

# HCI Final Report 2023/2024

## *Introduction*

### **Project Name**

- GNAM

### **Value Proposition**

- Become a master of healthy food.

### **Team members names**

- Nicolò Caradonna - s316993
- Mario Todaro - s308812
- Vincenzo Dalia - s309864
- Angelo Iannielli - s317887

### **Group Name**

- GNAM

### **Problem/solution overview**

- Our proposal focuses on inspiring users to adopt a healthy diet through a «gamification» approach. We aim to encourage the diversification of meals day by day considering also time-saving, through prompts and achievement of specific goals. We identified this solution, through a brainstorming of ideas, trying to answer multiple needs found in the interviewed users.

# Needfindings

## Description of the domain and why we choose it

- Within the Education and Learning theme, we have chosen nutrition education specifically "eating well" as a topic.

Our domain of interest consists of young students and/or workers who started to live on their own for the first time.

We chose to explore this topic as we believe it is very relevant to this category that finds itself facing drastic changes.

## Interviews: Methodology and procedure

- The participants have been chosen by exploiting personal knowledge and are appropriate since they are people who have recently moved out on their own (Immediate Users) or have gone through this experience in the past (Lead Users).

We also recruited some Domain Experts through social networks.

User	Gender	Age	City	Time living on their own
Immediate 1	Female	21	Palermo	2 months
Immediate 2	Male	23	Torino	1 year
Immediate 3	Male	19	Siena	4 months
Immediate 4	Male	21	Palermo	6 months
Immediate 5	Male	20	Palermo	1 year
Lead 1	Female	27	Dresden (Germany)	9 years
Lead 2	Male	23	Granada (Spain)	4 years
Lead 3	Male	24	Bologna	3 years
Lead 4	Female	23	Torino	5 years
Domain Expert 1	Female	55	Firenze	-----
Domain Expert 2	Female	30	Monza	-----

- The interviews were conducted mainly online through Zoom and two of them were in person in Turin.

The interviews were conducted in groups of two, specifically Angelo/Nicolò and Mario/Vincenzo.

For each interview, one group member presented questions to the interviewee, and the second member took notes and recorded the conversation using a smartphone.

User	Who	Where	Roles	
Immediate 1	Mario/Vincenzo	Online - Zoom	Interviewer: Mario	Assistant: Vincenzo
Immediate 2	Nicolò/Angelo	Politecnico	Interviewer: Nicolò	Assistant: Angelo
Immediate 3	Mario/Vincenzo	Online - Zoom	Interviewer: Vincenzo	Assistant: Mario
Immediate 4	Mario/Vincenzo	Online - Zoom	Interviewer: Vincenzo	Assistant: Mario
Immediate 5	Mario/Vincenzo	Online - Zoom	Interviewer: Vincenzo	Assistant: Mario
Lead 1	Nicolò/Angelo	Online - Zoom	Interviewer: Nicolò	Assistant: Angelo
Lead 2	Mario/Vincenzo	Online - Zoom	Interviewer: Vincenzo	Assistant: Mario
Lead 3	Mario/Vincenzo	Online - Zoom	Interviewer: Mario	Assistant: Vincenzo
Lead 4	Nicolò/Angelo	Politecnico	Interviewer: Angelo	Assistant: Nicolò
Domain Expert 1	Nicolò/Angelo	Online - Zoom	Interviewer: Angelo	Assistant: Nicolò
Domain Expert 2	Nicolò/Angelo	Online - Zoom	Interviewer: Angelo	Assistant: Nicolò

- **List of questions (Immediate User/Lead User):**

1. *How long have you lived alone and why?*
2. *How many and what meals do you eat per day?*
3. *Have there been any changes in your diet since living alone and if so what were they?*
4. *Tell me three positive and three negative aspects that you have noticed in managing your diet independently.*
5. *How satisfied are you with your eating habits from 1 to 5? (explain why [n])*
6. *How interested are you in the healthy aspect of the products you consume?*
7. *How does your lifestyle or daily routine impact your nutrition?*
8. *Have you ever followed any diet since living alone? (Yes) What was your experience? (No) Why have you never thought about following one?*
9. *Is the choice of what you eat conditioned by intolerances, allergies, health problems or ethical reasons and in which way?*
10. *How do you choose what to eat day by day?*
11. *How often and on which occasions are you not preparing your own meals?*
12. *How do you organize your shopping list?*
13. *Knowing that you have to buy a certain product, what drives your choice?*
14. *Are you able to distinguish healthy and unhealthy products? If so in which way, otherwise what is your main difficulty?*

15. *Focusing specifically on products labels, what do you think are their positive and negative aspects and how do they influence your ability to make purchasing decisions?*
16. *Do you feel autonomous in preparing a recipe?*
17. *Are you able to diversify your diet? If so in which way, otherwise what's stopping you?*
18. *Which cooking skills do you already have and which would you like to learn?*
19. *Tell me about the last time you tried to make a new recipe, where did you get your information from, how did you learn to make it?*
20. *Do you prefer to eat your meals alone or in company? How does this affect your behaviors?*

The same questions were asked for Immediate and Lead Users. For the second one with a focus on the differences between their actual habits and the ones they had during the first period of living on their own

- **List of Questions (Domain Expert):**

1. *In what ways do you deal with nutrition?*
2. *How difficult do you think it is to change eating habits?*
3. *What might be the first hurdle to overcome to improve nutrition as soon as you move out on your own?*
4. *Considering the later times instead, what are the top 3 difficulties?*
5. *What might be the underlying problems that prevent people who go to live alone from having a healthy diet?*
6. *How does people's social life affect their eating habits?*
7. *What is people's relationship with social media like?*
8. *Are there habits that are hard to break? If so, what are they?*
9. *What are the main emotional or behavioral obstacles that prevent people from maintaining a healthy diet in the long term?*
10. *How does the absence of family members at home affect food choices and behaviors at the dinner table?*
11. *Do your patients know which foods should be eaten in moderation and which should be restricted in their daily diet?*
12. *Do culinary skills influence people's food choices? If so, how?*
13. *What are the main mistakes people make when shopping for groceries that could negatively affect their nutrition?*
14. *Are your patients aware of the importance of nutrition labels on products? Do they read and understand labels when they shop? Do they have any*

*specific difficulties?*

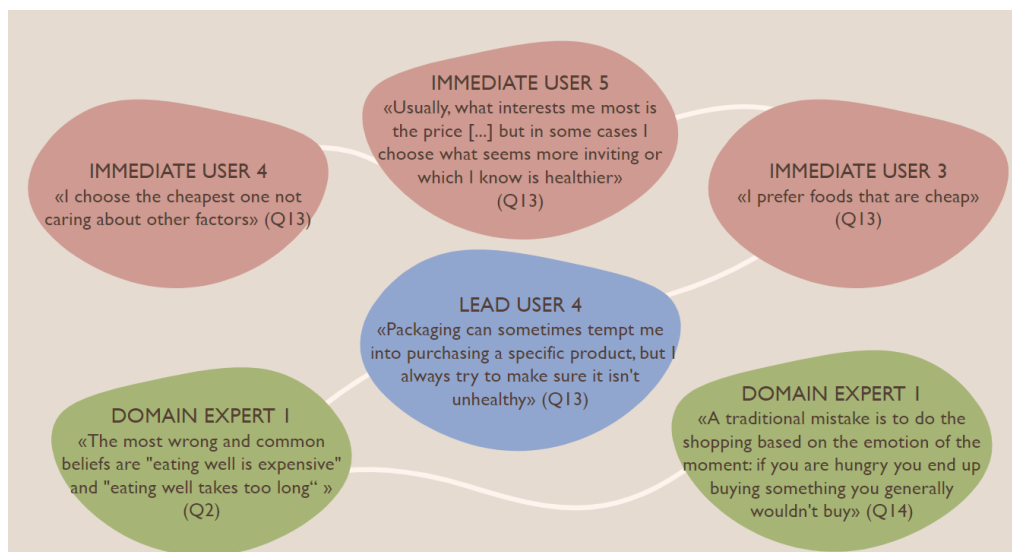
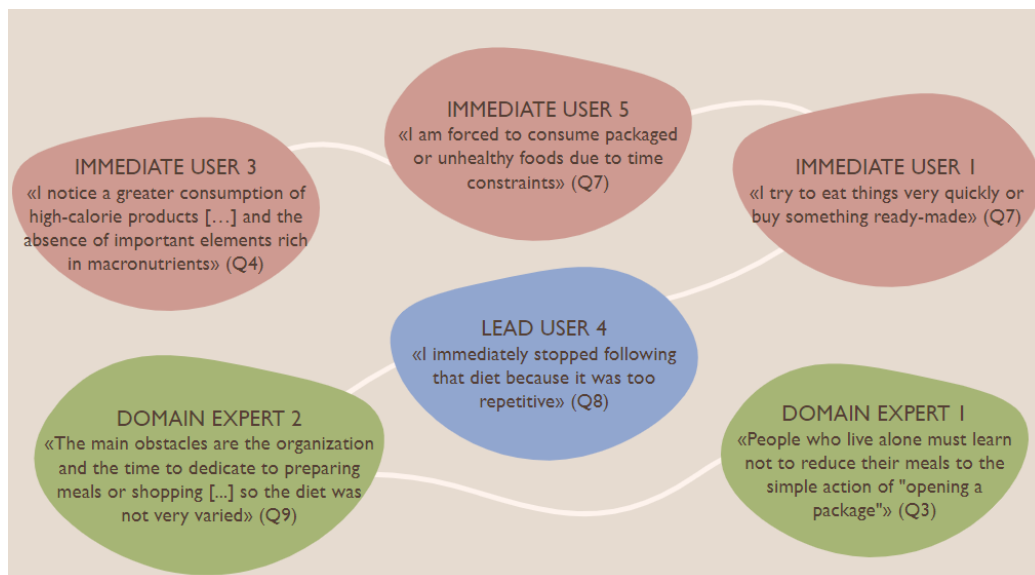
*15. How do you "teach" patients how to recognize healthy foods? What are the pointers and suggestions to avoid bad eating habits?*

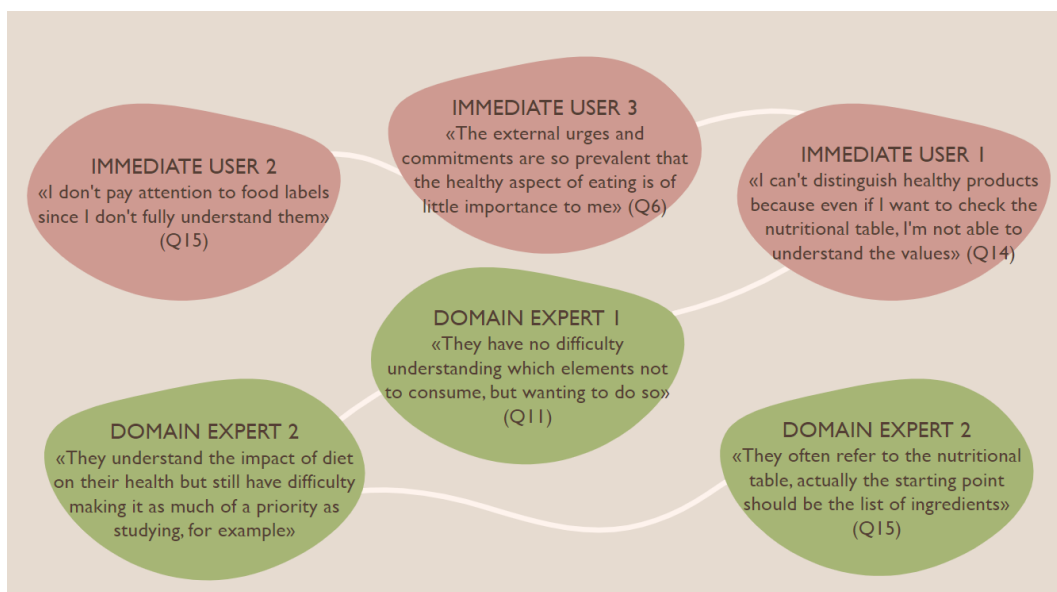
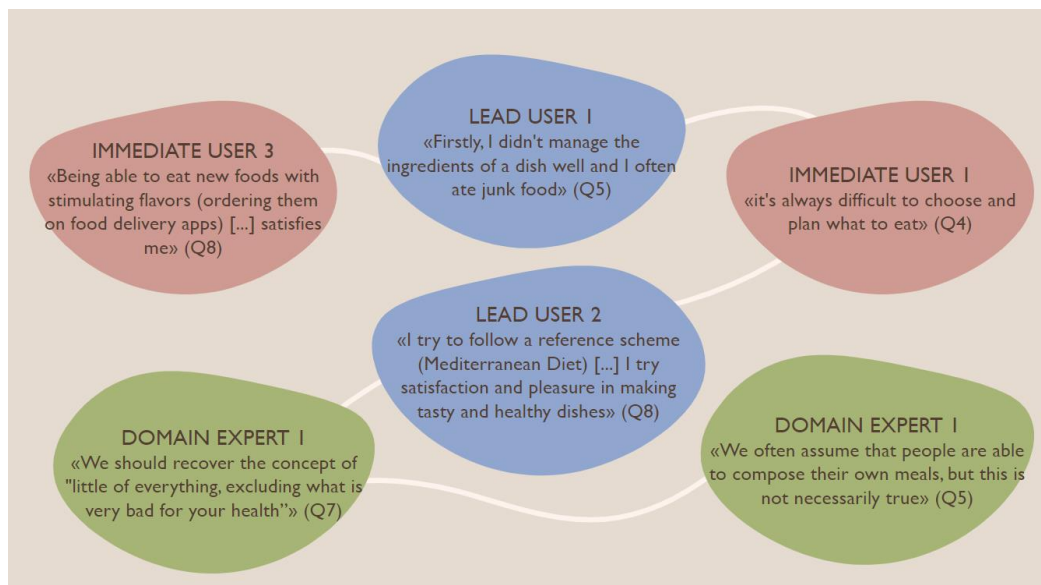
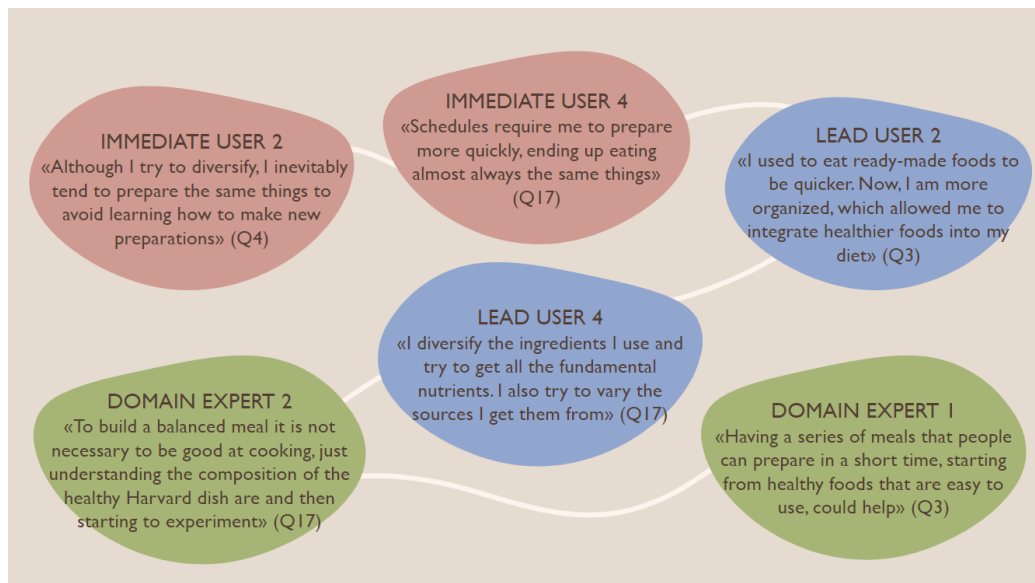
*16. How can people with limited cooking skills learn how to prepare healthy, balanced meals?*

