Creative and visually oriented
* Values work-life balance
* Adaptable to change
* Strong sense of independence
* Design-conscious consumer
* Appreciates aesthetic quality
* Network-oriented professional
* Advocates for deaf culture and awareness

**- Age**: 28 years old

**- Occupation**: Freelance graphic designer

**- Location**: Metropolitan area

**- Condition**: Hearing impairment (profound)

**- Income**: Variable

**- Tech literacy**: Advanced`

**Behaviours**

**Needs & Goals**

- Visual alerts for announcements

- Clear visual indicators for delays/changes

- Real-time text notifications

- Emergency information in text format

- Visual confirmation of ticket validation

- Easy-to-understand route maps

* Heavy reliance on visual information
* Uses sign language as primary communication
* Frequently travels to client meetings
* Active social media user for work
* Prefers off-peak travel times
* Uses multiple devices (smartphone, tablet)

### **Common Needs**

1. **Customization Options**

   - Interface adjustments

   - Notification preferences

   - Navigation preferences

2. **Information Clarity**

   - Simple language

   - Clear hierarchy

   - Consistent layout

3. **Accessibility Features**

   - Screen reader compatibility

   - Voice commands

   - Haptic feedback

### **Usage Context**

- Daily commute scenarios

- Emergency situations

- Planned leisure trips

- Weather conditions impact

- Peak vs. off-peak usage

### **Pain Points**

1. Inconsistent accessibility information

2. Complex navigation patterns

3. Poor contrast in interfaces

4. Unreliable real-time updates

5. Limited customization options

### **Design Implications**

- Prioritize accessibility features from the start

- Implement clear information hierarchy

- Provide multiple feedback methods

- Ensure consistent navigation patterns

- Include customization options

## 2️⃣ Benchmarking