



checkMeal

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Index

Idea	3
Competitor analysis	3
FoodIsGood	3
myCia	4
Yuka	4
User profile	5
Personae	5
Restaurant Owner: Katherine Simmons	5
Person with dietary restrictions: Eleanor Tenant	5
Person with a friend who has dietary restrictions: Patrick Murray	6
Scenarios	6
Methods and Protocols	7
Questionnaire	7
Interviews	9
Interview #1	9
Interview #2	10
Interview #3	12
Findings	13
Hierarchical Task Analysis	13
Buy a product in the grocery shop	14
Go out for dinner	14
State Transition Networks	15
Edit restriction	15
Search restaurant	15
Scan product	16
Expert evaluation	16
Mockups	16
Cognitive walkthrough	18
Task 1	18
Task 2	19
Task 3	19

Results	20
Heuristic evaluation	20
Prototype	21
User evaluation	23
Controlled experiment 1	23
Controlled experiment 2	24
Think aloud	25
Cooperative evaluation	26
Incidents	27
Solutions	27
Final Prototype	27
Appendix - Questionnaires Results	28



The swiss knife for dietary restrictions!

Idea:

The idea was born from the need of an application to support people with dietary restrictions. In particular it will allow the user to choose what are his intolerances or allergies and then:

- scan a product's barcode to check if it is suitable for the user and does not contain any of the ingredients he is allergic to;
- scan through a list of restaurants, choose one and read the menu filtered by the food preferences and intolerances inserted in the app.

It groups single services already offered by other apps creating a unique tool which combines them all together.

In general the app could be used by anyone who wants to check if a product has or not some ingredient. As an example for people with religious prohibitions or for someone who doesn't like some foods.

Competitor analysis:

We tested different applications which provide similar services to the ones we are going to offer. Those are the pros and cons we observed in those apps:

FoodIsGood

Pros:

- allows to scan the barcode and tells the ingredients
- allows to search for food that can be eaten
- help finding recipes compatible with dietary restrictions

Cons:

- does not include restaurants
- only available in USA
- does not automatically tell if a product is compatible with the diet of the user
- cannot search for restaurants and their menus

myCia

Pros:

- allows to search through restaurant and add favorites
- shows both complete and filtered menu based on your dietary restrictions
- allows to book a table through the app
- allows to search a restaurant by combining several user accounts

Cons:

- cannot scan a product's barcode to check the ingredients
- doesn't show restaurant info
- cannot change profile info more than once in 30 days
- cannot search for a restaurant adding temporary filters on the ingredients (you cannot add intolerances of a friend if you don't link your accounts)

Yuka

Pros:

- allows to scan the barcode and shows additives and nutritional values
- allows to add favorite products
- gives alternatives for healthier products
- gives a score on the nutritional values of the product

Cons:

- cannot set food preferences unless you pay a membership
- cannot search for restaurants and their menus
- does not include the list of ingredients for the products

COMPETITORS	checkMeal	FoodIsGood	myCia	Yuka
Scan a product	Yes	Yes	No	Yes
Set the dietary restrictions	Yes	No	Yes	Yes
Show the ingredients	Yes	Yes	No	No
Tell if a product is suitable for the user	Yes	No	Yes	Yes
Find a restaurant	Yes	No	Yes	No
View filtered menu	Yes	No	Yes	No

User profile:

- Age: 14-75
- Gender: not relevant
- Location: everywhere
- Technology: smartphone familiarity
- Distinguishing marks: does not like some type of food, has dietary restrictions or knows someone that has them

Personae:

Restaurant Owner: Katherine Simmons - 43 years old

Katherine is a strong willed woman that does not get pushed around by others. This characteristic and her being prone to hard work allowed her to open a restaurant at a very young age. She is bossy around her employees but only because she wants to create the best dishes possible to make her clients happy. At the same time she wants her employees to learn and give their best. In her free time at home she likes to read detective stories while drinking her favorite tea. She also likes to travel in exotic countries and to make new experiences to get inspiration for new dishes. She usually stays in her own apartment in Manhattan but lately she is spending more time at her boyfriend's house. She graduated with top marks at culinary school where she specialized in fish dishes.

Person with dietary restrictions: Eleanor Tennant - 22 years old

Eleanor is studying engineering at the university. She was born in a small village and to attend lessons she moved to the student's lodgings in Edinburgh with her friends. She is very friendly and she likes to go out with them. She is very worried about the world and its ecological issues. She also likes staying alone and for this reason she loves to have long walks in the park next to her house with her dogs. Indeed, she loves animals and being in touch with nature. Eleanor is a very environmentalist person and she is vegan. She wants to share her ideas with her friends and her family. For this reason, all the members of her family are becoming more careful in recycling and in buying eco-sustainable products. As a consequence, Eleanor habitually does grocery shopping in "zero waste shops".

Person with a friend who has dietary restrictions: Patrick Murray - 32 years old

Patrick is a lawyer working for a law firm in Los Angeles. He is married and has a 1 year old daughter. He is a very extroverted person so he is well liked not only by his clients but also by his coworkers. He is always eager to try new adrenalinic experiences and for this reason he is seen as a bit impulsive by his friends. He tries his best to make everyone around him happy so he is very considerate about everyone's issues and problems, this sometimes makes him appear as a bit invasive. In his free time he likes to go to the gym and hang out with his friends but since the birth of his daughter he has very little free time so he cherishes it as much as he can.

Scenarios:

Katherine: It's Friday at dinner time, the restaurant is full with clients and Katherine is overloaded with work. She notices that the same waiter keeps coming back to the kitchen asking for information about dishes. To understand what is happening she stops the waiter and asks why he keeps coming in. The waiter answers explaining that there is a client that has some intolerances and she's asking what she can eat, but the waiter does not precisely know what the ingredients are so he cannot reply. At the end of the evening while tidying up the place, Katherine thinks again about what happened and decides that she needs a simple way to let clients know what they can eat in her menu without having the waiter go back and forth in the kitchen. Moreover she thinks that creating a restaurant where everybody does not have issues in ordering dishes can be a great opportunity to have good advertisements and more clients.

Eleanor: It's Saturday afternoon and Eleanor and her friends are deciding where to have dinner in the evening. They are having a little bit of back and forth because they cannot decide on any restaurant for one reason or another. This is not the first time that something like this has happened, it is always hard to find a new place that makes everyone happy and that has a menu also for her. Indeed, last time they went to dinner she could not order anything from the menu and this really frustrated her. Also her friends were clearly sorry about what happened because they chose the place. Eleanor would love to know in advance which restaurants have a menu suitable for her to avoid this kind of situation in the future.

Patrick: It's Thursday morning and Patrick is using his morning off to buy food and drinks for the party with his friends that he is hosting on Friday night. It has been several months since they had a proper party so he wants everything to be as perfect as possible. Among the friends that he invited he knows that there are two that have some intolerances. He obviously wants to avoid making them sick but still he wants to have something that they can eat without them having to bring it themselves. So he starts to read the labels of each product that he is buying to check one by one the ingredients. This operation takes a lot and Patrick loses a lot of his free time. For future events Patrick would love to have something that could speed up this process.

Methods and Protocols:

To better define the requirements, we prepared a survey to gather information about expected users. The following questions were proposed to an audience to quickly collect quantitative data from a large number of users. The distribution was online (<https://forms.gle/PUX78EsbpzwvdHTa9>).

We also did some interviews in order to understand more about potential users. This let us extrapolate unexpected information leaving room for new ideas.

Questionnaire:

In order to collect data we published a questionnaire, 143 people answered it. Most of them (54.5%) are 22-35 years old, 31.5 % are 36-65 years old, 7.7% are 14-21 years old, 5.6 % older than 66 years old and final 0.7% are younger than 13 years old. Most of them have a high school degree or higher degree (92.3%) and the others have a lower degree.

92.3% of the answers (132 answers) are from people who don't own a restaurant. Of this subgroup:

- 62.1% people don't eat some kind of food; The main reasons are: taste preferences (75.9%), a food allergy or intolerance (20.4%), health reasons (9.6%), for ethical reasons (6%) and for other reasons (1.2%).
- Even if 37.9% do not have any kind of problem with food, we still believe that most of them could find a use in our app since a high percentage (64.4%) knows someone with dietary restrictions.
- 33.3% go to a restaurant at least once a week, 28% of them 2-3 times a month and the others once a month or less.