*17. How do you educate people to plan meals and grocery shopping so that they have healthy and varied ingredients in their daily diet?*

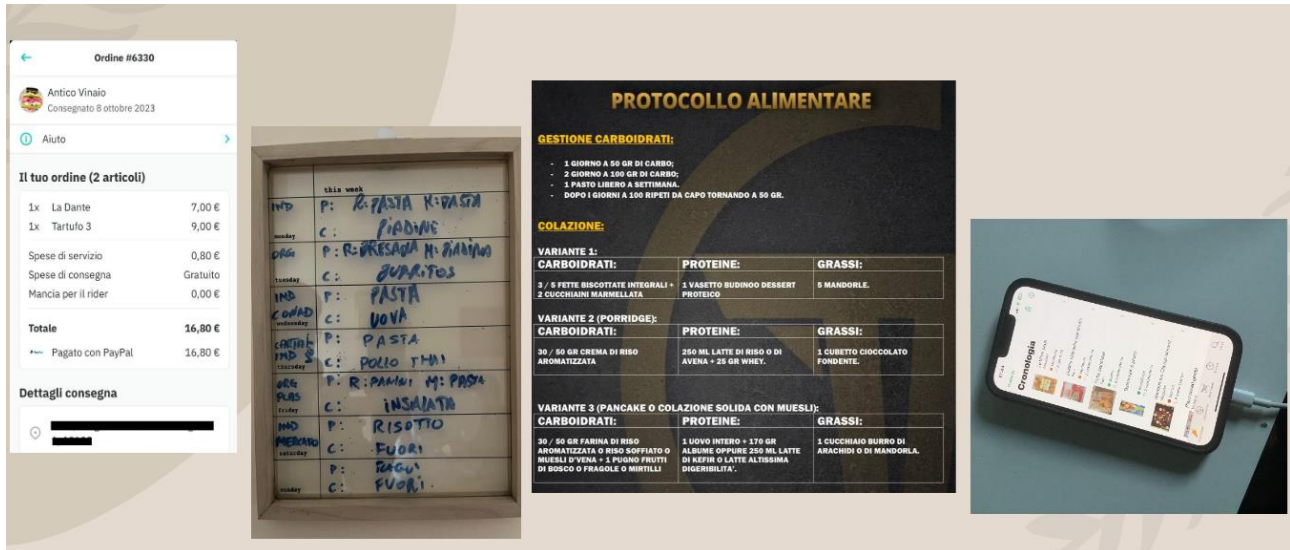
## Interviews: Results

- Key Quotes





- Useful photos



- Link to Consent Form

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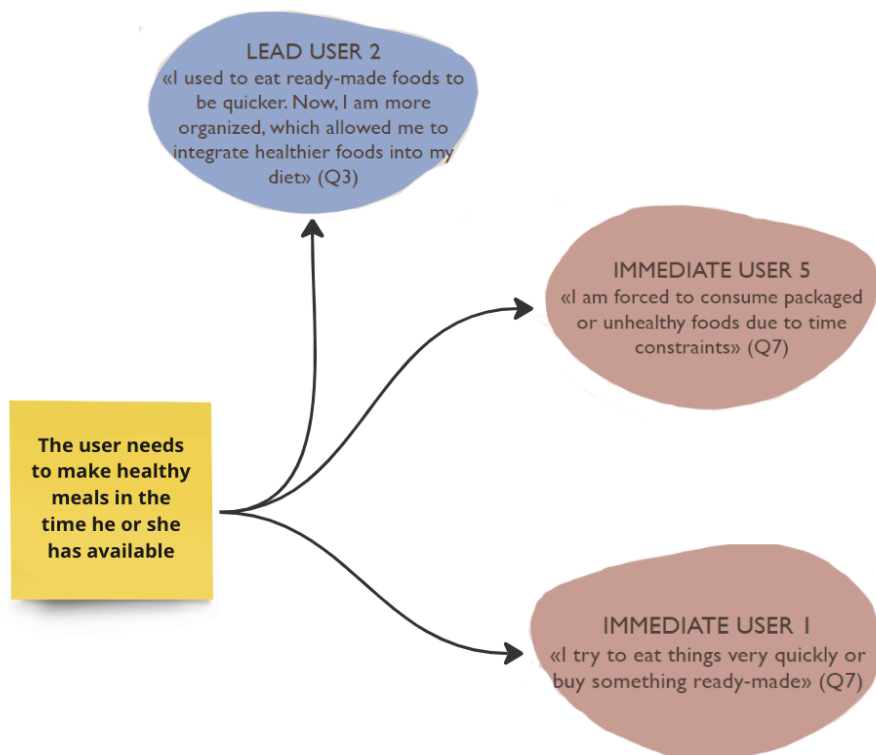
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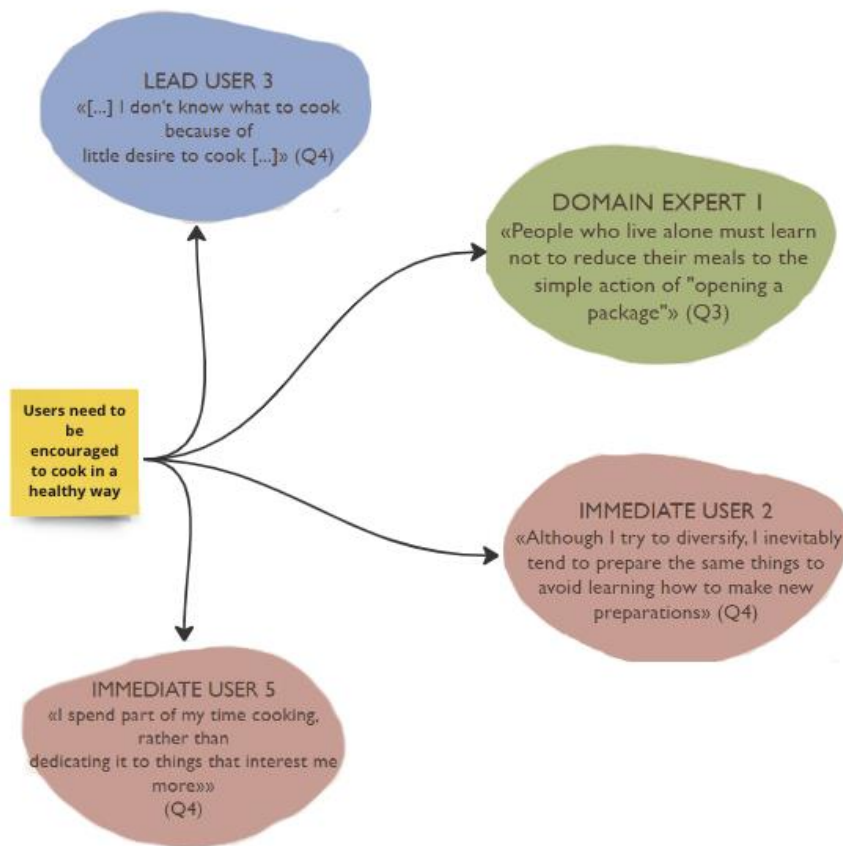
## Synthesis: List of brainstormed user needs

