VILNIUS UNIVERSITY
FACULTY OF MATHEMATICS AND INFORMATICS
SOFTWARE ENGINEERING

Nutrition and Synchronization App

Klaidas Sinkevičius
Pijus Zlatkus
Vadim Čeremisinov
Deividas Baltuška

Vilnius
2023

Table of Contents

1. Introduction

1.1. Project titles

1.1.1. Full

Nutrition and Synchronization App

1.1.2. Short

NutriSync

1.2. Problem statement

In today's digital age, a significant number of health-conscious individuals, including athletes and busy professionals, are leveraging technology to achieve their fitness and dietary goals. While smart devices and applications such as Strava, Garmin, Google Health, and Apple Health offer insights into one's activity levels, a disconnect persists in aligning these insights with the dietary provisions in one's fridge. This misalignment manifests when they find their refrigerators either overstocked or lacking essential items tailored to their real-time nutritional needs. Consequently, individuals often find themselves making hasty grocery orders, leading to financial inefficiencies by either purchasing items at non-optimal prices or incurring frequent delivery charges. This challenge emerges due to the lack of an integrated system capable of harmonizing the data from fitness activities with real-time dietary stock, ensuring both health optimization and financial prudence. Addressing this disconnect is crucial, not just for the individual's well-being and financial health, but also to fully harness the potential of technological integrations in modern living.

2. User needs analysis

2.1. Expectations of the stakeholders

2.1.1. Primary users

2.1.1.1. Health-conscious individuals & Fitness Enthusiasts:

They will use NutriSync daily to monitor their food stocks, get recommendations tailored to their physical activities, and ensure that their dietary needs are in line with their fitness goals.

2.1.1.2. Online Grocery Shoppers:

Regular users of online grocery platforms will use the application to optimize their shopping lists and automate their order processes based on real-time needs.

2.1.1.3. Intentions

To have a seamless and efficient grocery management system that ensures their dietary needs are consistently aligned with their fitness goals.

2.1.2. Secondary users

2.1.2.1. Dieticians and Nutritionists:

They may analyze activity and consumption statistics to provide better dietary recommendations.

2.1.2.2. Family Members or Roommates

Individuals who might occasionally input information or use the system outputs, such as system-generated grocery lists, reports, or notifications about the stock status.

2.1.2.3. Intentions

To support primary users in their goals, understand patterns, and make informed decisions or recommendations.

2.1.3. Business Owners and Managers

They expect the application to increase sales by ensuring that user orders are frequent and tailored. Fitness App Providers (e.g., Strava, Garmin, etc.) might expect an increase in the usage of their platforms, as users would want more accurate dietary recommendations.

2.1.3.1. Intentions

To see a boost in user engagement, sales, and overall brand loyalty. They would invest in the system with the expectation that, for instance, sales might increase by at least 10% due to tailored and frequent orders.

2.1.4. Competitors

2.1.4.1. Traditional Grocery Apps

Apps that simply allow users to order groceries without any smart integrations like Barbora, Bolt, Wolt and Walmart. Other Fitness & Health Apps like Strava, Google Health and Apple Health: Apps which provide health insights but don't have the fridge and grocery integration.

2.1.4.2. Intentions

They will be observing the success of NutriSync and might be motivated to offer similar or better experiences to retain their user base.

2.1.5. Maintainers

2.1.5.1. NutriSync Team

Our team is going to maintain and continue the development of the platform without any additional help from other companies. We will work on the regular updating, troubleshooting, and maintenance of the NutriSync application to ensure smooth user experience.

2.1.5.2. Intentions

To ensure the application runs flawlessly, integrating feedback and ensuring any issues are promptly addressed.

2.2. Current Users' Activities

2.2.1. Primary User Group: Health-conscious individuals & Fitness Enthusiasts

2.2.1.1. Morning Routine

Jane, age of 20, starts her day with a morning run, tracked by her Garmin device. After her workout, she checks her Samsung Family Hub fridge and finds she's out of yogurt and bananas for her smoothie. Instead of making a mental note, the fridge suggests a grocery order on Barbora based on her usual post-workout meals.

Problem: Manual checking of inventory after physical activity can result in forgetting to reorder necessary items.

Opportunity: Using smart fridge technology combined with grocery ordering platforms to automate product recommendations and ordering after exercise.

2.2.1.2. Weekly Meal Prep

John, an avid meal prepper, often plans his meals around his workouts using a smartwatch based on data by Strava. John uses Google Health databases to find recipes based on his workout data to align his meals with his workout intensity.

Problem: Difficulties in manually finding recipes that align with specific workout intensities.

Opportunity: Using health databases and tracking apps to suggest recipes in line with recent physical activities.

2.2.1.3. Dietary Adjustments

Lucy has increased her swimming sessions this month and tracks them on her Apple Health app. She's unsure about the dietary changes she should make to support this activity and tries to use MyFitnessPal to get recommendations on the dietary adjustments.