- a big percentage (33.8%) had problems understanding what they could eat from the menu at least once in their life, as we expected sometimes it is not very easy to distinguish what you can order and our app could help with that.
- the majority (87.1%) do grocery shopping at least once a week and 69.7% of the subgroup do grocery shopping also for people with dietary restrictions. This confirms once again that a big part of the population has to deal with this problem and our app could help in facing these kinds of situations.
- only 19.7% of 132 never check the ingredients of the products they buy and 48.5% of them do it often or always.
- regarding the two main functionalities of our app, 10.6% think that an app to let them know the ingredients of a product is not very useful. More or less the same percentage (9.8%) think that it is not useful either an application that lets you see menus of restaurants filtered by dietary restrictions.
We believe that these data are related to the fact that some of the answers come from older people that may not be accustomed to technologies. However, the big majority of the population would find it helpful to have a filtered menu and would use our app to check ingredients of a product. This may be the consequence of experiences lived in real life.

The remaining 7.7% (11 answers) came from restaurant owners or managers, so we asked questions about their experience. In this subgroup:

- 63.6% have an online menu, suggesting that most of them would not have problems in having their menu on the web.
- 45.5% do not have allergens on their menu. This shows that there is the necessity of using our application.
- 63.6% have vegan and gluten free options, telling us that they are most likely open to such innovation.
- Almost half of them, 45.5%, have issues in satisfying customers' needs and 90.9% received some kind of complaint about it even if their waiters are able to answer questions about dishes ingredients (72.7%).
- To conclude, 81.8% would sign in to an app that lets their customers see the menu filtered by their needs.

Interviews:

We did interviews to have direct communication with potential users. The complete transcriptions are reported here:

Interview #1

Interviewer: Hi! Can I ask you some questions for the course of "Human Computer Interaction" at "La Sapienza University of Rome"? I'll explain our idea better: we want to design an app that helps people with dietary restrictions to find out if a product from the supermarket is suitable for them or if they can eat a dish at a restaurant.

Person#1: Yes, Sure!

Interviewer: What is your name?

Person#1: Eleonora

Interviewer: How old are you?

Person#1: 22 years old

Interviewer: What is your higher degree?

Person#1: High school

Interviewer: What's your current occupation, are you studying or working?

Person#1: I'm studying energetic engineering.

Interviewer: After these general questions we can go to specific questions about our application. First of all, are there any foods you do not eat?

Person#1: I cannot eat foods containing gluten, lactose and yeast. Moreover I should avoid eggplants, bell peppers, peppers, chili peppers, chocolate, fatty meat and strawberries.

Interviewer: Why you cannot eat them?

Person#1: For health reasons.

Interviewer: I feel you, I must avoid some foods too. How many times do you manage to go to the restaurant?

Person#1: Very rarely, mostly when I go out with friends.

Interviewer: In the few times you go, do you manage to find suitable dishes in the menu or do you need to request special dishes to have something to eat?

Person#1: Usually I find something I can eat but most of the time I have to make special requests to understand if in the making of the dish they use foods that can hurt me.

Interviewer: Regarding your alimentary routine at home, how many times do you go grocery shopping? Do you need to go searching in different shops?

Person#1: Usually I go once a week and to find all I need I have to visit at least three different shops.

Interviewer: When you go grocery shopping, do you buy food only for you or also for your whole family?

Person#1: I shop for everyone.

Interviewer: Do you usually check the ingredients of the products you buy?

Person#1: Yes, I do it every time.

Interviewer: Now we can go to questions about the real content of our application.

There are some applications that help checking ingredients and allergens of the products. Do you use any of them?

Person#1: No

Interviewer: Our application lets you scan the barcode of a product to know its ingredients and filters restaurant menus based on your dietary needs. Would it help you?

Person#1: Yes, especially the second functionality. In grocery shops it is easier to check the ingredients of a product because they are listed on the label, while in restaurants it is not always easy to know the ingredients of a dish.

Interviewer: After having understood all the advantages of our application, what do you think of it?

Person#1: Your application will be useful because it will save me time in having a clear idea of what I can and cannot eat.

Interviewer: Do you have any suggestions to help us develop our application?

Person#1: Do not limit the list of ingredients in the one usually excluded, like gluten and lactose, but consider all the other dietary needs. Anyway, it is a great idea!

Interviewer: We'll consider everything you told us, both suggestions and issues.

Thank you for your time!

Person#1: Thank you!

Interview #2

Interviewer: Hi! Can I ask you some questions for the course of "Human Computer Interaction" at "La Sapienza University of Rome"? I'll explain our idea better: we want to design an app that helps people with dietary restrictions to find out if a product from the supermarket is suitable for them or if they can eat a dish at a restaurant.

Person#2: Yes, Sure!

Interviewer: What is your name?

Person#2: Andrea

Interviewer: How old are you?

Person#2: I am 22 years old

Interviewer: What is your higher degree?

Person#2: Bachelor degree

Interviewer: What's your current occupation, are you studying or working?

Person#2: I'm doing a master degree.

Interviewer: After these general questions we can go to specific questions about our application. First of all, are there any foods you do not eat?

Person#2: Yes, unluckily. I cannot eat foods containing gluten and lactose.

Interviewer: I feel you, I must avoid some foods too. How many times do you manage to go to the restaurant?

Person#2: Usually two or three times a week, because I learnt to find the right restaurants.

Interviewer: When you go, do you manage to find suitable dishes in the menu or do you need to request special dishes to have something to eat?

Person#2: Usually when I choose the place I do not have problems, while when someone invites me I have difficulties in finding something I can eat. Most of the time I need to ask a waiter but they do not always answer correctly.

Interviewer: Regarding your alimentary routine at home, how many times do you go grocery shopping? Do you need to go searching in different shops?

Person#2: Twice a week. I go both in normal shops and specialized shops.

Interviewer: When you go grocery shopping, do you buy food only for you or also for your whole family?

Person#2: I do it for my whole family.

Interviewer: Do you usually check the ingredients of the products you buy?

Person#2: I check them carefully every single time.

Interviewer: Now we can go to questions about the real content of our application. There are some applications that help checking ingredients and allergens of the products. Do you use any of them?

Person#2: I tried downloading some of them but none of them really satisfied me.

Interviewer: Do you think it would be helpful having an application that has more functionalities with respect to the ones already on the market?

Person#2: Yes, it would be really helpful.

Interviewer: Our application lets you scan the barcode of a product to know its ingredients and filters restaurant menus based on your dietary needs. Would it help you?

Person#2: Sure, it would make my life easier and it would help me avoid the errors I sometimes make.

Interviewer: After having understood all the advantages of our application, what do you think of it?

Person#2: I cannot wait until it becomes real to use it. I think it will be really hard to involve all the restaurant owners but I would be more conscious about what I am ordering.

Interviewer: Do you have any suggestions to help us develop our application?

Person#2: A critical point is being trusted by the customers of your application. I learnt not to trust waiters and cooks because it happened to me that they were not informed about allergies and offered me not suitable dishes. You should do routine checks to be sure the ingredients listed in your app are really the ones in the dish.

Interviewer: We'll consider everything you told us, both suggestions and issues.

Thank you for your time!

Person#2: Thank you!

Interview #3

Interviewer: Hi! Can I ask you some questions for the course of "Human Computer Interaction" at "La Sapienza University of Rome"? I'll explain our idea better: we want to design an app that helps people with dietary restrictions to find out if a product from the supermarket is suitable for them or if they can eat a dish at a restaurant.

Person#3: Yes, Sure!

Interviewer: What is your name?

Person#3: Giovanna

Interviewer: How old are you?

Person#3: 42 years old

Interviewer: What is your higher degree?

Person#3: Bachelor degree

Interviewer: What's your current occupation, are you studying or working?

Person#3: I'm the owner of a restaurant.

Interviewer: Wow! What's the name of the restaurant?

Person#3: Pizza for you

Interviewer: I can't wait to go there! After these general questions we can go to specific questions about our application. Do you have only a paper menu or also an online one?

Person#3: I also have an online one. My restaurant is trendy especially among young people. They usually check the menu online.

Interviewer: Does your menu contain the list of allergens for every dish?

Person#3: Yes, obviously.

Interviewer: Regarding vegetarians and vegans, do you have dishes that can satisfy their needs?

Person#3: Yes, I care a lot about offering a good experience to everyone in my shop.

Interviewer: Did it ever happen to you to satisfy specific dietary needs?

Person#3: Yes, more times. Not only vegetarians and vegans but also people that for health reasons cannot eat specific foods.