- **Need 1**

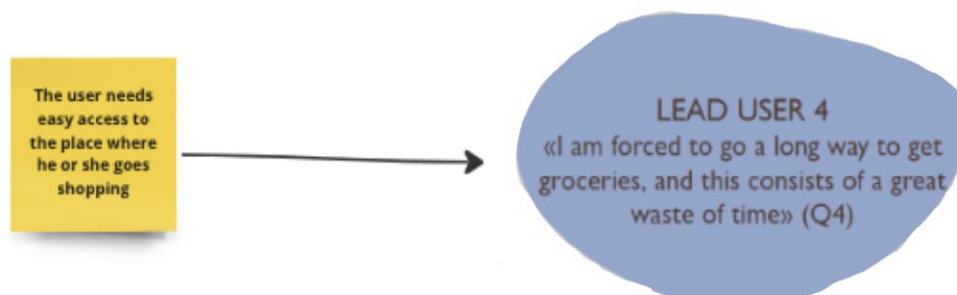




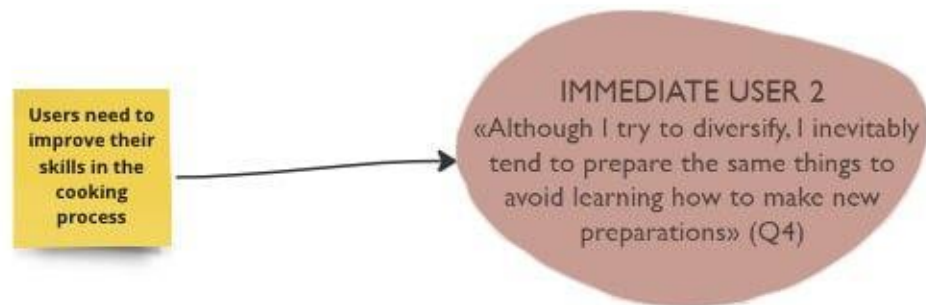
- Need 2



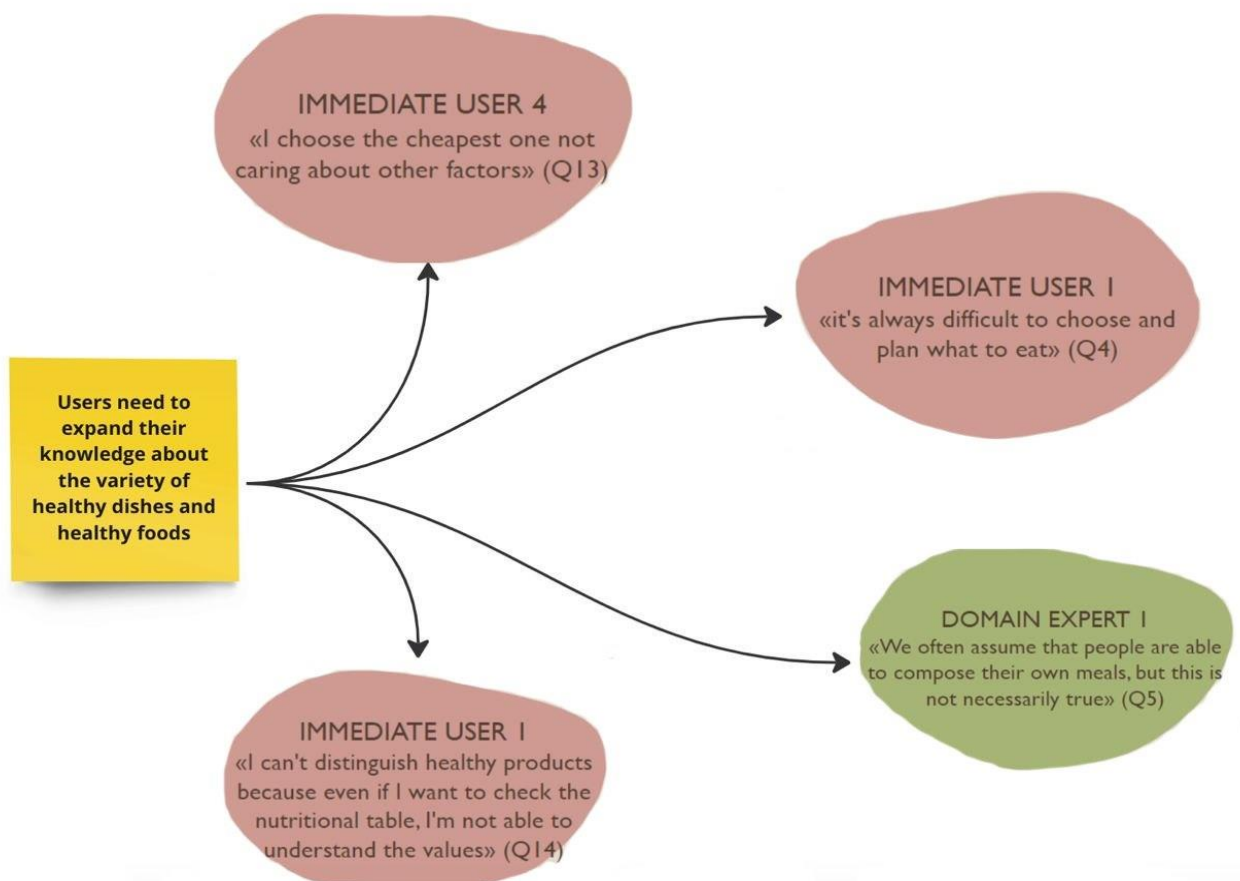
- Need 3



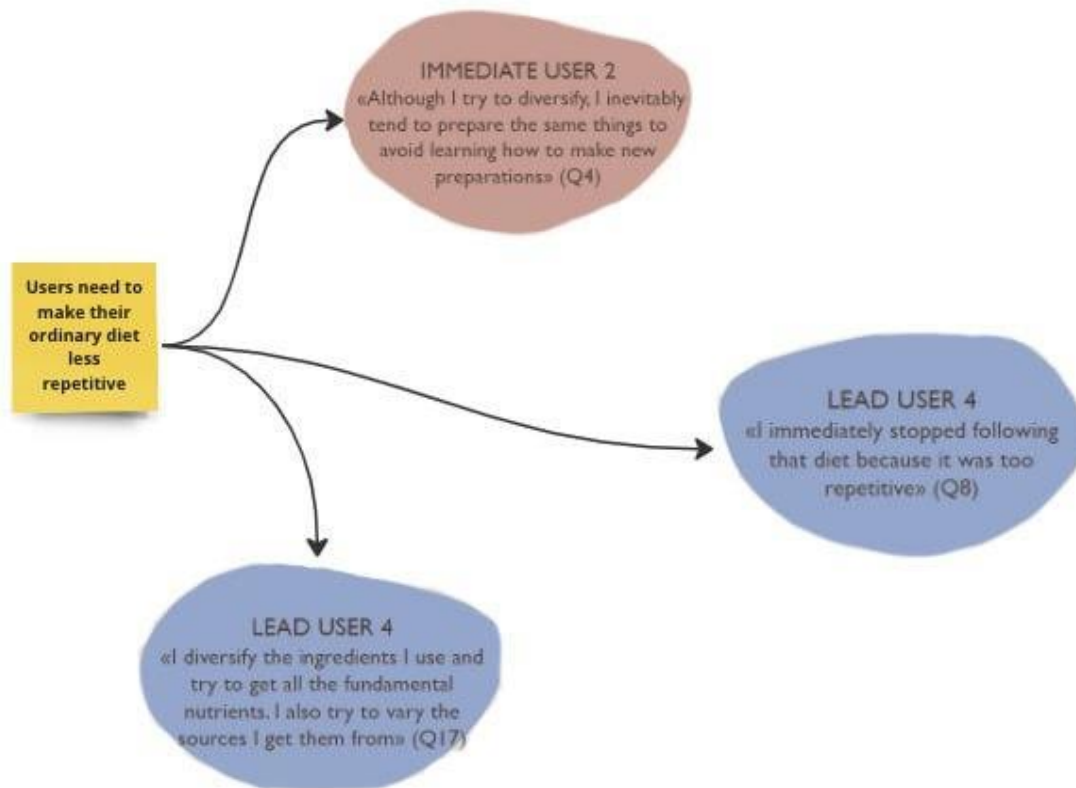
- Need 4



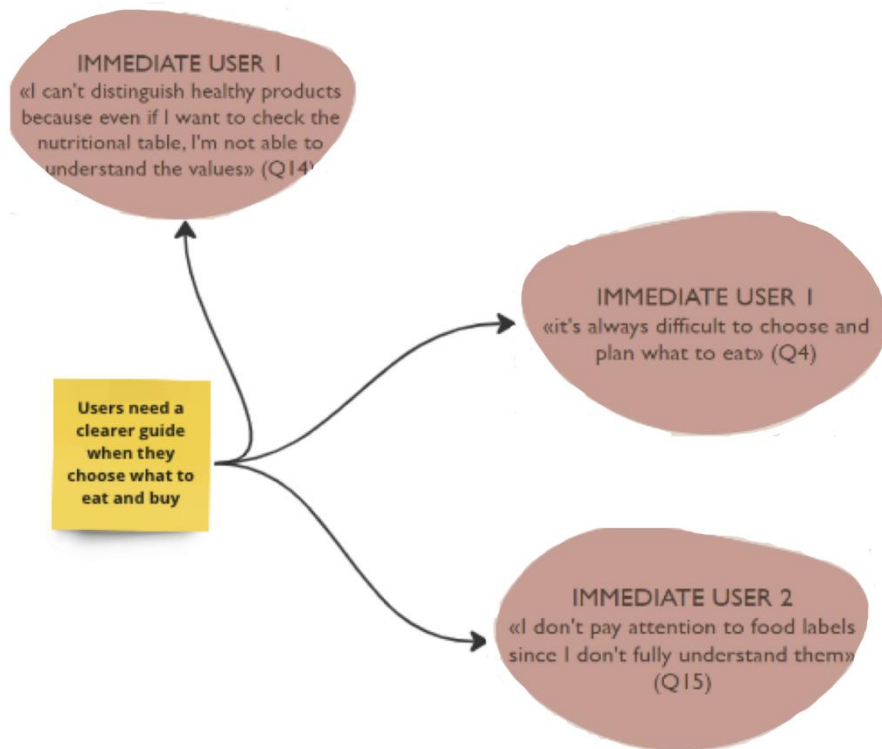
- Need 5



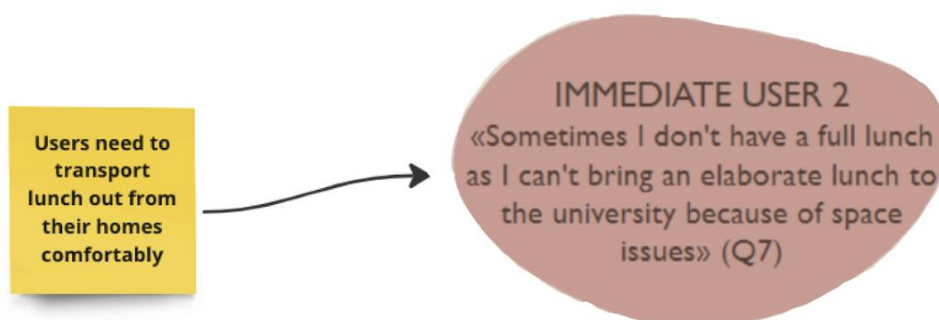
- Need 6



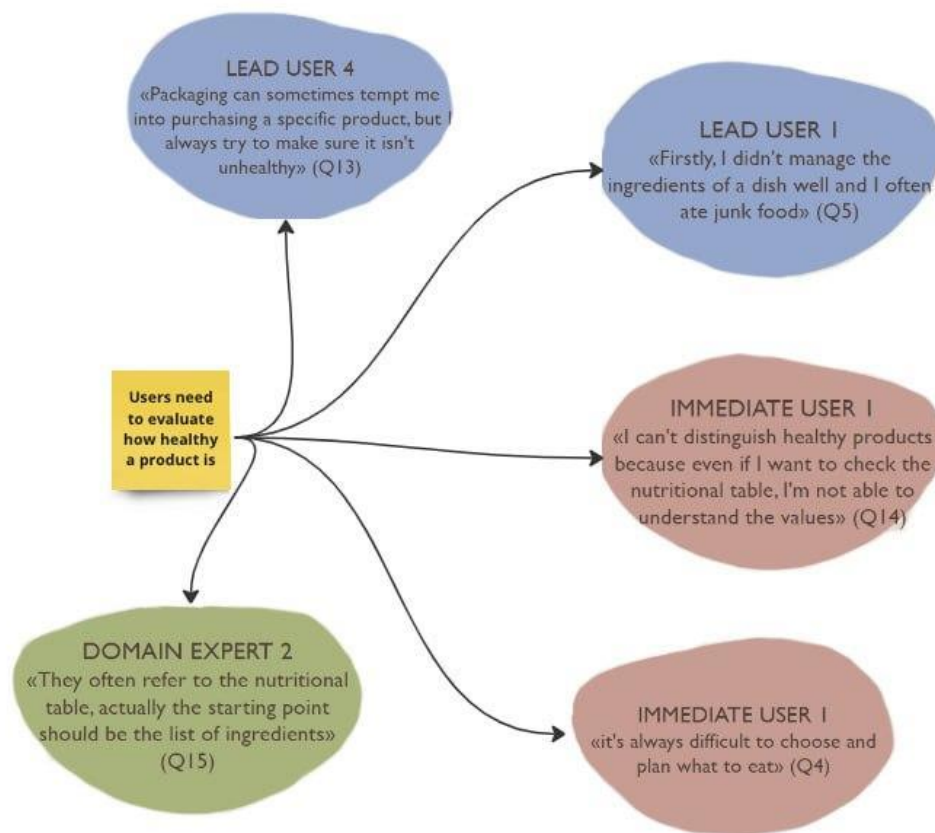
- **Need 7**



- **Need 8**



- **Need 9**

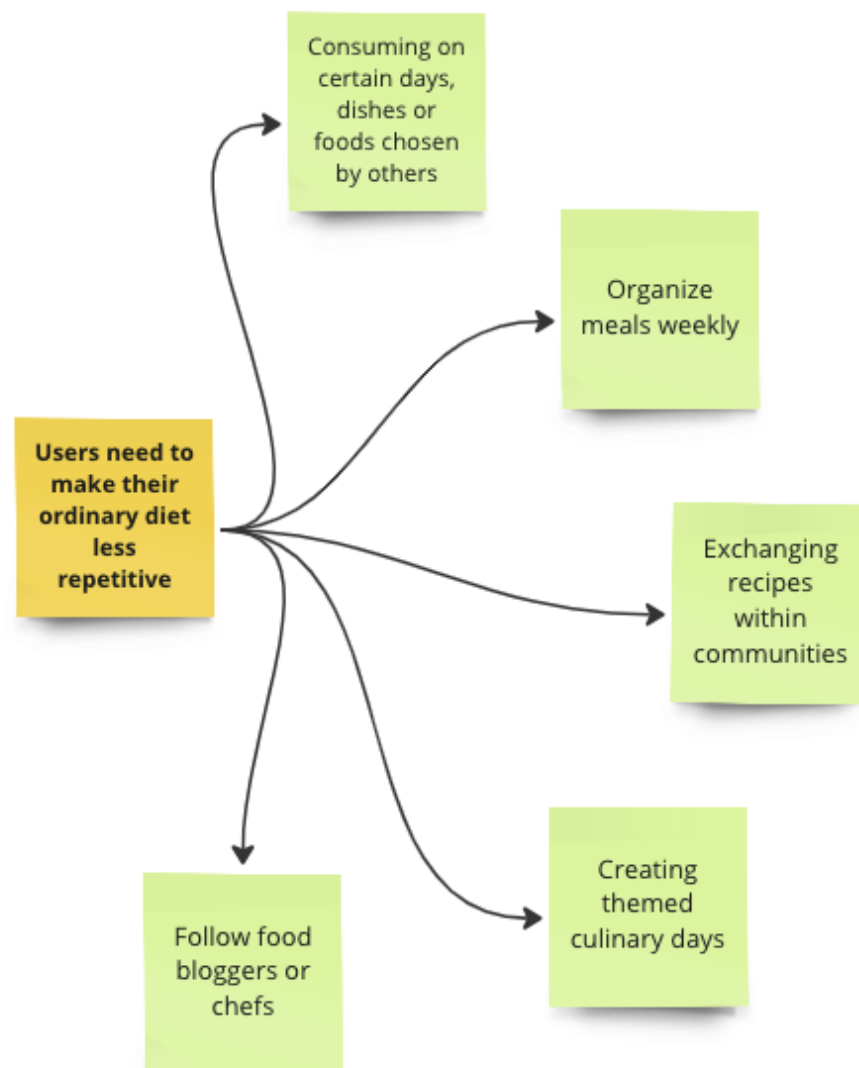


### Synthesis: Deep Userneed

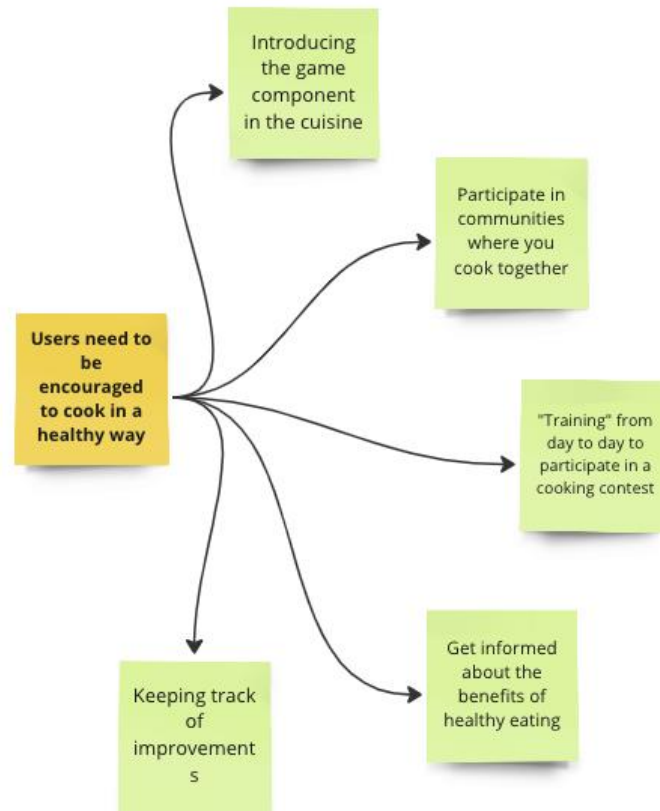
- During the many interviews we conducted, we noticed that the most prevalent themes in the responses we received were related specifically to Time, Willingness, and Ability to purchase and prepare healthy meals so we decided to focus on:
  - **Need 1: The user needs to make healthy meals in the time he or she has available.**
  - **Need 6: Users need to make their ordinary diet less repetitive.**
  - **Need 7: Users need to be encouraged to cook in a healthy way.**

## Solutions: Deep Userneed Solutions

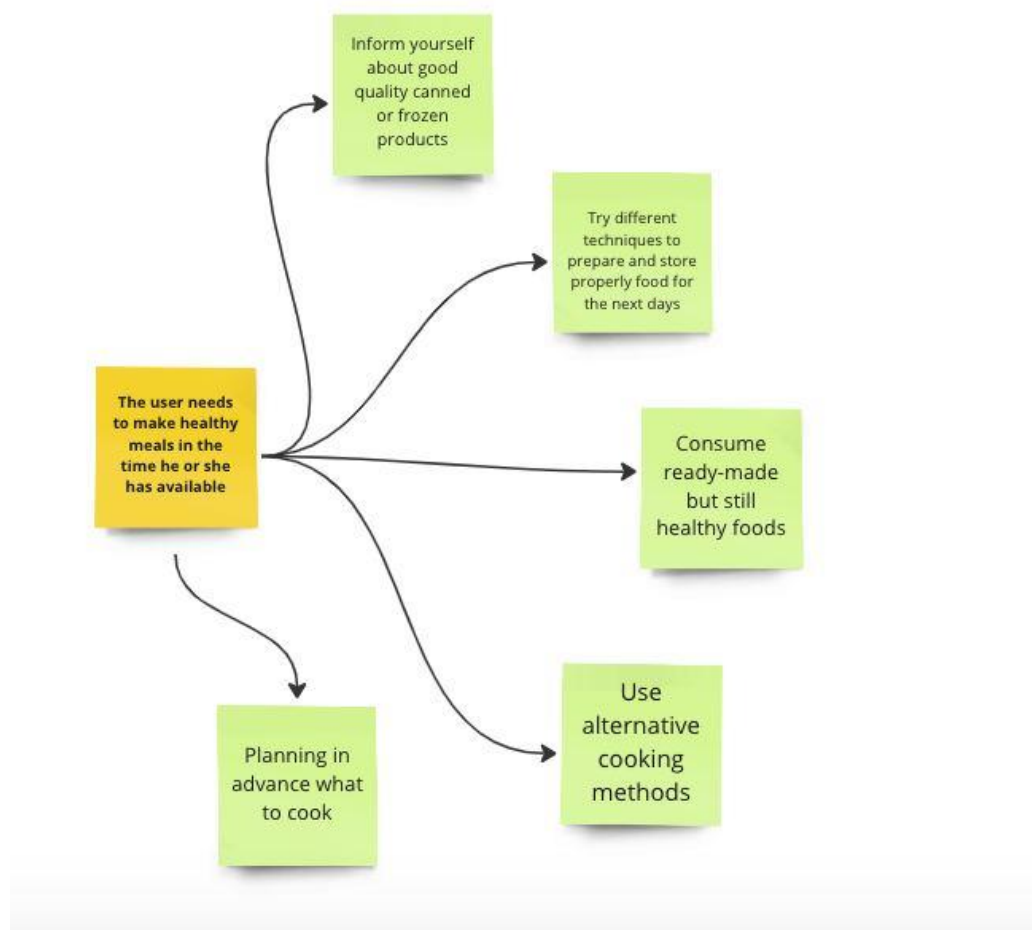
- Having chosen these deep user needs we brainstormed to figure out different types of solutions to the problems identified by looking for something that was generic enough but still not too general. We also tried to avoid thinking about a possible application that would satisfy those needs by trying to be as generic as possible.
- **Need 1**



- **Need 2**



- **Need 3**



### Solutions: Top Solution

- In the end we decided to select the need: **Users need to be encouraged to cook in a healthy way.**

The reason for this decision in addition to the presence of this issue in the interviews conducted is that, after careful reevaluation of the responses obtained, the other needs were quite relatable to the final one.

For example, the issue of time is often used by the people we analyzed as an excuse for their laziness or lack of encouragement.



# Task and Storyboard

## List of the simple, moderate, and complex tasks.

- **Simple Task:** Successfully record your latest healthy meal.
- **Moderate Task:** Complete an assessment after setting nutritional goals.
- **Complex Task:** Experience an alternative or unfamiliar cuisine.

## Why did you choose them? Why are they important for your target population?

- The tasks were chosen to make the healthy meal experience similar to a game so that the user was encouraged to have a healthy diet. In addition, some tasks such as moderate and complex tasks also lead the user to diversify their cooking. Our population is composed of young people so the game component can be very attractive in our opinion.

## Storyboard

- Description: The storyboard represents the user during moments of eating a meal, showing his problems and needs that lead him to use the application. The learning process in healthy eating is shown, starting from bad habits and elementary knowledge to applying the acquired knowledge to experience innovative cuisines in complete autonomy.
- The storyboard depicts a scene from everyday life. In particular, it portrays a potential user who realizes they are not following a healthy diet and needs support to improve it. The application is proactive: it not only helps users understand how to improve their diet through feedback but also offers additional features that allow them to continue eating healthily over time. This is achieved through completing tasks and suggesting international meals. The main strength of this storyboard is that it visualizes concrete usage in everyday life. However, it does not fully explain how it incentivizes the user to continue using it. This is done through a rewards system, which is not explicitly visible in the board.



## *Low-fidelity Prototypes*

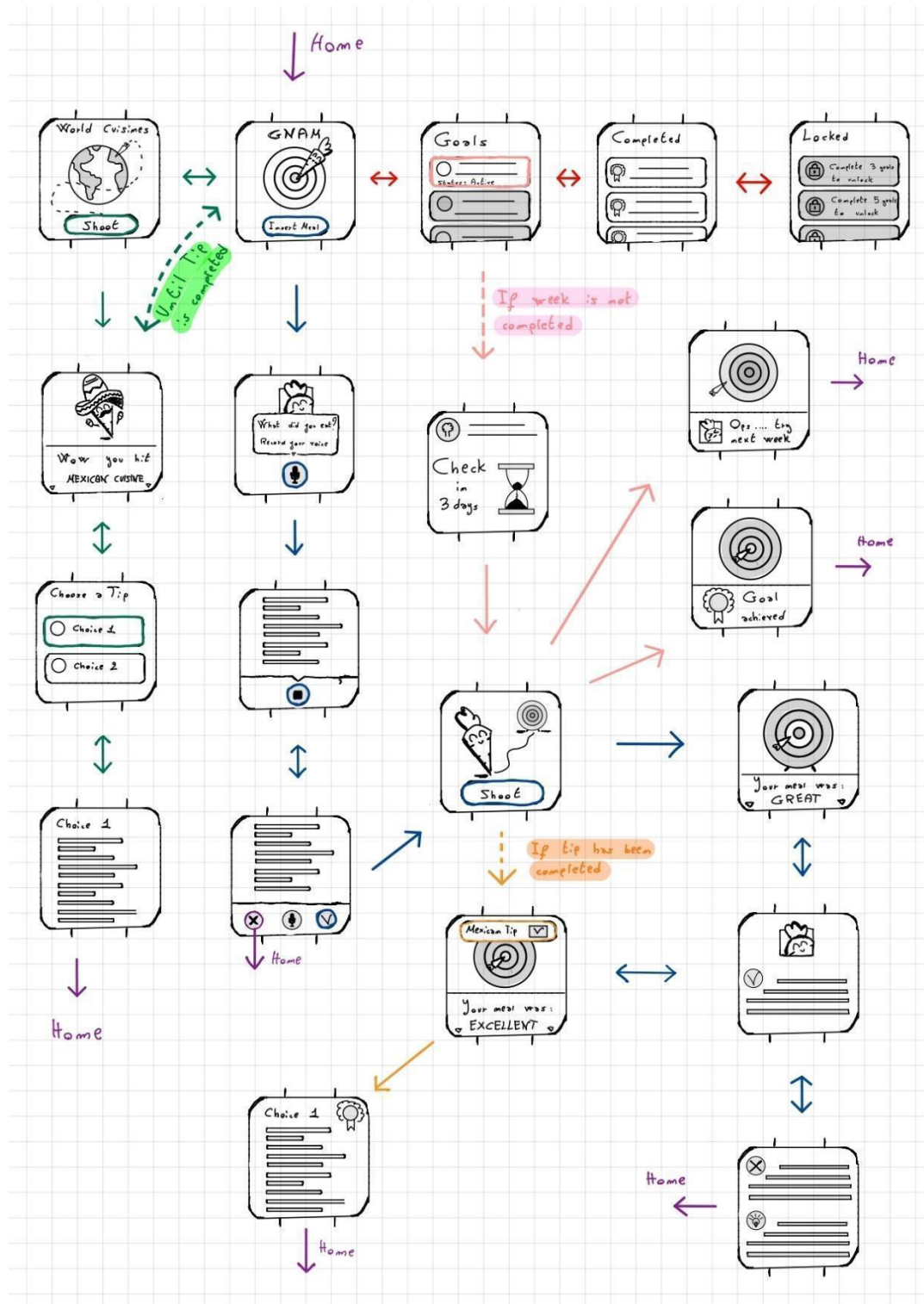
### Modalities exploration

- The modalities we considered were: smartphone, smartwatch, computer and VR.  
Selected Alternatives: We end up with smartphone and smartwatch since “touch” and “speech” have been chosen as the most suited for our problem as well as they allow more dynamicity.

### First Prototype - A Game for Smartwatch

- **Simple Task:** It is completed by recording by voice your latest meal, receiving a “score” about how healthy is. The result is visualized using a target-shooting animation.
- **Moderate Task:** It is completed by choosing one or more goals, representing guidelines for a healthy diet, possibly achieved after a week of evaluations on the inserted meals. The evaluation is performed as in the simple task.
- **Complex Task:** It is completed by unlocking “special” tips regarding how to prepare an international food or suggest a peculiar food.  
The evaluation is done considering both the suggested tip and the previous knowledge acquired by completing moderate tasks.

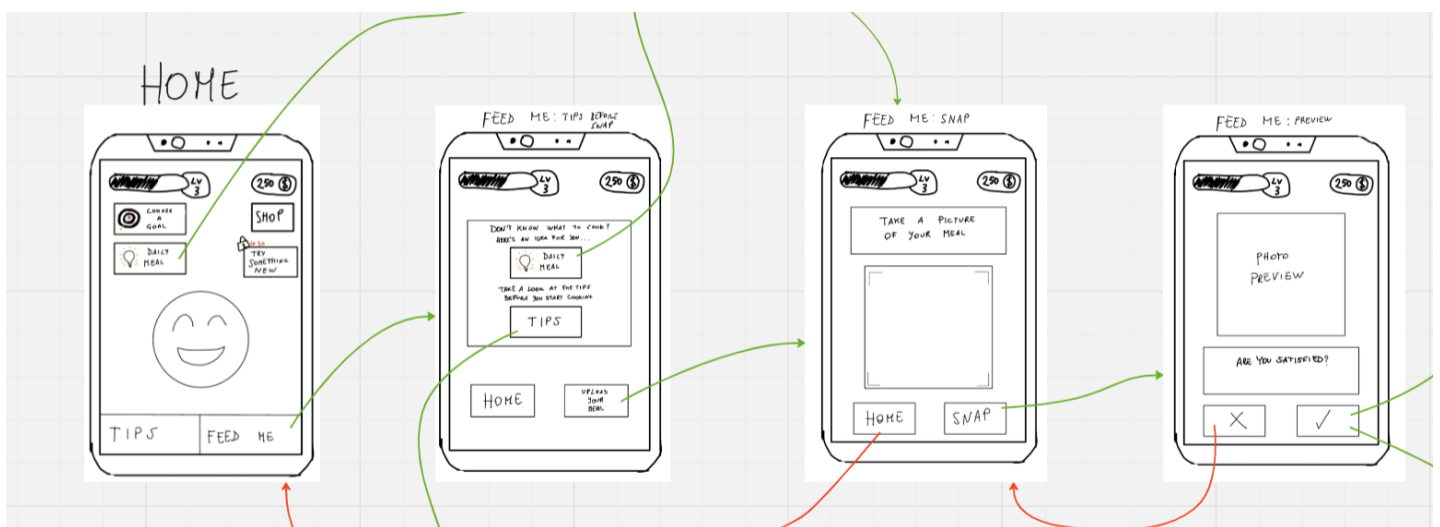
## Paper Prototype with High Level Flow



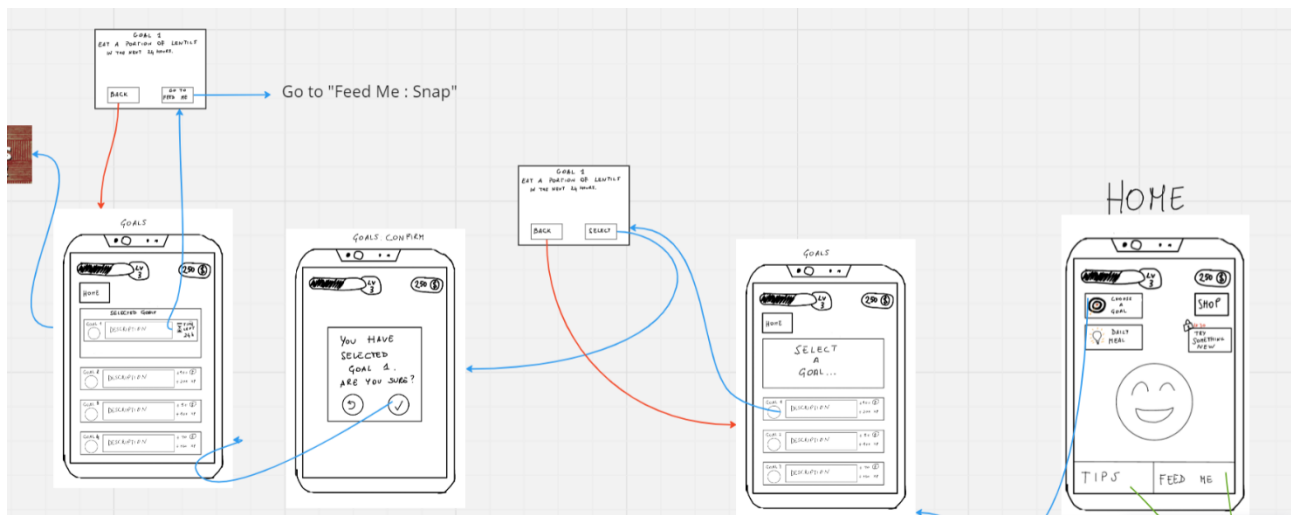
## Second Prototype - A Game for Smartphone (Tamagotchi)

- **Simple Task:** It is completed by uploading a photo of the meal prepared by the user. The meal is judged positively or negatively, affecting the Tamagotchi experience and the coins possessed.
- **Moderate Task:** The user selects a long-term goal and, following the proposed guidelines, uploads photos of his or her food for the specified time. Once the requirements have been met, the user will receive experience and coins as a reward.
- **Complex Task:** Once sufficient experience has been gained, the user will be able to access the 'Try something new' section from which, through a payment of some coins, he or she will be able to obtain a meal from a new cuisine from the world.