Interviewer: Have you ever had complaints from customers regarding their specific dietary needs?

Person#3: No, luckily. I always try to have a dynamic menu which changes often based on seasonality, trends and the suggestions that I always get from customers.

Interviewer: Are your waiters ready and available to answer questions about ingredients of your dishes?

Person#3: Yes, every week we do a meeting to keep them updated on the ingredients of every dish.

Interviewer: Do you think an application that could filter your menu based on the dietary needs of a customer would be helpful?

Person#3: Yes, it would help the waiters save time and it would also make my customers more safe.

Interviewer: Do you have any suggestions to help us develop our application?

Person#3: It should be easy to change the menu and the ingredients in the app as I change them really often.

Interviewer: We'll consider everything you told us, both suggestions and issues.

Thank you for your time, we'll surely come to visit you at your restaurant!

Person#3: Thank you!

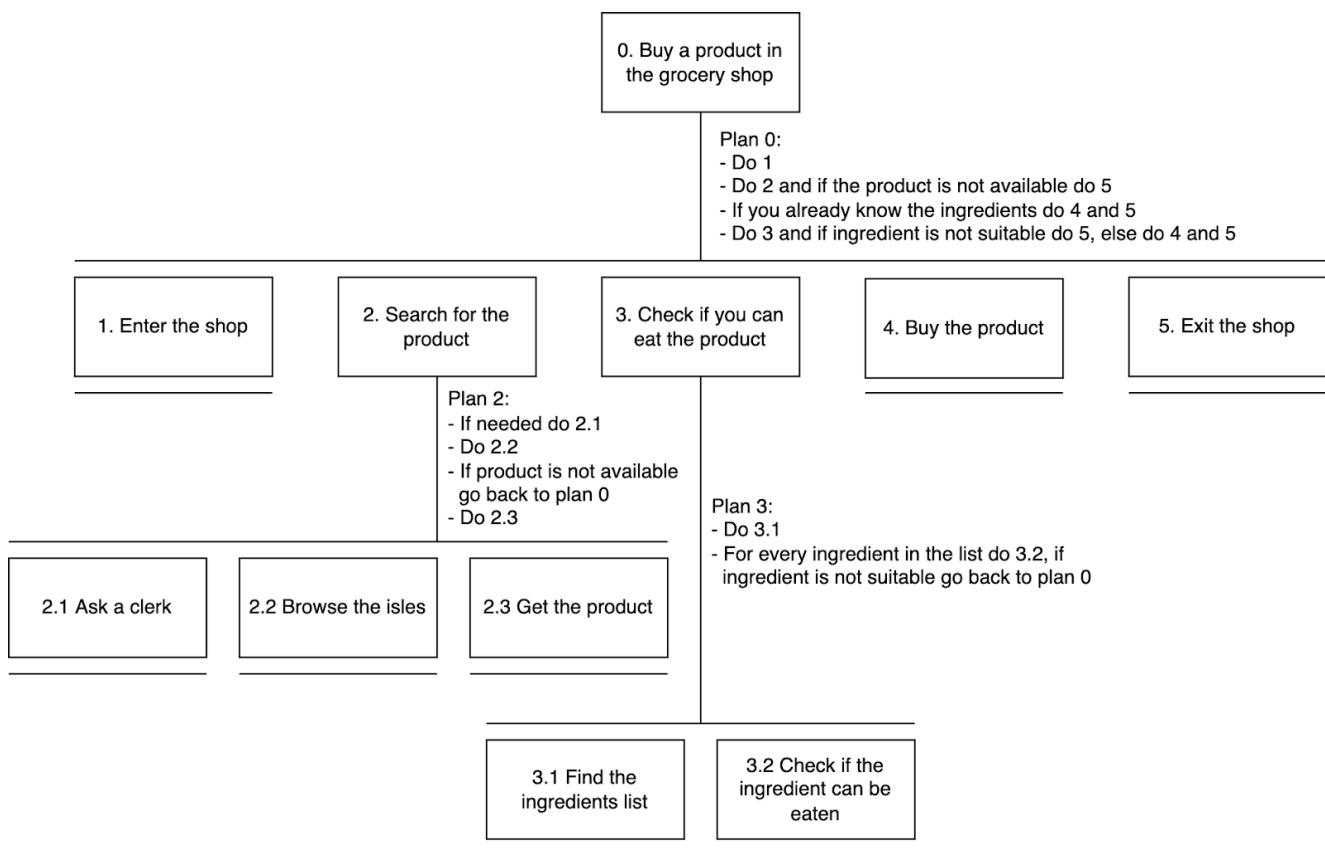
Findings:

A main point we found out is the necessity of having updated menus and ingredients. The customers with serious allergies and intolerances have more difficulties in trusting the information contained in an application. To cope with this newly discovered information, the content of the application should be checked periodically by some experts directly on the field.

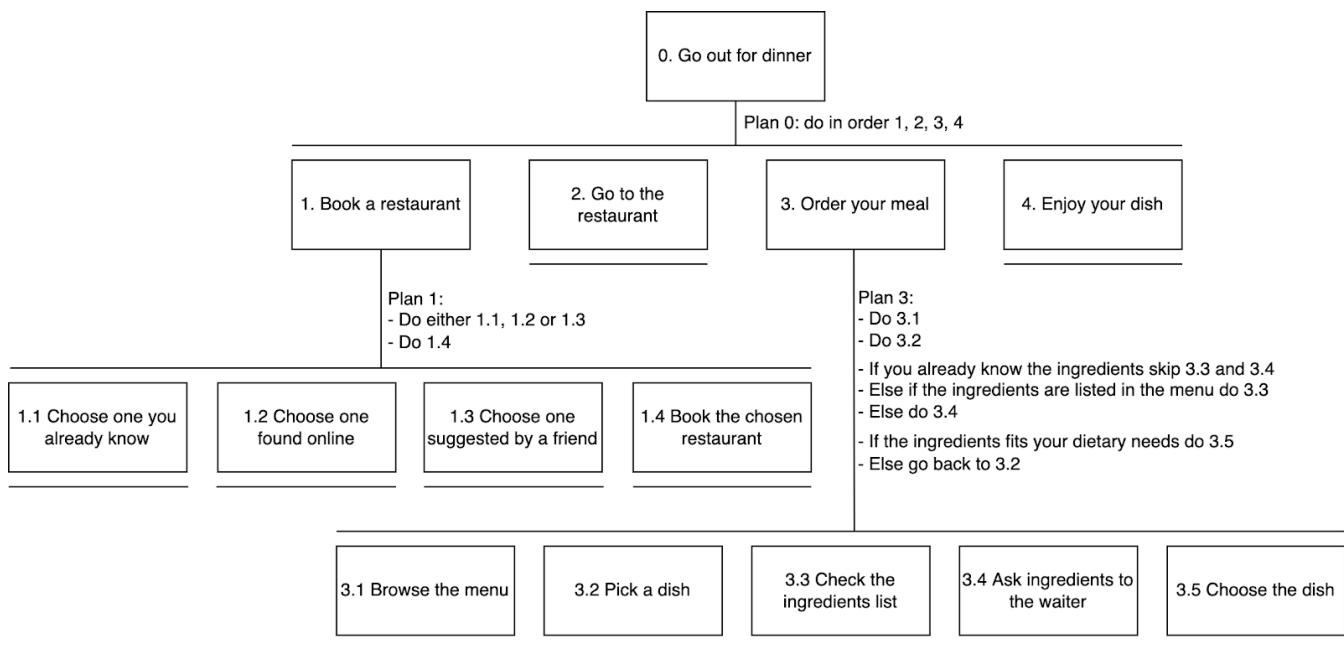
Hierarchical Task Analysis:

Using HTA we can understand the tasks performed by users in order to achieve certain goals. We analyzed the user behavior with respect to two main goals that our application will support the user in:

Buy a product in the grocery shop



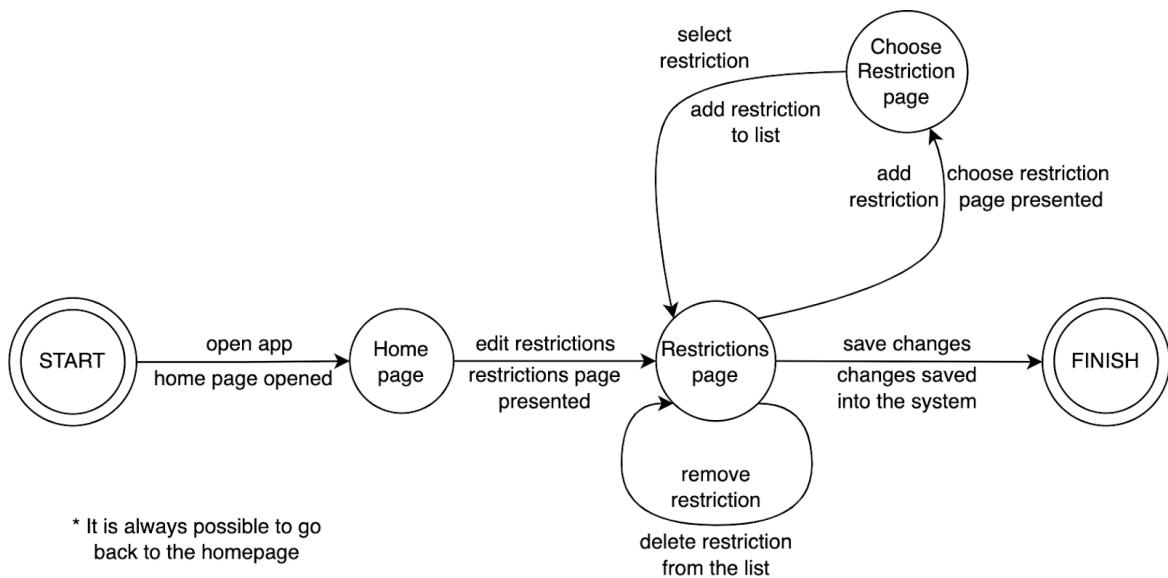
Go out for dinner



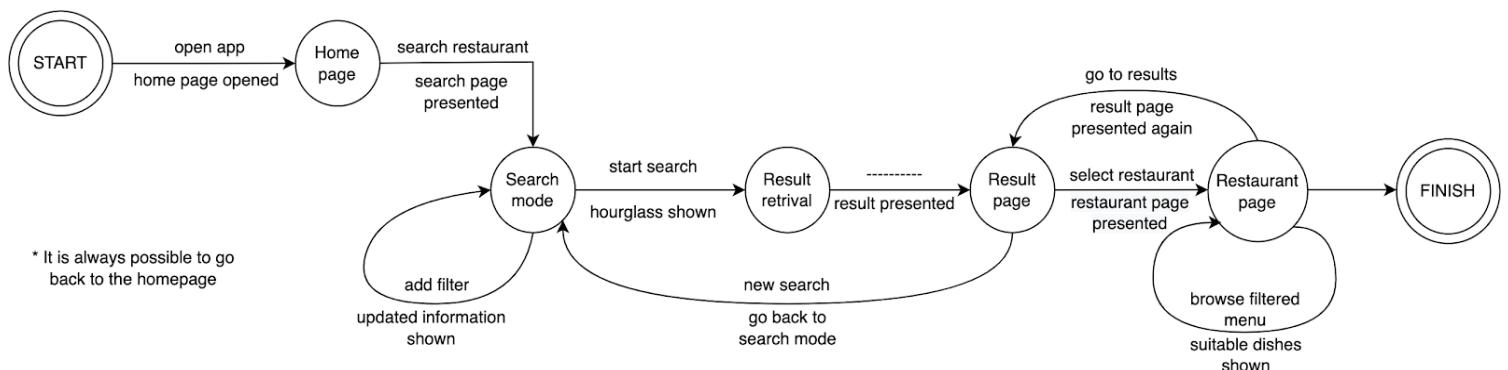
State Transition Networks:

Using STN we developed the interaction between the user and our system. In particular, we focused on those interaction needed to perform the following actions:

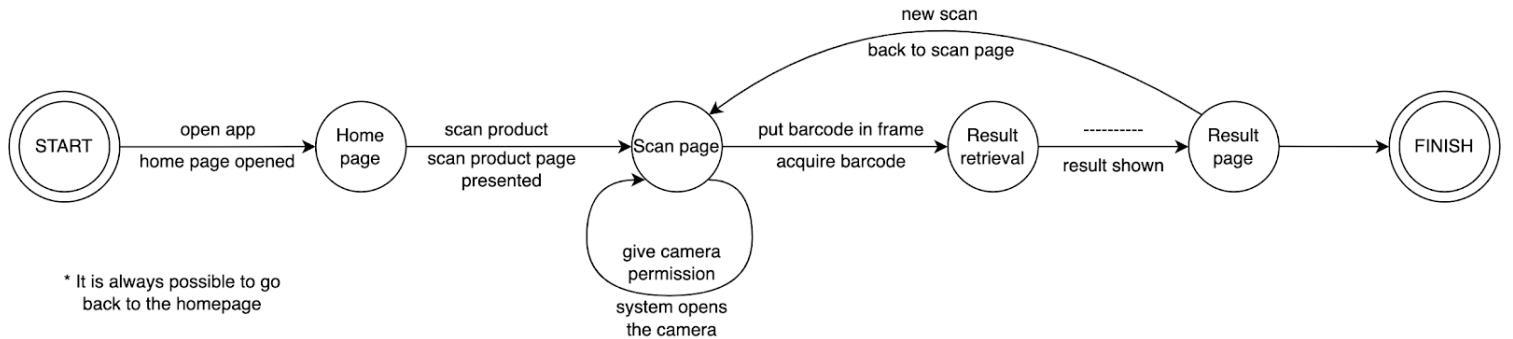
Edit restriction



Search restaurant



Scan product

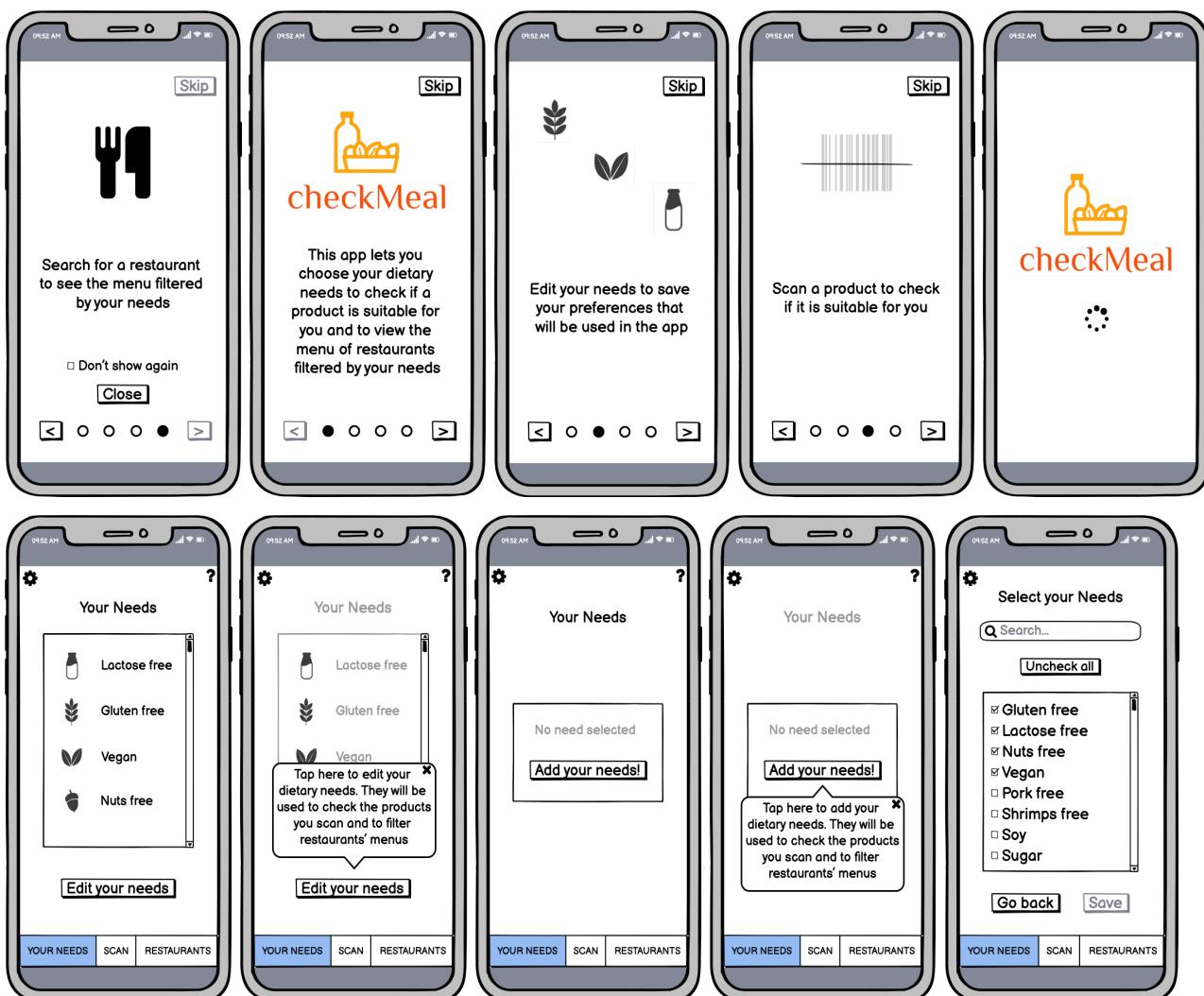


Expert evaluation:

We made mockups of our application and developed the flow of actions to complete some tasks with our app.