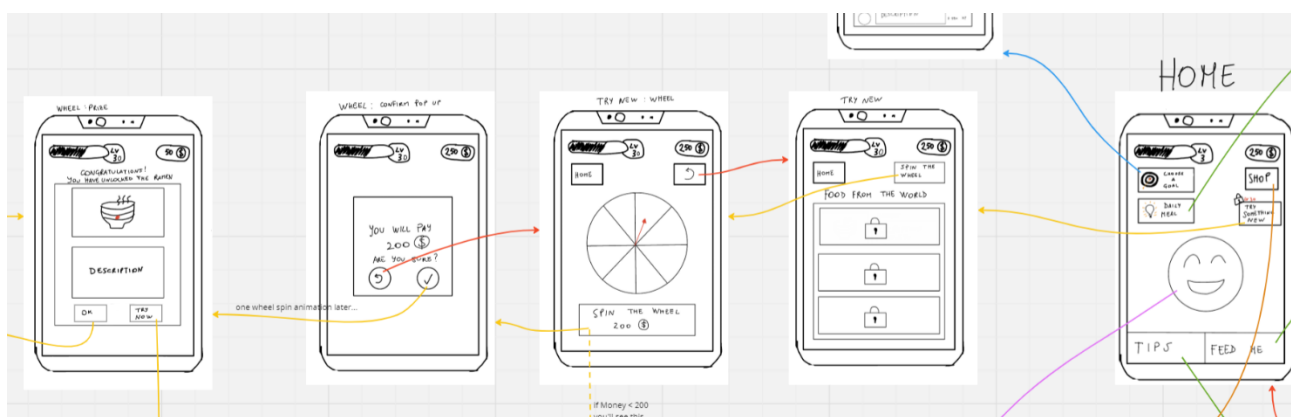
### Simple task flow (uploading a meal)



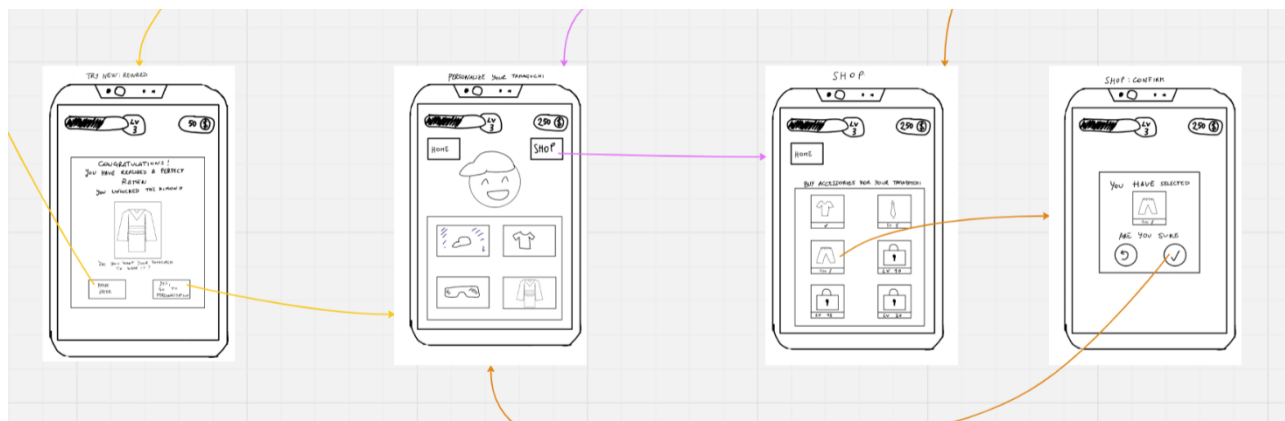
### Moderate Task flow (activating a goal)



### Complex Task Flow (unlock a special international cuisine)



## Tamagotchi Personalization



Check the prototype here:

[https://miro.com/app/board/uXjVNLeuwiQ=?share\\_link\\_id=171311973291](https://miro.com/app/board/uXjVNLeuwiQ=?share_link_id=171311973291)

## Heuristic Evaluations

- **Evaluations Modalities:**

A number of 4 evaluations were received, 2 for the Smartwatch prototype and 2 for the smartphone prototype. All the evaluations were conducted in person splitting into groups of 2. For each simulation, the two team members conducted a simulation of the application using the paper prototype after elucidating the concept of the application to the reviewer.

Throughout the session, the reviewer interacted with the paper prototype by pressing or swiping on the user interface to navigate through various functionalities. Whenever an aspect of the interface was unclear, the reviewer sought clarification from the two team members who provided additional context. All the reviewers took notes during the simulation.

After the simulation, the reviewer contacted the members who conducted the simulation to get some explanations or clarifications

### **First prototype considerations (Smartwatch):**

When performing the two evaluations, the main problems that emerged for this prototype related to navigation, which was difficult for the evaluators to understand.

Even from the violations, it is clear that there are problems with navigation and that the evaluators expressed the need for buttons that would allow them to understand where to go from each screen.

### **Second prototype considerations (Smartphone):**

During execution, there were no particular problems for the evaluators in understanding how the prototype works and directing themselves to the various screens for task completion.

From the evaluations, there was mainly a violation of heuristics regarding terminologies and names used in the different buttons that are present in the application. In addition, the "goal" system was not completely effective given the little freedom given to a user in choosing and then disabling a goal.

First Evaluation (Prototype 1):

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Second Evaluation:

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Third Evaluation (Prototype 2):

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Fourth Evaluation (Prototype 2):

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- **List of Violation Prototype 1 (Smartwatch)**

- 1. H1 Visibility of system status

- Where:** In all screens of the application “menu”.

- What:** The app does not show what section of the menu we are in.

- Why:** By not showing in the app menu the number of screens present, and not using the typical bullets found in smartwatch apps, the user could become confused not understanding how he or she should act to accomplish the various tasks.

- Severity:** 3

- 2. H1: Visibility of system status

- Where:** Insert a meal > Record > Inserting a meal that achieves a goal

- What:** No feedback or indication that you just achieved a goal

- Why:** You receive feedback as you would for any meal; instead, you have to go to the “Goals” section to check if the goal has been completed or not.

- Severity:** 3

- 3. H2 Match between system and the real world

- Where:** On the screen that appears to see whether the goal was completed or not.

- What:** The term “Shoot” is used.

- Why:** The term Shoot in the application is used in a different way from the usual meaning, also in the screen there are no indications that make the user understand what happens after clicking the button.

- Severity:** 1

- 4. H2: Match between system and the real world

- Where:** World Cuisines > Mexican Cuisine > Choose a Tip

- What:** The term “tip” is used for something that is actually treated as a “task”

- Why:** The tip should be performed by the user, and he receives a “certificate” upon completing it.

- Severity:** 1

- 5. H2: Match between system and the real world

- Where:** Goals > Completed Goals

- What:** Does not contain a completed goal until this completed goal is opened from the list

- Why:** User might think to check whether a goal has been completed or not by going to the list of completed goals, but a completed goal does not appear in this section unless it is “opened” from the list of goals first. (Information does not appear in a natural and logical order, so H2)

- Severity:** 3

#### 6. H2: Match between system and the real world

**Where:** Goals > Completed Goals > Locked Goals

**What:** Goals and Locked Goals are separated in different pages, with the page of Completed Goals in between them

**Why:** There is no need to separate goals and locked goals, and user has no indication that there exist goals that are locked unless he lands on that page by mistake. (Information does not appear in a natural and logical order, so H2)

**Severity:** 3

#### 7. H3 User control and freedom

**Where:** In all sub-menu screens.

**What:** The visible button to return to the previous screen is missing.

**Why:** The application uses the right swipe to return to the previous screen without putting an explicit button. This could be confusing to the user, especially for those who are not very familiar with the platform.

**Severity:** 3

#### 8. H3 User control and freedom

**Where:** On the screen to choose tips.

**What:** It is not possible to deselect a tip.

**Why:** The user if clicks on a tip it is activated automatically, without having the possibility of deselecting it.

**Severity:** 2

#### 9. H3: User Control and Flexibility

**Where:** World Cuisines > You hit Mexican Cuisine

**What:** No back button or swipe left to go to Home option.

**Why:** User is forced to choose a tip and view it before he can navigate back home.

**Severity:** 3

#### 10. H3: User Control and Freedom

**Where:** Insert a meal > Record > Confirm Recording

**What:** The "X" button takes the user back to the Home Page.

**Why:** User is supposed to press it when his speech was not recognized correctly, and he wants to restart recording, so it must redirect him to "Record your voice" page, not Home.

**Severity:** 3

#### 11. H3: User Control and Flexibility

**Where:** List of Goals > Select Goal > Shoot or Deactivate Goal

**What:** No back button that takes you one step back.

**Why:** Cannot navigate back to the list of goals again to select a different goal.

**Severity:** 2

### 12. H3: User Control and Flexibility

**Where:** List of Goals > Select Goal > Shoot

**What:** No Home button that takes you one Home.

**Why:** User is forced to press shoot and view result of Goal, as it is the only way to navigate back Home.

**Severity:** 2

### 13. H3: User Control and Freedom

**Where:** World Cuisines > You hit Mexican Cuisine > Choose a tip > Tortilla di Mais

**What:** You can go back only to the home page from here by swiping left, no back button

**Why:** User is unable to go back and choose another tip in case of clicking "choice 1" and not "choice 2" by mistake for example.

**Severity:** 2

### 14. H3: User Control and Freedom

**Where:** World Cuisines > You hit Mexican Cuisine > Choose a tip > Tortilla de Mais

**What:** You cannot explore all tips regarding the one Cuisine that you "unlocked"

**Why:** User is unable to go back and choose another tip, or select multiple tips. The user can only go back to the home page, so he has to repeat the whole process and possibly land on another international cuisine, i.e, he does not have the freedom or the chance to explore all the tips related to a specific cuisine.

**Severity:** 3

### 15. H4 Consistency and standards

**Where:** In the screen for goal activation.

**What:** The app uses "Goal" to refer to a goal to be achieved, except here where for confirmation it refers to the same term using the word "Task".

**Why:** It is an inconsistent terminology for the same meaning in the application, which can create confusion.

**Severity:** 1

### 16. H4 Consistency and standards

**Where:** In the screen for goal activation.

**What:** In the confirmation message for goal activation, the application uses the term "Start," while in the button below it uses the term "Activate".

**Why:** It is inconsistent terminology for the same meaning in the application, which can create confusion.

**Severity:** 1

### 17. H4 Consistency and standards

**Where:** On the completed goals screen.

**What:** Completed tips are also shown.

**Why:** The user also gets completed tips on the completed goals screen, which may confuse the user.

**Severity:** 3

#### 18. H4 Consistency and standards

**Where:** On the screen that appears if you have completed the goal.

**What:** The term “Achieved” is used even though it is then displayed on “Completed.”

**Why:** Two different terms are used for the same meaning in the application.

**Severity:** 1

#### 19. H5 Error prevention

**Where:** On the screen to choose tips.

**What:** If clicked, a tip is automatically activated.

**Why:** Once a tip is selected, it is automatically activated without asking the user for confirmation.

**Severity:** 1

#### 20. H6: Recognition rather than recall

**Where:** World Cuisines > You hit Mexican Cuisine

**What:** Unlike previous screens, you have to swipe DOWN for the next screen

**Why:** For other screens, the user has to swipe left or right to navigate. There is no indication that the user should swipe down, and thus it isn't easily recognizable. This creates confusion and may cause the user to try all possible swipes every time he reaches this page until he memorizes this. A scrollbar or an arrow would solve this issue.

**Severity:** 2

#### 21. H6: Recognition rather than recall

**Where:** World Cuisines > You hit Mexican Cuisine > Choose a tip > Tortilla di Mais

**What:** User is assigned a “tip” that he should complete, but he cannot see this tip anywhere.

**Why:** The “tip” that the user must complete cannot be visualized anywhere, it is only visible in the moment it is assigned to him.

**Severity:** 3

#### 22. H6: Recognition rather than recall

**Where:** Insert a meal > Shoot > Feedback

**What:** The meal feedback is not saved anywhere, thus data is easily lost.

**Why:** This feedback contains suggestions, advice, and evaluations, but it is only visible in the moment and cannot be accessed by the user again. If the user closes this page before reading everything by mistake, it can never be accessed again. Also, the user might want to consult the feedback again when preparing his next meal, or when grocery shopping, etc.. The user is expected to recall and memorize the feedback when it is shown.

**Severity: 3**

23. H6: Recognition rather than recall

**Where:** Insert a meal > Record > Inserting a meal that achieves a task related to international meal

**What:** The “Mexican Tip” checked box needs to be pressed to see that the tip was completed

**Why:** The “Mexican Tip” checked box does not look like a button, and the user does not recognize he needs to press it.

**Severity: 3**

24. H6: Recognition rather than recall

**Where:** Insert a meal > Record > Submit Recording

**What:** The microphone symbol meaning “continue recording” is not straightforward to understand

**Why:** It means “continue recording,” but it is not clear. The user might think it means start recording all over again, i.e., overwriting what has already been recorded. It is not easily recognizable, lack of indications.

**Severity: 2**

25. H6: Recognition rather than recall

**Where:** Insert a meal > Record

**What:** The “microphone symbol button” must be pressed and held

**Why:** No indication to suggest that it is a press and hold button, the user does not recognize that he must press and hold the button. How to interact with this button should be clear from the interface and easily recognizable by the user.

**Severity: 3**

26. H7 Flexibility and efficiency of use

**Where:** In the menu or in the subsection concerning goals.

**What:** Lacks a shortcut to see only activated goals.

**Why:** Having a shortcut to see the active goals speeds up using the app to complete the task.

**Severity: 2**

27. H8: Aesthetic and minimalist design

**Where:** Insert a meal > Record > Shoot, List of Goals > Select Goal > Shoot

**What:** The screen with “shoot” is ambiguous and unnecessary

**Why:** It is not immediately clear why this screen appears, and it serves no purpose other than adding an intermediate step between submitting a meal and receiving the feedback, or between selecting a goal and viewing its status.

**Severity: 1**

#### 28. H8: Aesthetic and minimalist design

**Where:** Insert a meal > Record > Inserting a meal that achieves a task related to an international meal

**What:** The user has to view two feedback screens, one that says “meal was excellent,” then press on a popup button to view another one that says “Choice 1 has been achieved”

**Why:** If a meal achieves a tip, it should be the first feedback given about that meal, and the fact that it is excellent is redundant, since it satisfies a tip suggested by the application itself.

**Severity:** 2

#### 29. H10: Help and documentation

**Where:** Repeated throughout the prototype

**What:** Swipe from left to right to go back to Home Page

**Why:** Not immediately obvious for first-time user of the application, or a first-time user of a smartwatch. A help section that would clarify how to navigate could be useful.