Then, we asked an expert to evaluate the user interface we were developing.

Mockups:







Cognitive walkthrough:

We sent the expert the user profile and the following tasks:

- Task 1: Edit your dietary restriction to remove “gluten free” and to add “lactose free” and “vegan”.

Act. 1: Click on the button “YOUR NEEDS” in the button bar.

Resp. 1: Display moves to “Your needs” page.

Act. 2: Click on the button “Edit your needs”.

Resp. 2: Display moves to “Select your needs” page.

Act. 3: Click on the search bar.

Resp. 3: The keyboard is shown and a flashing cursor appears in the search field.

Act. 4: Type “g”.

Resp. 4: System shows only the restriction starting with letter “g”.

Act. 5: Uncheck the “gluten free” checkbox.

Resp. 5: The checkbox near the “gluten free” option becomes unchecked.

Act. 6: Click on the “X” in the search bar.

Resp. 6: All the options are shown.

Act. 7: Click on the “lactose free” checkbox.

Resp. 7: The checkbox near the “lactose free” option becomes checked.

Act. 8: Click on the “vegan” checkbox.

Resp. 8: The checkbox near the “vegan” option becomes checked.

Act. 9: Click on the button “Save”.

Resp. 9: Display shows a popup informing that the needs have been successfully saved.

Act. 10: Click on “Close” in the popup.

Resp. 10: Display moves to “Your needs” page which shows the updated needs.

- Task 2: Check if “Tortellini rana meat 250g” is suitable for a user, given that he has to eat “lactose free” and “vegan”, and read the ingredients.

The user must have included in its dietary needs the options “lactose free” and “vegan”.

Act. 1: Click on the button “SCAN” in the button bar.

Resp. 1: Display moves to “Scan” page and opens a popup asking for camera permission.

Act. 2: Click on the button “Grant” inside the popup.

Resp. 2: The system opens the camera and shows the image inside the frame.

[This action must be performed only the first time the SCAN functionality is used.]

Act. 3: Put the barcode of the product inside the frame.

Resp. 3: Display shows a popup indicating that the product is not ok.

Act. 4: Click on the button “Ingredients”

Resp. 4: Display shows a page containing all the ingredients of the product scanned.

- Task 3: View the menu of the restaurant “Foodoo” (which provides dinner and has low price) filtered by “lactose free” and “vegan” restrictions.

The user must have included in its dietary needs the options “lactose free” and “vegan”.

Act. 1: Click on the button “RESTAURANTS” in the button bar.

Resp. 1: Display moves to “Restaurants” page.

Act. 2: Check the “Dinner” option.

Resp. 2: The circle near the “Dinner” option becomes filled.

Act. 3: Check the “€” option in the price section.

Resp. 3: The circle near the “€” option becomes filled.

Act. 4: Click on the button “Search”.

Resp. 4: Display shows a loading page for some time and then lands on the result page.

Act. 5: Scroll the list searching for Foodoo and then click on it.

Resp. 5: Display shows the restaurant page containing general information and the filtered menu.

Results:

Task 1 - Action # 3

Question: Is the effect of the action the same as the user’s goal at that point?

Answer: I think no. I assume the user will not look for search as the first option.

Task 2 - Action # 1

Question: Once users have found the correct action, will they know it is the one they need?

Answer: If the user is not familiar with the possibility to scan code could be in trouble. I assume he/she will look for something that refers to “check meal” or ingredients.

We addressed the first comment by also keeping the possibility to search for restrictions by simply scrolling the list which is presented to the user. For the second comment we performed a controlled experiment to choose the right label for that function. The results can be found later in this document.

Heuristic evaluation:

We sent the expert the user profile, together with the mockups and a brief explanation of the system purpose:

“Mobile application that allows users to add their dietary needs, check if a product is suitable for them and view the menu of restaurants filtered by their needs.”

Frame	Heuristic Violated	Severity	Description - Comment
Camera popup	Consistency and standards	2	Answers are often pairs. The answer No goes with the opposite Yes (in this case you put Grant).
Filtered menu	Recognition rather than recall	2	Put a easy way to associate symbols to restrictions (for example = Gluten free)

Severities:

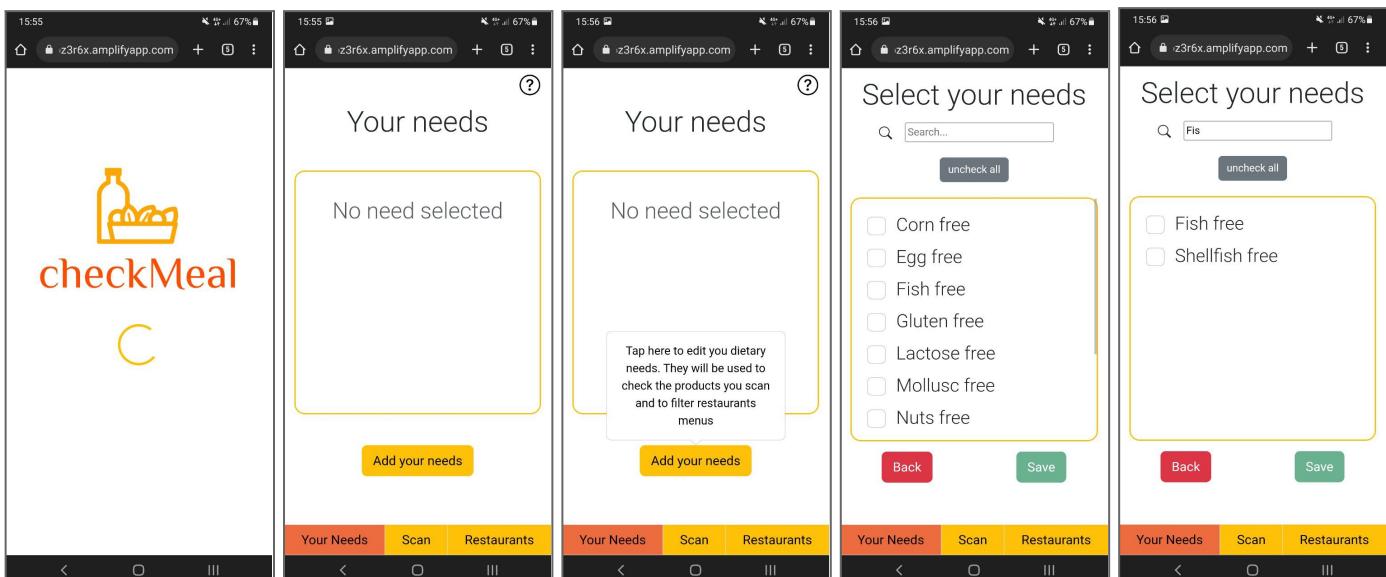
- 0 = I don't agree that this is a usability problem at all
- 1 = Cosmetic problem only
- 2 = Minor usability problem
- 3 = Major usability problem
- 4 = Usability catastrophe

Regarding the first comment, we discovered we had no control over the popup asking for camera permission. Indeed, the labels are set by the operating system that is installed in the user device.

For the second comment we decided to add a legend which can be opened from the menu page. This legend associates every symbol to the relative restriction.