**Severity:** 1

#### 30. H10 Help users recognize, diagnose, and recover from errors

**Where:** On the screen that appears if the goal has not been completed.

**What:** There is a lack of guidance on how to activate the goal again.

**Why:** The screen instructs the user to retry the failed goal but there are no clear directions on how to reactivate it.

**Severity:** 1

#### 31. H10 Help users recognize, diagnose, and recover from errors

**Where:** In the “Locked” screen.

**What:** Supposed blocked goals are shown but how to unlock them is not said.

**Why:** Not having directions on how to unlock the various goals, the user will not know what actions to take to unlock them.

**Severity:** 2

#### 32. HN

**Where:** Insert a meal > Record > Inserting a meal that achieves a goal

**What:** The same feedback, “your meal was great/excellent...” is received upon inserting a meal that achieves a certain task and any other meal.

**Why:** There is no distinction between a casual meal and a meal that achieves a goal.

**Severity:** 1

#### 33. HN

**Where:** In the “Locked” screen.

**What:** Supposed blocked goals are shown but how to unlock them is not said.

**Why:** Not having directions on how to unlock the various goals, the user will not know what actions to take to unlock them.

**Severity:** 2

34. HN

**Where:** In the menu or in the World Cuisines section.

**What:** Lacks a screen to remind the user of previously recommended and activated tips.

**Why:** Once the user selects a tip, there is no screen to re-read it, this could lead to the user forgetting the tip and not completing the task.

**Severity:** 3

- **List of Violation Prototype 2 (Smartphone)**

1. H2: Match between system and the real world

**Where:** Feed Me: Tips Before Snap screen.

**What:** The app uses the “upload your meal” button to take the photo at the meal, making the purpose of the button not so clear.

**Why:** It is a not so clear function in the application, which can create confusion.

**Severity:** 2

2. H4: Consistency and standards

**Where:** Feed Me: Tips Before Snap screen, Daily Meal Pop Up screen, Wheel: Prize screen, Goals:Finished screen (after clicking check your results)

**What:** Respectively, the App uses “upload your meal”, “feed me”, “try now”, “go to feed me”

**Why:** It is an inconsistent button terminology for the same function in the application, which can create confusion.

**Severity:** 3

3. H9: Help users recognize, diagnose, and recover from errors

**Where:** In the Shop screen, when clicking on an unlocked item.

**What:** No error message appears if the user clicks on an unlocked item and does not have sufficient money to buy it.

**Why:** Users should easily understand why they are unable to buy a certain item.

**Severity:** 3

4. H4: Consistency and standards

**Where:** In the Shop:Confirm screen, in Wheel: Confirm Pop Up screen, in Goal:Confirm screen, and in the Feed me:Preview screen

**What:** The app uses “⏮” button in Shop:Confirm screen, in Wheel: Confirm Pop Up screen, in Goal:Confirm screen to undo the operation and return to the previous screen, while in Feed me:Preview screen it uses “X” button.

**Why:** It is an inconsistent button choice for the same function in the application, which can create confusion.

**Severity:** 2

#### 5. H9: Help users recognize, diagnose, and recover from errors

**Where:** In the App Home screen.

**What:** No error message appears if the user clicks on the “try something new” button and has not reached level 30.

**Why:** Users should easily understand why they are unable to access new foods from the world.

**Severity:** 3

#### 6. H4: Consistency and standards

**Where:** In the Try New: Wheel screen.

**What:** The “⏮” button in this screen is put top right, while also on other screens is put bottom left.

**Why:** It is an inconsistent button layout in the application, which can create confusion.

**Severity:** 1

#### 7. H4: Consistency and standards

**Where:** In the Home screen and in the Goals screen of the app.

**What:** On the Home screen “choose a goal” label in the button is used, while in the Goal screen “select a goal...” is used as a descriptive label.

**Why:** It is an inconsistent textual choice in the application, which can create confusion.

**Severity:** 1

#### 8. H8: Aesthetic and minimalist design

**Where:** In the Goals screen, in Goals:Finished screen, in Tips screen, in Try New screen.

**What:** When displaying the goals list, tips list or international foods list, in each element is added a description or a preview of the description, anyway accessible when clicking on an element and viewing it in detail.

**Why:** This subtracts precious screen space (given that it’s a mobile prototype) and removes visibility of the most relevant information, like the image or the name.

**Severity:** 3

#### 9. H4: Consistency and standards

**Where:** In Feed Me: Tips Before Snap screen and Feed Me: Snap screen.

**What:** In the whole app the home button is top left, except in these screens where it is bottom left.



**Why:** It is an inconsistent button position choice in the application, which can be confusing.

**Severity:** 2

#### 10. H1: Visibility of system status

**Where:** In Try New:Wheel screen.

**What:** Inside the wheel there is an arrow that points on a slice of the wheel that contains nothing.

**Why:** The user probably will not understand what he is going to obtain.

**Severity:** 3

#### 11. H2 Match between system and the real word

**Where:** In "Home".

**What:** The term "daily meal" is used to refer to a recommended meal.

**Why:** The term is misleading, and may lead the user to think that it is the section for uploading the daily meal

**Severity:** 3

#### 12. H2 Match between system and the real word

**Where:** In "Home".

**What:** The use of the term "feed me" does not make the user realize that in this section they are given the opportunity to upload their daily meal

**Why:** The term could lead to user confusion by making the user think of an interactive feature related solely to Tamagotchi

**Severity:** 3

#### 13. H4 Consistency and standards

**Where:** in "home" and in "daily meal" pop up.

**What:** The app uses "feed me" in both screens to indicate different functionality

**Why:** The user may not understand what he is supposed to do and be confused because he expects a button with the same name to have the same functionality throughout the experience with the application. It is inconsistent terminology for the same function in the application.

**Severity:** 3

#### 14. H10 Help and documentation

**Where:** in "tips"

**What:** Some tips are locked but the user is not told what to do to unlock them

**Why:** The user is not helped in any way and is in an impasse where he does not know how to move forward to unlock the tips.

**Severity:** 3

#### 15. H3 User control and freedom

**Where:** In "goals"

**What:** If the user selects and activates a goal, there is no way to deselect it.

**Why:** The user may have changed his mind, made a mistake, or realized that it would be better to choose another goal but is forced to keep the goal activated and has no way to change his choice

**Severity:** 3

#### 16. H10 Help and documentation

**Where:** in “goals”

**What:** There are locked elements but no indication is given to the user explaining that to unlock them he must turn the wheel

**Why:** The user is not helped with clear directions on what to do going forward, he may find himself displaced and not know how to continue. In fact, the “turn the wheel” section is not explanatory for the context we are in and is not immediate to understand.

**Severity:** 2

#### 17. H6 Recognition rather than recall

**Where:** in the pop-up that appears on the “home” indicating the completion of the goal

**What:** It is not specified which goal was completed

**Why:** The user may not remember the goal he had previously activated

**Severity:** 1

#### 18. H7 Flexibility and efficiency of use

**Where:** in “goals”

**What:** Lacks a shortcut that allows the user to see completed goals and failed goals

**Why:** The user has no way to speed up navigation by seeing the goals already “completed” correctly or “failed” to decide whether he wants to redo them or discard them but has to scroll through them all each time

**Severity:** 3

#### 19. H4 Consistency and standards

**Where:** in “goals confirm” and in the pop up to check the result of the goal

**What:** The “back” button to go at the previous page is shown rather than the curved arrow used in all other screens

**Why:** Two different symbols are used for the same function in the application, which can create confusion. It is inconsistent terminology for the same function in the application.

**Severity:** 1

#### 20. H2 Match between system and the real world

**Where:** in “wheel prize”

**What:** Below the description are the “ok” and “try now” buttons

**Why:** The terms “ok” and “try now” put under a description do not make it clear what the difference between the two is and what they do. They might suggest that both are used to agree to try the food recommended in the description.

**Severity:** 2

#### 21. H10 Help and documentation

**Where:** in the pop up that appears on the “try new: wheel” screen.

**What:** If the user does not have enough coins to turn the wheel a pop up is shown notifying the user of this, but the user is not shown how to retrieve the coins.

**Why:** The user who sees this pop-up for the first time may get stuck and unclear about the situation, not getting directions and not knowing what to do because he would like to turn the wheel but is not helped on how to retrieve the coins.

**Severity:** 2

#### 22. H7 Flexibility and efficiency of use

**Where:** in “try new”

**What:** Lacks a shortcut to view newly unlocked foods

**Why:** The user is forced to scroll through all the unlocked foods to find the desired one, thus slowing down their browsing experience

**Severity:** 3

#### 23. H10 Help and documentation

**Where:** in “try new:reward”

**What:** it is not explained where to find the kimono if I click the “maybe later” button

**Why:** user gets confused and is not given information on where to retrieve all unlocked accessories

**Severity:** 2

#### 24. H4 Consistency and standards

**Where:** in the confirmation pop-up that appears after clicking on a goal

**What:** The “select” button appears to confirm instead of the “✓” symbol used in all other screens

**Why:** Two different symbols are used for the same function in the application, in fact the user has been used to seeing in all other screens the symbol “✓” is might get confused. it is inconsistent symbology for the same function in the application.

**Severity:** 1

#### 25. H10 Help and documentation

**Where:** in “home”

**What:** It is not understood that by clicking on the tamagotchi the user can view items unlocked by trying world foods and other clothing items purchased in the shop

**Why:** There is no information or help to make the user understand that by clicking on the tamagotchi he accesses another section

**Severity:** 2

#### 26. H4 Consistency and standards

**Where:** in “daily meal pop up”

**What:** the “got it” button is used to close the pop up, while in all other pop ups within the application the “ok” button is used

**Why:** Two different terms indicate the same functionality it is an inconsistent terminology for the same function in the application, which can create confusion.

**Severity:** 1

### Chosen Prototype

- The chosen prototype is the second one (Smartphone platform application) The reason for this choice is that the Heuristic Violations have shown that there are some problems related to the navigation in the Smartwatch prototype. The only way to solve this navigation issue is to add some buttons in the interface to make the user aware of the direction to move. This solution is not feasible for us since adding components to a very small screen will “choke” the interface. On the other hand, the navigation in the Smartphone prototype shows no problems.
- The logic used to implement the “moderate task” in the Smartphone prototype has some problems according to the evaluation. The evaluators faced the necessity to discard/disable a goal to change it but in the current implementation idea, the goals can be repeated infinite times but cannot be deactivated. Letting a user discard a goal will break the logic of the game. To solve this issue, we will implement the “moderate task” using the logic of the Smartwatch prototype where goals can be activated/deactivated and executed only one time in the game.
- We will also change the “Wheel” animation used for the “complex task” interface with the animation used in the Smartwatch since we think it is more appropriate and we received some feedback on it in the evaluation.

# Medium to High-Fidelity Prototype

## Used tools and screens

- The tool we used for the medium prototype is Figma since it was explained in class, and it is one of the most complete tools for this task. The first page is the Home page, it is the most important one since it is the first one seen by a user when the application is opened, and it gives access to all the interfaces to perform the three tasks. The second one has been chosen since it is accessible from the home page to perform the simple task that the user will use widely in his experience.

## Link to the prototype

- <https://www.figma.com/proto/22RoManBkkmhraYVaTHzCk/Prototipo?type=design&node-id=1-2&t=OLNwh555hdQDoxPk-1&scaling=scale-down&page-id=0%3A1&starting-point-node-id=1%3A2&mode=design>

## Major Problem Resolution (Severity 3 and 4)

Violation 2 :

The labels will be modified to have consistency so as not to confuse the user.

Violation 3 :

It will be made known to the user, unambiguously, which items he can and cannot buy at the shop. There are 3 possible cases: - 1 Item unlocked and sufficient money - 2 Items unlocked but insufficient money - 3 Objects yet to be unlocked.

Each case scenario will be differentiated from the others graphically, and in addition, objects that cannot be purchased (cases 2 and 3) cannot be clicked by the user since the button will be disabled.

Violation 5 - Contested:

There is already a padlock on the screen indicating that the feature is yet to be unlocked and an inscription indicating the level to be reached to unlock the section. In addition, the button has been disabled as further evidence that the feature is yet to be unlocked.

Violation 8 - Contested:

The preview is, as the name suggests, a partial display of the entire description inserted in a space that would otherwise remain empty; removing it would not allow space to be recovered. Its absence would also force the user to click on the box to get even the slightest information.

Violation 10:

The Try New mode presented in Prototype 2 will be replaced by the one in Prototype 1 (Smartwatch), which is clearer for the user.

Violation 11:

The button name will be changed to one that is more intuitive for the user.

Violation 12:

Documentation will be added that will explain to the user the parallelism between the meals he eats and those with which he will feed the Tamagotchi (Stated intent of the application and presented to the reviewer during the heuristic evaluation)

Violation 13:

Solved using the approach defined for solving problem 2

Violation 14:

Within the “Tips” screen, the user will be told how to unlock them.

Violation 15 and Violation 18:

The goal system has been completely revised; elements already present in prototype 1 (Smartwatch) will be taken but repurposed. With each level increase, as indicated, the user will unlock **N** goals from which they can choose. The user will be given the option of deselecting one goal to choose another. Successfully completed goals will be placed within a special screen with all previously completed goals, while failed/deselected goals will still be available for the user to try again.

Violation 22:

The user, from the “Try New” screen will have the ability to immediately find new (not yet tried) dishes and distinguish them from those he has already tried instead via a separate box, a sorting that puts them at the beginning, or a filter.

## Minor Problem Resolution

Violations: 1, 4, 6, 7, 9, 19, 20, 24, 26:

All flagged labels and their locations will be reviewed and corrected to ensure greater consistency throughout the app.

Violation 16:

Solved using the approach defined for solving problem 15 and problem 18

Violation 17:

The completed goal will be specified.

Violation 21 - Contested:

Access to the try new screen is blocked until a certain level is reached, which assumes a certain amount of experience on the part of the user, at which point he or she will already be clear on how to obtain the coins.

Violation 23 and Violation 25:

Through an appropriate hint/documentation, the user will be clear on how to access the Tamagotchi customization screen. In addition, the label “Maybe Later” will be replaced with a label that explicitly calls to the customization page.

# High-fidelity Prototype

Describe tools, framework, libraries, ... used and why you selected them.

The Framework used for the project were:

- **Chakra UI:** it is a UI library based on React Bootstrap that offers a wide variety of components.
- **Express.js:** minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications.
- **SQLite:** a very simple SQL database engine

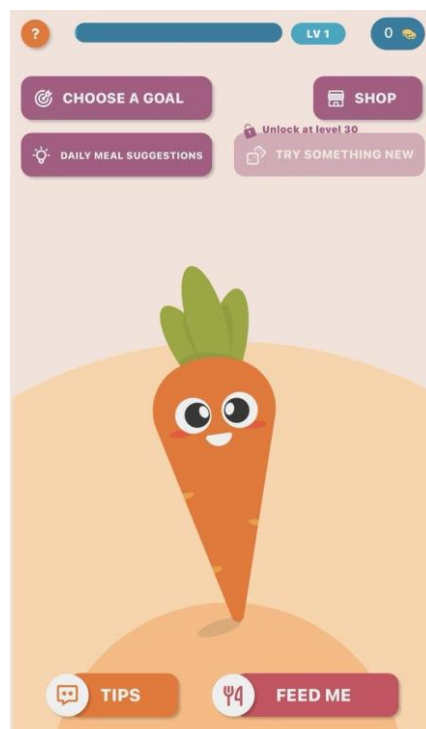
Most of the tools were chosen since they are known by all team members.

Link to the GitHub repository.

[https://github.com/polito-hci-2023/GNAM\\_PROTOTYPE.git](https://github.com/polito-hci-2023/GNAM_PROTOTYPE.git)

Describe the most significant screens of the prototype, and why they are significant to you.

- **Home Page**





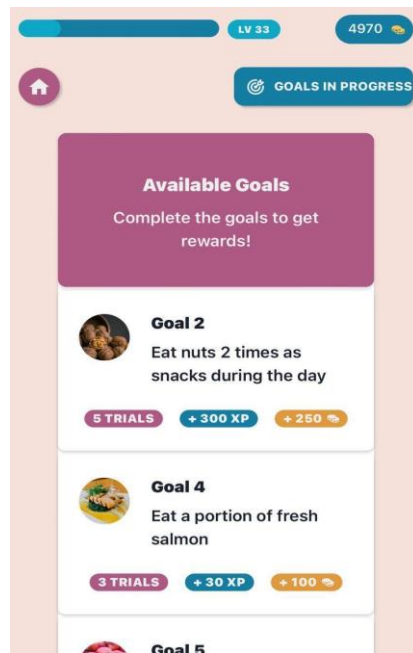
As mentioned earlier one of the most important screens of the application is the home page as it allows through the multitude of buttons present, access to the various sections that allow the three tasks to be completed.

It also immediately shows the type of game that has been implemented in fact the first image that jumps to the eye is the Tamagotchi which represents the core of the "playful" part of the prototype.

Here we list the function of the buttons:

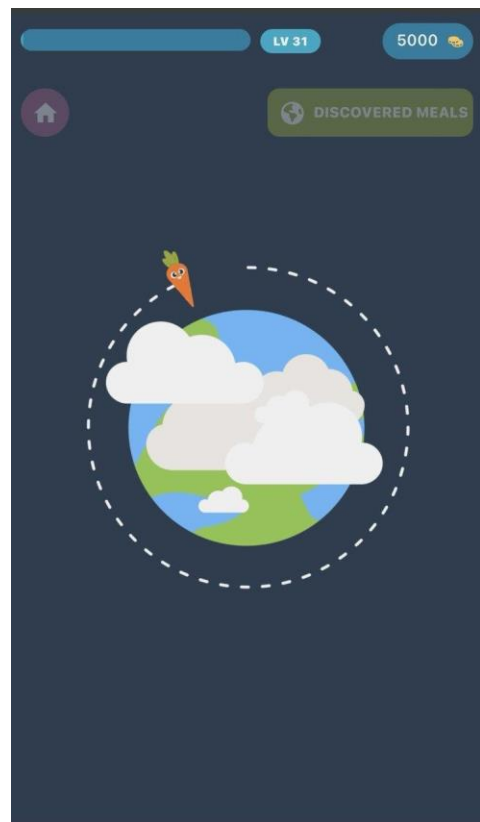
- **Tips Button:** Open a selection of tips where the User can get tips about healthy food and diet.
- **Choose Goal Button:** Open a selection of goals.
- **Try Something New Button:** Open a selection of special goals related to World Cuisine (it is available from level 30)
- **FeedMe Button:** Open the screen that allows a user to upload a meal.
- **Daily Meal Suggestions Button:** Open a pop-up showing a suggested food for each day
- **Shop Button:** Open the shop section where the user can personalize the Tamagotchi.

- Goal Panel



This screen directly accessible via the "Choose Goal" button from the homepage allows a user to see the goals unlocked at a given time with the possibility of clicking on each of them to activate it or simply to have a broader description.

- **Hit The Globe**



This screenshot, on the other hand, shows the core of the complex task that is, the ability to randomly draw a particular "special goal" inspired by one of the world's cuisines.

Clicking on “Hit the globe” button, you will see an animation of the globe with the unlocked goal.

Also because of the animation present we believe it can make the whole experience playful, encouraging the user to use the app.

## Comment on the hard-coded part, the pre-stored data, and the limitations.

- **Hard Coded part:**

The functionality that was implemented in a hard-coded manner concerns the scanning of a plate via photo which was simulated using Qr-code. The prototype does not include an intelligent system to understand the contents of a dish and whether it is healthy or not, but everything is simulated using a QR code containing the title of the dish being photographed.

Some images such as those related to goals are not saved in a database in association with the goal but are hardcoded to the correct goal using the unique goal ID.

- **Pre-stored part**

Most of the data is saved in a database, in particular, all goals, tips, and special goals have been saved in associations with some images and descriptions.

- **Limitations**

The application has some limitations, in fact, the possibility of accessing with multiple users is not managed and the number of tips, goals, and special goals is extremely limited compared to the idea of the game.

As mentioned, the dish recognition part is not implemented intelligently, and the app also presents some limitations regarding the presence of objectives and data that change over time.

# Usability testing

## Preparation and run

The test was carried out by first defining a protocol in which we chose target users (people living on their own for the first time) defined the materials needed to carry it out. In particular, we prepared consent forms to have the users' permission to record the test carried out and prepared an extended version of the three previously defined tasks. Two post-questionnaires were also prepared to be offered at the end of the test.

The test was conducted in separate sessions mainly at home and at the polytechnic. For each session, one member of the group played the role of facilitator while the others played the role of observer.

The facilitator followed the previously prepared script, asking pre-prepared questions and vocally proposing tasks for the user to perform.

The observers took notes during the performance of the test to note any errors or user behaviors.

At the end of each session, a questionnaire ( SUS ) and some Debriefing questions were proposed to understand the general opinion.

The refined version of the task is:

T1	Manage to open a tip and read it
T2	Open the FeedMe section and upload the meal using the smartphone's camera.
T3	Manage to open and read a suggested meal
T4	Navigate to the goal section, read the description of one goal, and then activate it.
T5	Complete the goal that has been activated in the previous task
T6	Get the rewards from a completed goal
T7	Buy a skin from the shop and apply it to the Tamagotchi
T8	Unlock a regional food in the "Try Something new section"
T9	Complete the special regional cuisine goal

Link to Script/Consent Forms/Post-questionnaires:

[https://drive.google.com/file/d/1HUmU8G5die2RZKVGTKfmz8cw8U2pqdWM/view?usp=drive\\_link](https://drive.google.com/file/d/1HUmU8G5die2RZKVGTKfmz8cw8U2pqdWM/view?usp=drive_link)

## Results

### First Screen Tour:

In the first phase, users were encouraged to observe the initial screen trying to identify the main features of the application. All users appreciated the home screen also thanks to the presence of the Tamagotchi illustration which made the interface very friendly. They managed to recognize all the main aspects of the game that they learned through the tutorial.

### Task 1:

From the tests conducted, no user experienced any difficulty in completion, managing to complete it very quickly. The most critical part of the task namely opening the tip to read more information was successfully performed by all users

### Task 2

The task was successfully completed by all participants in particular it is very relevant that all participants used the insertion by photo of the meal correctly without errors.

### Task 3

Task successfully completed by all participants in a very short time. No problems were encountered during this phase although one of the users felt that there were more suggestions in the section due to the name used in the button "Suggestions" instead of "Suggestion". All the users correctly close the section with the "Got it" button instead of clicking on "Upload Meal" since they understood that the meal is not ready yet to be uploaded.

### Task 4

The users easily completed this task by immediately noticing that the button to use is "Choose a goal." Once the screen is opened, they saw the list of all available goals, and after selecting which one to activate, they correctly clicked on the goal card activating it with the button.

### **Task 5**

The task was successfully completed by all users however shortcuts were not used that were specifically inserted to more quickly enter a meal starting from the goal.

Some users in fact despite seeing the goal activated in the "Goals in progress" section did not click on the related card accessing a shortcut, they instead used the meal entry method used previously.

### **Task 6**

Task successfully completed by almost all testers.

Only one tester had difficulty understanding that after completing a goal it was necessary to click on the "Check result" button to acquire the award. However, after seeing no increase in the score he was able to return to the goal in progress section and click on the button to complete the goal.

### **Task 7**

The task was successfully completed by all users. The most critical part of the task, i.e. the selection of the newly purchased skin from the customization section, was completed by everyone without problems, in fact no user, after purchasing the skin, had difficulty understanding that it should also be selected and applied to the Tamagotchi.

It should be noted that 3/4 also understood that they could return to the home page to observe the Tamagotchi with the new clearer customization

### **Task 8**

All users completed the task completely and managed to correctly start the animation to unlock the goal.

One of the problems encountered with this task was the duration of the animation which led some testers to believe they had to perform some operation to make it stop.

### **Task 9**

The task was completed successfully with minor issues. Some users, guided by the goal activation dynamics carried out previously, thought that the special goals should also be activated. This led one user to be in doubt about what to do on the

screen and another to click on a title in the interface that he thought was a button. However, the users managed to complete the task

## **Test 1**

SUS Score: 97.5

### **Successful Task Completion:**

- Task 1 : 100 (Complete Success)
- Task 2 : 100 (Complete Success)
- Task 3 : 100 (Complete Success)
- Task 4 : 100 (Complete Success)
- Task 5 : 100 (Complete Success)
- Task 6 : 100 (Complete Success)
- Task 7 : 100 (Complete Success)
- Task 8 : 80 (Success complete with Minor Issue)
- Task 9 : 100 (Complete Success)

## **Test 2**

SUS Score: 90.0

### **Successful Task Completion**

- Task 1: 100 – Complete Success
- Task 2: 100 – Complete Success
- Task 3: 90 – Success with Minor Issue
- Task 4: 100 – Complete Success
- Task 5: 70 – Success with Minor Issue
- Task 6: 100 – Complete Success
- Task 7: 100 – Complete Success
- Task 8: 100 – Complete Success
- Task 9: 100 – Complete Success



## Test 3

SUS Score: 92.5

### Successful Task Completion:

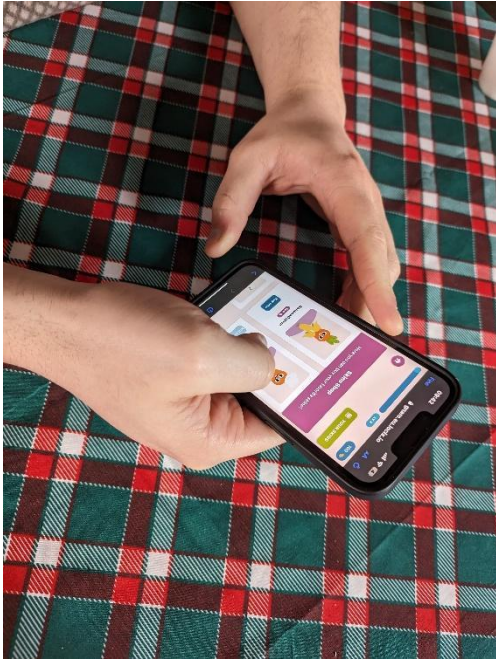
- Task 1 : 100 (Complete Success)
- Task 2 : 100 (Complete Success)
- Task 3 : 100 (Complete Success)
- Task 4 : 100 (Complete Success)
- Task 5 : 100 (Complete Success)
- Task 6 : 100 (Complete Success)
- Task 7 : 100 (Complete Success)
- Task 8 : 80 (Success complete with Minor Issue)
- Task 9 : 80 (Success complete with Minor Issue)

## Test 4

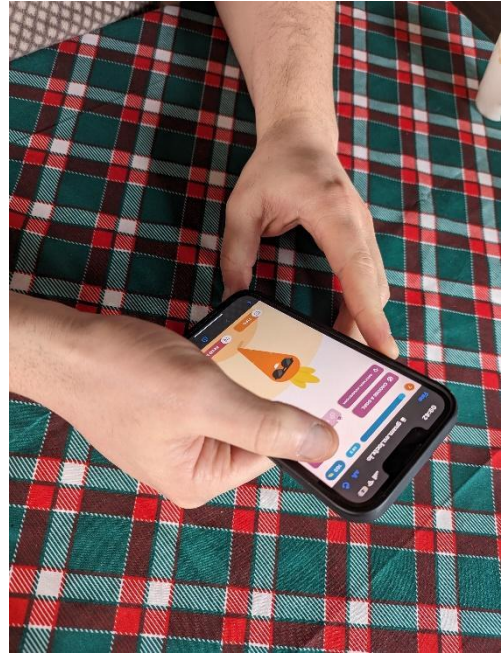
SUS Score: 92.5

### Successful Task Completion:

- Task 1 : 100 (Complete Success)
- Task 2 : 100 (Complete Success)
- Task 3 : 100 (Complete Success)
- Task 4 : 90 (Success with minor issue)
- Task 5 : 100 (Complete Success)
- Task 6 : 40 (Completed with major issue)
- Task 7 : 80 (Success with minor issue)
- Task 8 : 100 (Complete Success)
- Task 9 : 90 (Success with minor issue)