Prototype:

Starting from the mockups and keeping into account the comments received from the expert evaluation, we developed a prototype of the application. Here are some screenshots:



1. Select your needs

2. Your needs

3. Your needs

4. Scan a barcode to know if the product is suitable for you!

5. Scan a barcode to know if the product is suitable for you!

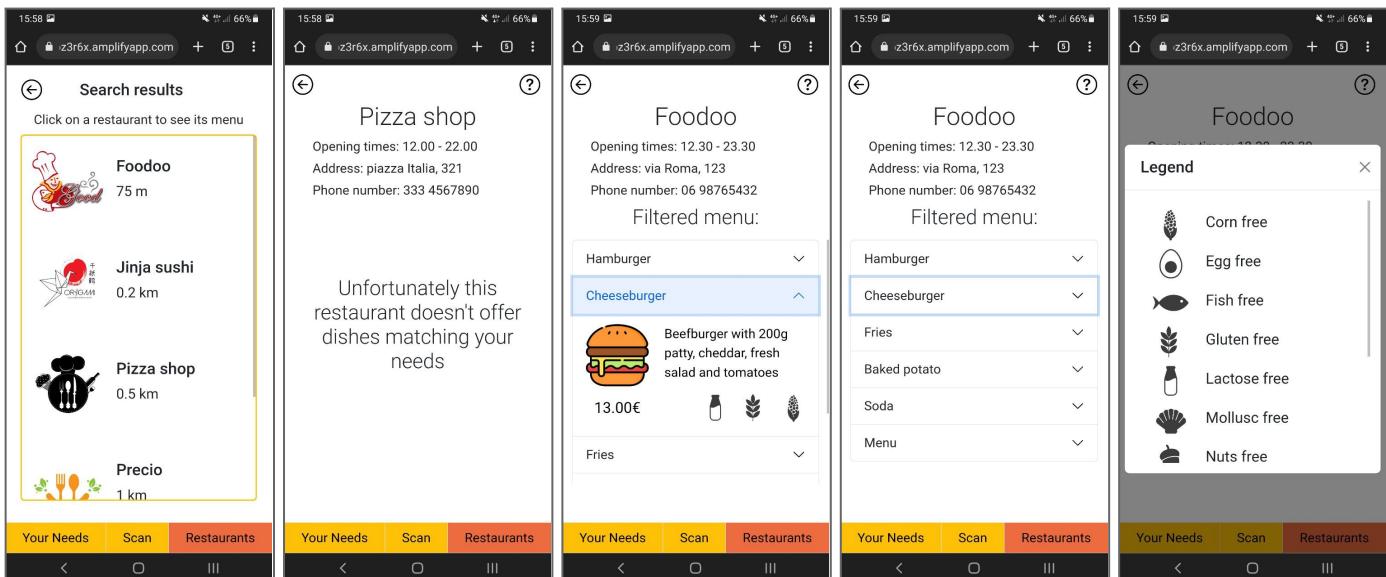
6. Rice flora

7. Rice flora

8. Tortellini Rana 250g

9. Search a restaurant!

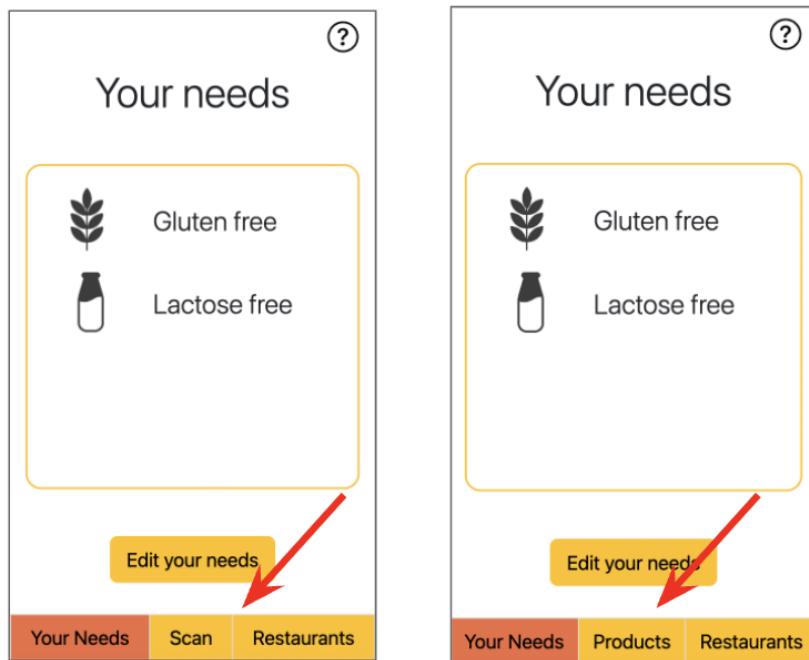
10. Search a restaurant!



User evaluation:

We used the prototype in order to test our application with real users. We did different types of experiments.

Controlled experiment 1:



Task: check if "Rice Flora" is suitable for you, considering that you need to eat gluten free and lactose free.

Hypothesis: the number of errors done by the user while carrying out the task will be smaller if the function is labeled "Scan" than if the function is labeled "Products".

Independent variable: label of the “scan a product” function

Dependent variable: number of errors occurred while performing the task

The number of errors was incremented each time the user pressed a button he was not supposed to press.

We performed the experiment in person, to give a more concrete feel to the user. We had two groups of six people. Each member of a group performed the task using only one of the two options for the interface.

# errors	
Scan	Products
0	4
2	3
1	3
0	2
1	4
3	1

Groups	Count	Sum	Average	Variance
Scan	6	7	1.17	1.37
Products	6	17	2.83	1.37

Source of Variation	SS	df	MS	F	P-value	F crit
Between groups	8.33	1.00	8.33	6.10	0.03	4.96

F > F crit

We confirmed our hypothesis

Controlled experiment 2:

The figure consists of two side-by-side screenshots of a mobile application interface for a restaurant named "Foodoo".

Left Screenshot: Shows the main restaurant information: "Foodoo", "Opening times: 12.30 - 23.30", "Address: via Roma, 123", and "Phone number: 06 98765432". Below this is a "Filtered menu:" section. The "Hamburger" item is expanded, showing a picture of a burger, the description "Classic beefburger with 200g patty, fresh salad and tomatoes", the price "11.00€", and three small icons representing different dietary options. Other items like "Cheeseburger" and "Fries" are shown below with a dropdown arrow. At the bottom are buttons for "Your Needs", "Scan", and "Restaurants".

Right Screenshot: Shows the same main information but with a "Filtered menu:" section placed directly above the expanded "Hamburger" item. The rest of the interface is identical to the left screenshot.

Red arrows indicate a comparison between the two screens, specifically pointing from the "Go back to result page" button in the left screenshot to the back arrow icon in the right screenshot, and vice versa.

Task: Search for restaurants, read the menu of “Foodoo” and then the menu of “Pizza shop”.

Hypothesis: the time needed by the users to recognize the icon to go back is less than the one to recognize the written text.

Independent variable: button to go back to the previous page

Dependent variable: time needed by users to perform the task

The timer was started at the beginning of the task and was stopped as soon as the user terminated it. The task was structured to lead the users to press the “go back” button.

We performed the experiment in person, to give a more concrete feel to the user. We had two groups of six people. Each member of a group performed the task using only one of the two options for the interface.

Time	
Text	Icon
27	39
29	26
21	26
38	18
17	27
20	24

Groups	Count	Sum	Average	Variance
Scan	6	152	25.3	58.7
Products	6	160	26.7	47.1
ANOVA				
Source of Variation	SS	df	MS	F
Between groups	5.33	1.0	5.33	0.10
				0.76
				4.96

F < F crit We reject our hypothesis

Think aloud:

We performed three think alouds. The videos can be found in the google drive folder submitted together with this document.

Experiment 1:

From this experiment we did not discover any major issue.

Experiment 2:

This experiment highlighted a vulnerability of our user interface, in particular regarding restaurants without suitable dishes. After having discussed the

transcription of the experiment, the user told us he thought some errors occurred. When opening a restaurant page and not finding any dishes, he didn't understand the issue was due to his dietary needs.

Experiment 3:

From this experiment we did not discover any major issue.

Cooperative evaluation:

We performed three cooperative evaluations. The videos can be found in the google drive folder submitted together with this document.

Experiment 1:

From this experiment we confirmed the findings of the second think aloud. Indeed, the user got confused when there was no suitable dish for him in the restaurant menu and did not know what to do. Users are prone to think some kind of system error occurred and not that the absence is due to their needs.

Experiment 2:

From this experiment we discovered an issue when the user has to search for restaurants. After having chosen the filters, the user pressed on the "restaurants" button instead of the "search" button.

Experiment 3:

From this experiment we did not discover any major issue.

Incidents:

Priority 1 high 4 low	Description	How it was found	Good or Bad	Potential solution
3	The user could not understand that a restaurant didn't have dishes suitable for him.	The user selected four needs and he searched for restaurants. From the results page he chose a restaurant which did not have any dishes suitable for him.	Bad	Highlight the message "Unfortunately this restaurant doesn't offer dishes matching your needs." and add the message "Try searching for a different restaurant"
2	The user could not search for restaurants	After having chosen the filters, the user pressed on the "restaurants" button instead of the "search" button.	Bad	Add a help message which suggests the user to press on the search button to view the list of restaurants.

Solutions:

Incident 1:

We added a message saying "Try searching for a different restaurant" in the page of restaurants with empty menus. In this way the user is encouraged to proceed in searching for a different restaurant and not getting stuck.

Incident 2:

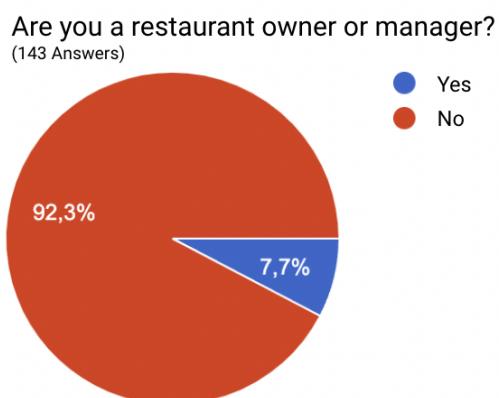
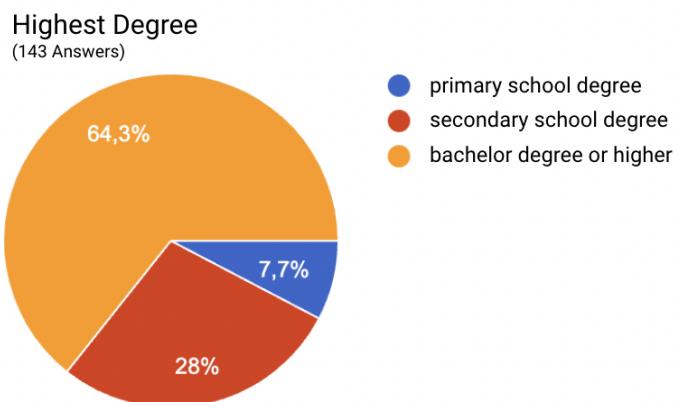
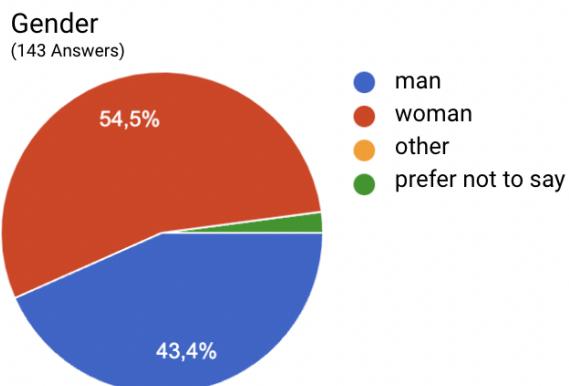
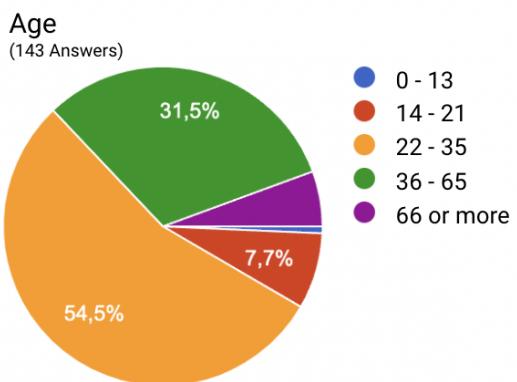
We added a help message which suggests the user to press on the search button to view the list of restaurants.

Final Prototype:

The final mobile web application can be found at
<https://dev5860.d1thbvtbbz3r6x.amplifyapp.com/>

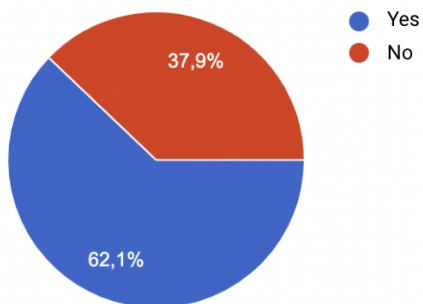
Appendix - Questionnaires Results:

General Informations:

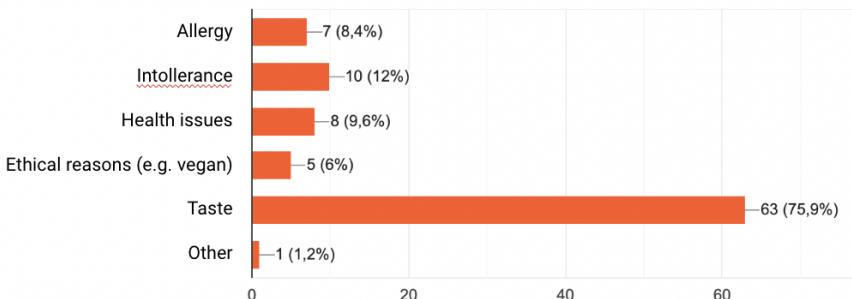


Customer:

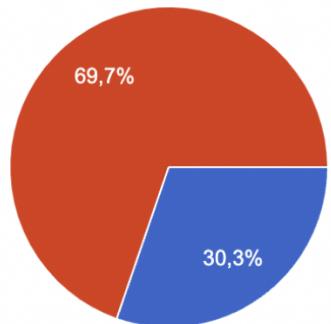
Is there any food you do not eat?
(132 Answers)



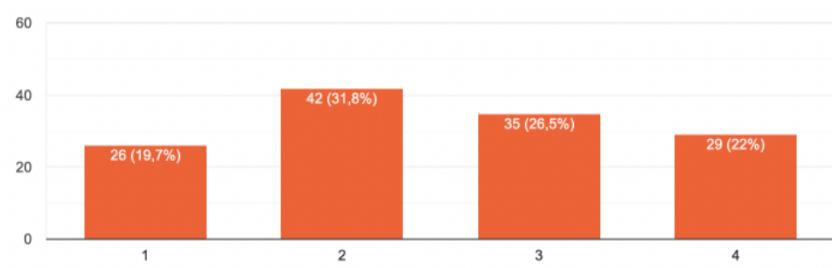
If you answered yes, what are the reasons?
(83 Answers)



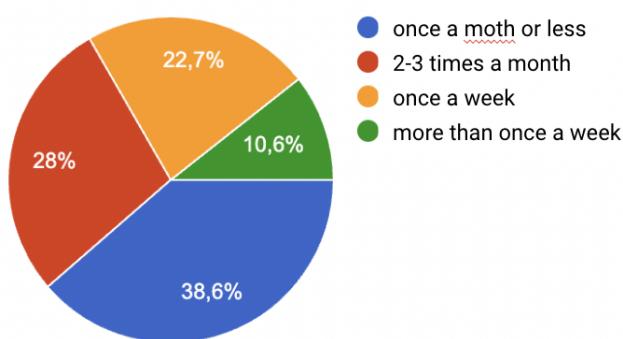
Do you usually do grocery shopping for people having dietary restrictions?
(132 Answers)



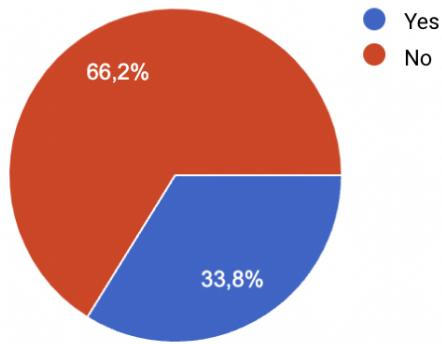
How often do you check the ingredients of the products you buy?
(132 Answers)



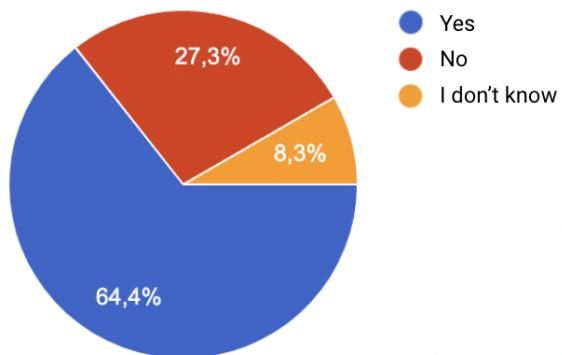
How often do you go to restaurants?
(132 Answers)