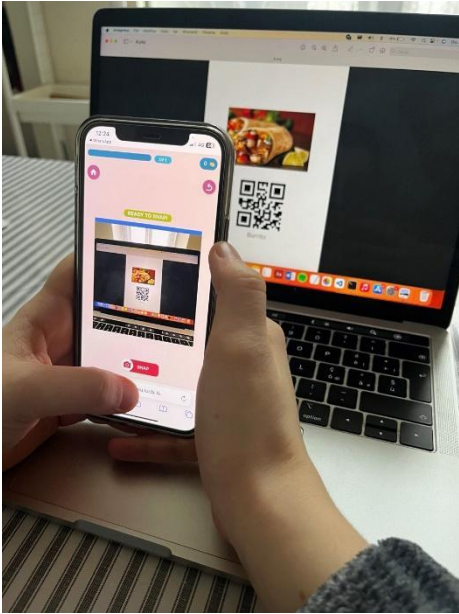
*User personalizing Tamagotchi*



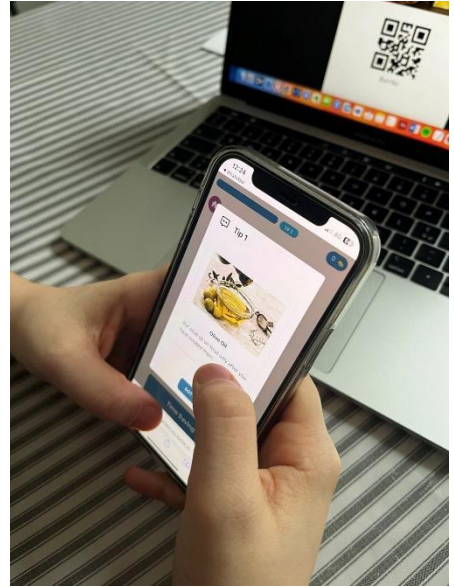
*User opening shop*



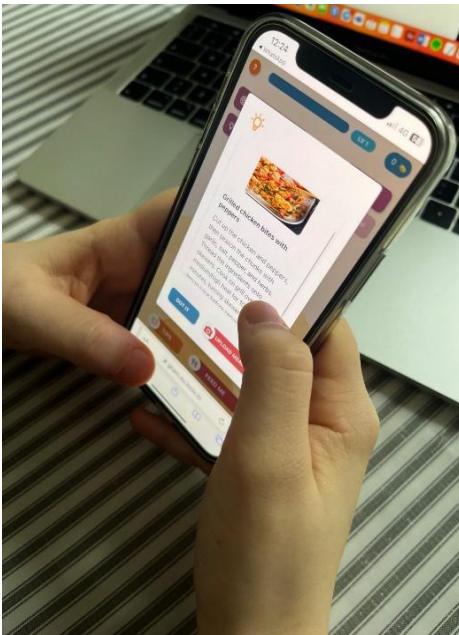
*User uploading a meal*



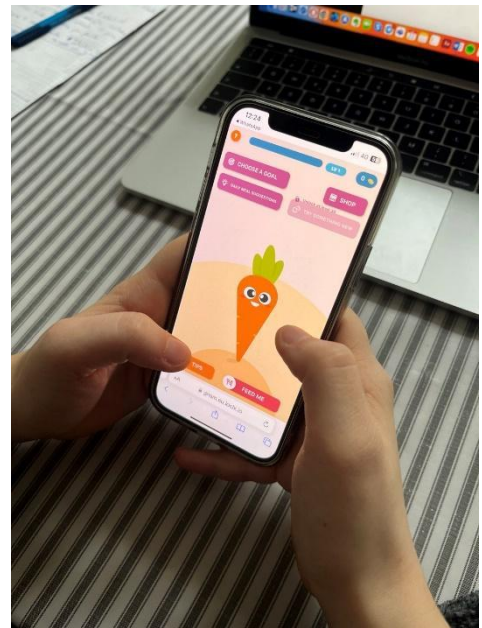
*User uploading a meal.*



*User reading a tip.*

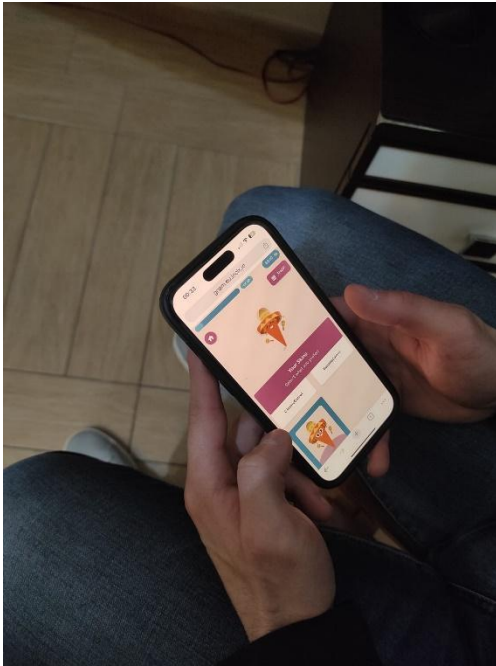


*User reading the suggested meal.*

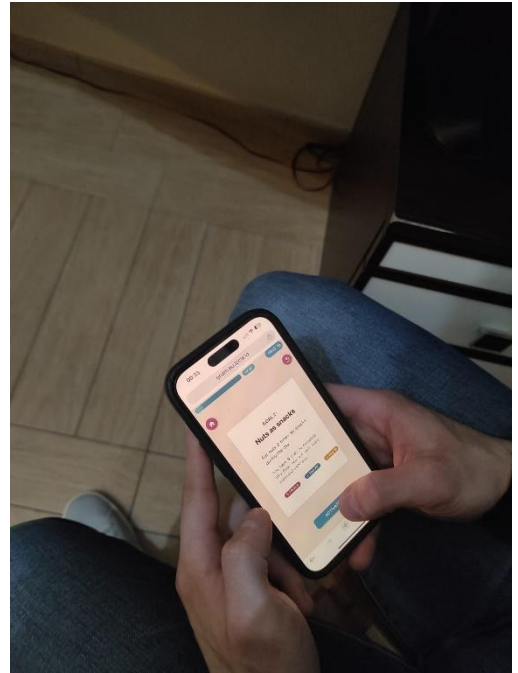


*User navigating home.*

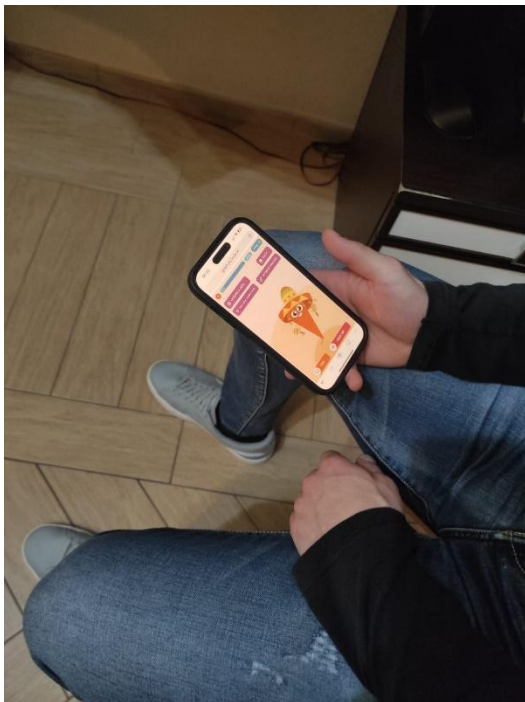




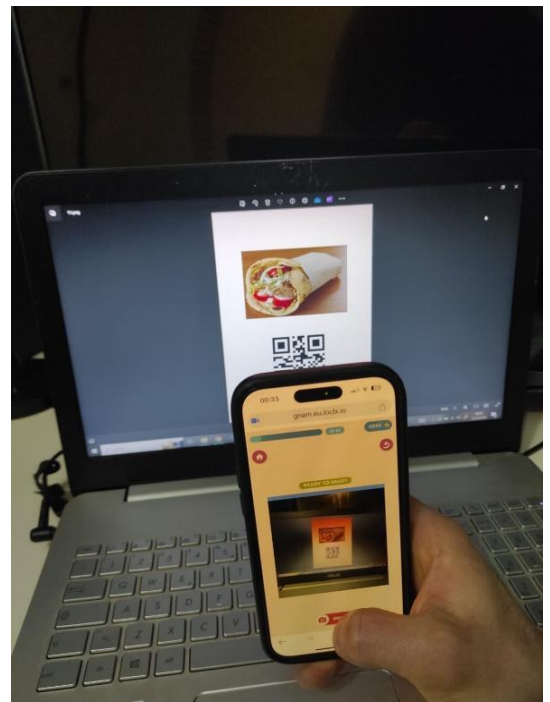
*User personalizing Tamagotchi*



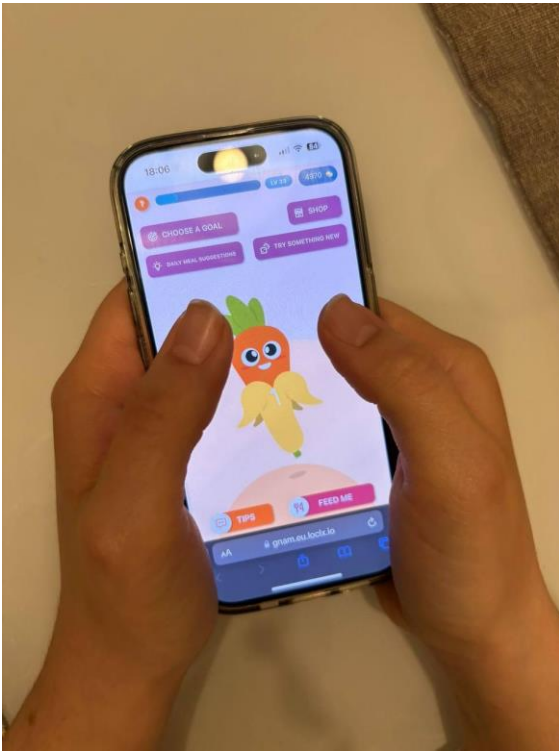
*User activating a tip.*



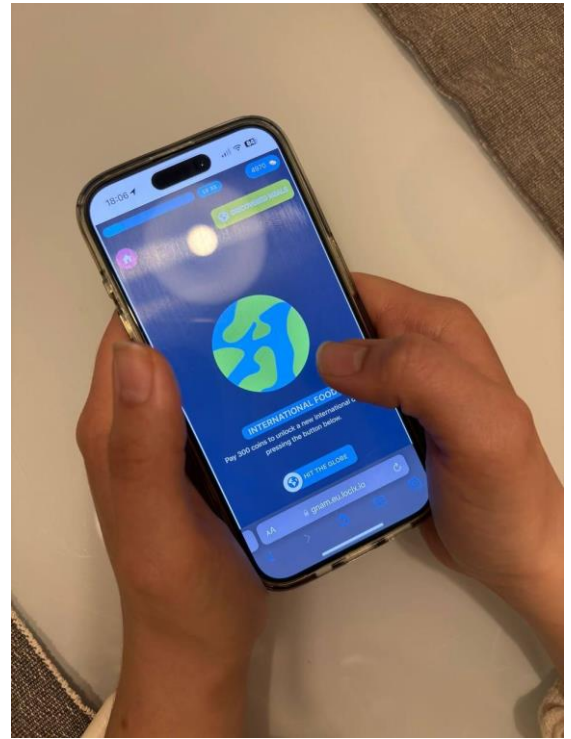
*User navigating home.*



*User uploading a meal.*



*User navigating home.*



*User trying "something new" section.*

## **Discoveries and Learnings**

Through the feedback we received on our app, we understood that the approach we used to meet the needs of our domain of interest was very functional. Users appreciated the possibility of engaging with a daily yet complex theme, such as nutrition, through a game. This indeed provides the right incentive to eat well.

The functionalities provided seem to be very useful in improving user habits: in particular, we received many positive reviews regarding the daily meal suggestion feature, as it is a quick and effective way to solve the common problem of not knowing what to eat.

Users greatly appreciated the interface and the app's appearance, albeit with some suggestions that would improve its understanding. The functionalities overall seem to be easy to use and straightforward to access, even for inexperienced users. Through normal usage, users can navigate throughout the app, so it is discovered immediately by users and no function remains hidden and unused.

The method used for loading meals was appreciated by everyone because it is extremely fast. This is definitely a strong point of the app because a complex and lengthy loading process would discourage its use.

## **Potential Changes**

One of the first changes to implement will be the renaming of the button from "Daily Meal Suggestions" to "Daily Meal Suggestion," as revealed in Task 3 of Test 2, where the user expected to receive more than one suggestion. Another issue, highlighted in Task 5 of Test 2 and Task 9 of Test 3, is the lack of a clear distinction between what is clickable and what is not. In particular, during the two cases examined: one user did not perceive a card as clickable and took a longer path, while the other thought to click on a piece of text only useful for signaling the completion of an action. This problem will be addressed by making it unambiguously clear which elements the user can interact with, for example, by using completely different React elements.

It will also be necessary to improve notifications that report changes or the completion of a goal to the user because, as happened during Tasks 6 and 7 of Test 4, Task 8 of Test 2, or Task 8 of Test 3, some events were not explicitly communicated to the user, raising doubts about the actual receipt of rewards, the activation of the selected skin, or the completion of an animation. Another problem identified during Test 4 is the lack of consistency between "Goals" and "International Meal." The user confused the two categories and thought it was necessary to activate something to unlock the special item associated with the international recipe. We will try to resolve this issue by aligning the special item assignment system with that of goals, thus requiring user activation of the goal.

# Conclusions

## Main learnings

- From this course we learned above all, how to work in a group, how to manage the various roles and the work to be done as well as how to manage differences of ideas and find a compromise. The project execution process was also very important and was built step by step so that each phase was guaranteed the right importance.  
We have also learned to look at things not only from the point of view of a programmer but also of users who are potentially unaware of the functioning of certain technologies.

## Group feedback: how did you split the work within the group, any positive aspects, and any problems you experienced as a group?

- To carry out the first Assignments, the group worked jointly to identify a category of users within the domain of interest. To carry out the part related to the prototypes we divided the work into 2 groups Angelo/Nicolò and Mario/Vincenzo to create two different prototypes.
- To carry out the project we divided the work in this way:
  - Nicolò: frontend with all screens structure + UI
  - Angelo: UI + game logic flow + Tamagotchi illustrations
  - Mario: backend + client data retrieval + main game logic flow
  - Vincenzo: backend + client data retrieval + main game logic flow
- Among the positive aspects, we certainly had the opportunity to build relationships with our university colleagues. The group did not have any particular problems other than natural disagreements on some ideas of the prototype and on the division of work which were all easily resolved.