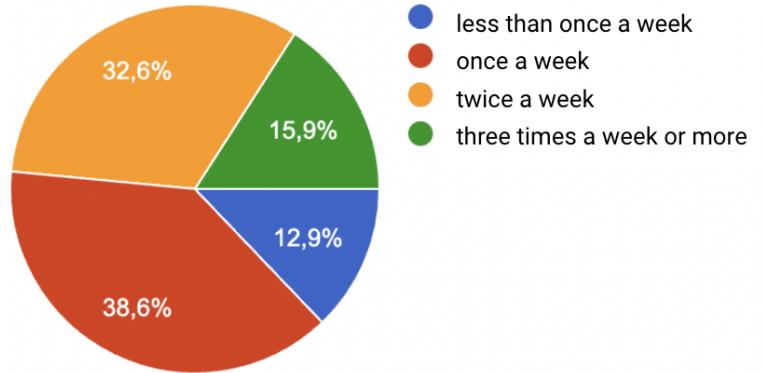
Have you ever had problems in understanding what you could eat at a restaurant?
(132 Answers)



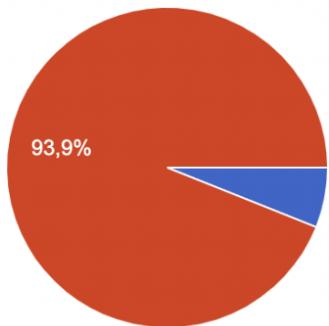
Do you have any friend or relative with dietary restrictions?
(132 Answers)



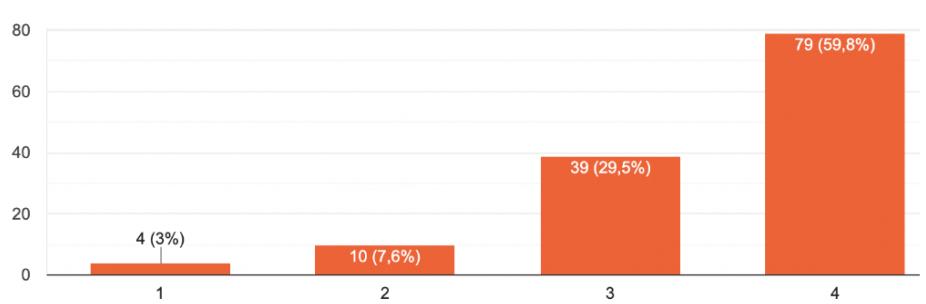
How often do you go grocery shopping?
(132 Answers)



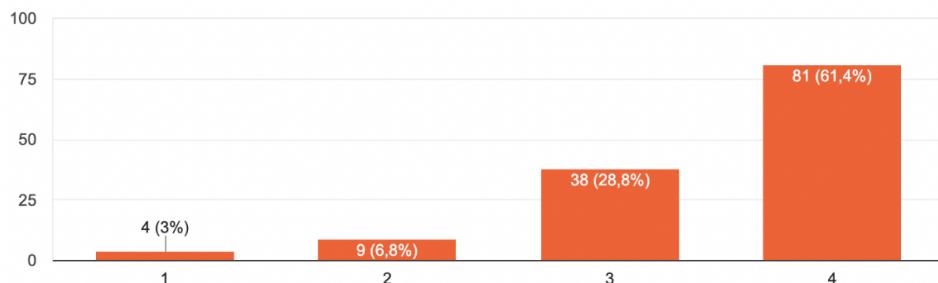
Do you have any app that helps you check for ingredients or allergens (e.g. MyCIA, Yuka, FoodIsGood etc.)?
(132 Answers)



How much do you think an application that lets you scan a barcode to know the ingredients of a product would be useful?
(132 Answers)

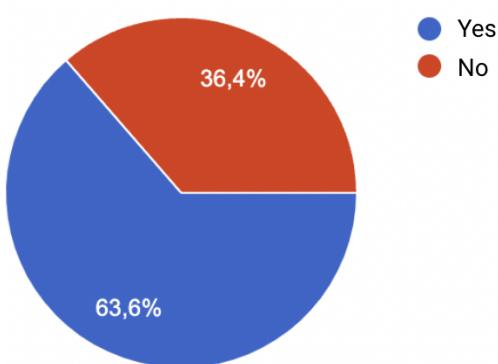


How much do you think an application that lets you see the menus of restaurants filtered by dietary restrictions would be useful?
(132 Answers)

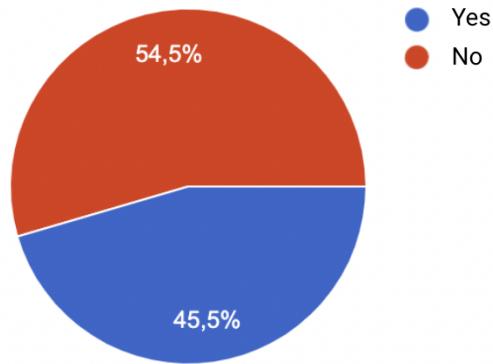


Restaurant Owner:

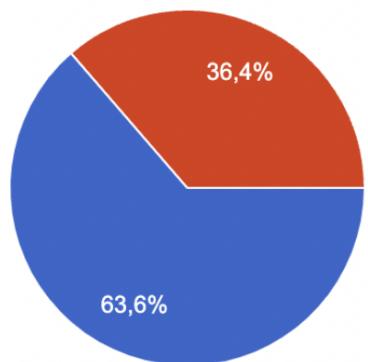
Do you have an online menu?
(11 Answers)



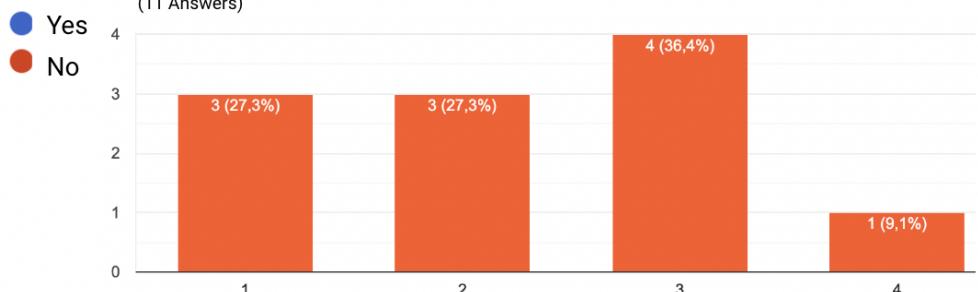
Does your menu includes the list of allergens for every dish?
(11 Answers)



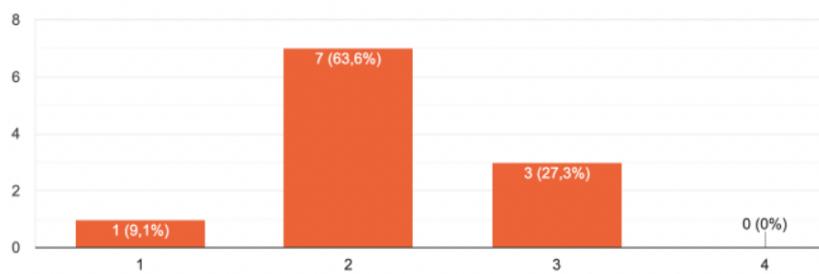
Do you have gluten free or vegan options?
(11 Answers)



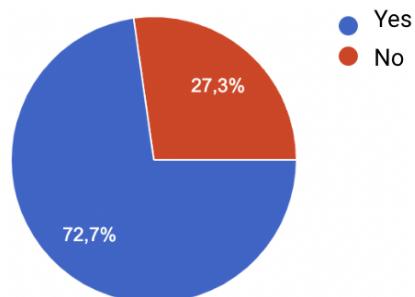
How often do you have problems in satisfying customers with specific dietary needs? (e.g. food allergies, vegan and vegetarian diets, ...)
(11 Answers)



How often do you receive complaints from customers regarding dietary needs?
(11 Answers)



Are your waiters ready to answer questions about ingredients of the dishes in the menu?
(11 Answers)



Would you join an application that lets the customers see your menu filtered by their dietary needs?
(11 Answers)