Problem: Uncertainty in modifying diet to align with increased physical activity.

Opportunity: Using dietary platforms to automatically recommend dietary adjustments based on increased exercise data.

2.2.1.4. Dietary Restrictions

Tom recently learned he has a mild lactose intolerance. He wants to ensure his meals post-workout don't contain dairy, but he often forgets and ends up having dairy-based protein shakes.

Problem: Remembering dietary restrictions while aligning with workout nutritional needs can be challenging.

Opportunity: Considering medical or dietary restrictions when suggesting post-workout meals.

2.2.1.5. Balancing Dietary & Cultural Values

Mrs. Aisha, a 70-year-old woman, is dedicated to her vegan lifestyle and equally committed to her Muslim faith. She aims to balance her meals with plant-based protein sources. Given her age, navigating multiple apps on her phone to find food that is both nutritionally appropriate and in line with her religious beliefs can be challenging.

Problem: Identifying plant-based protein sources that also adhere to Halal guidelines is a complex task on standard applications, especially for older users not well-versed with technology.

Opportunity: A user-friendly system that merges dietary and cultural preferences to provide personalized food recommendations, ensuring ease of use for elderly users.

2.2.2. Secondary User Group: Dieticians and Nutritionists

2.2.2.1. Dietary Recommendation

As a nutritionist, Dr. Smith frequently gets logs to his work computer from his clients about their physical activity. During his work he spends hours manually aligning these with dietary recommendations using simple document editing software and can’t help many clients in a day.

Problem: Manual alignment of activity data with dietary recommendations is time-consuming, leading to less served clients.

Opportunity: Integrating automated fitness apps with dietary databases can provide instant recommendations, saving time.

2.2.2.2. Client Monitoring

Dr. Fernandez wishes to monitor on his computer and phone her client's dietary intake over a week to adjust a diet plan. However, relying on the client's memory or manual logging is often inaccurate.

Problem: Relying on manual logs or memory for dietary intake can lead to inaccuracies.

Opportunity: Giving real-time dietary intake based on fridge inventory and activity can provide precise data for monitoring.

2.3. Characteristics of the users, activities, context and technologies

2.3.1. People

2.3.1.1. Demographics

- Age ranges from young adults (e.g., 20 years old) to elderly individuals (e.g., 70 years old).
- Health-conscious individuals with varied workout routines and dietary needs, including those with medical or dietary restrictions.
- Nutritionists and dieticians who provide tailored dietary advice based on physical activity and require accurate logs of dietary intake.
- Some may have dietary restrictions or health issues, such as lactose intolerance.
- Some users may have specific cultural or religious dietary guidelines, such as Halal requirements or veganism.

2.3.1.2. Motivation to Learn New Technologies:

- High motivation among those who already utilize technology for tracking fitness and meals.
- Potential resistance or challenges among the elderly, but a willingness exists if the technology meets their specific needs.
- Used Information Technology and Devices:
- Various devices like fitness tracking gadgets, phones for meal planning, and computers for data logging and analysis.

2.3.1.3. IT Usage Skill Level:

- Ranges from moderate to high among younger users and professionals.

- Potential for low to moderate skill level among the elderly or those not well-versed with multiple applications.

2.3.2. User Activities:

- Activities can vary from short tasks like checking inventory to longer tasks like meal prep or workouts.
- Some tasks might be rushed, like post-workout routines or providing dietary recommendations for clients, while others, like meal planning, may not have immediate time pressure.
- Activities can be a mix of single actions (e.g., morning routines) and continuous actions (e.g., monitoring dietary adjustments).
- For automated recommendations, faster responses are preferable.
- Activities can be solitary or collaborative, especially among professionals coordinating with clients.
- Tasks can range from well-defined actions to more vague ones that require browsing multiple types of information.
- Ensuring accurate dietary recommendations is critical, especially when accounting for medical or dietary restrictions.

2.3.3. Context

- Home environments, particularly kitchens, where meal prep and inventory checking happen.
- Professional settings like nutrition or dietician clinics where dietary recommendations are discussed.
- Fitness centres or gyms where users engage in physical activities and might discuss their dietary habits.

2.3.4. Technologies

- Fitness tracking devices and apps (Garmin, Strava, Apple Health).
- Grocery ordering platforms (Barbora, Wolt, Bolt).
- Smart fridge inventory management systems (Samsung Family Hub).
- Dietary databases or platforms where dietary restrictions and recommendations are stored (MyFitnessPal, Google Health databases).
- Smartwatch

- Phone
- Fridge
- Computer

2.4. User needs

N1. Efficient Grocery Management: Users need a way to efficiently manage their groceries to ensure they have the right items on hand after physical activities. (2.2.1.1)

N2. Customized Recipe suggestions: Users need a recipe suggestion feature to quickly find meals that align with their recent workouts, helping them during meal preparations. (2.2.1.2)

N3. Dietary Adjustment Assistance: Users need a dynamic dietary adjustment tool that reacts to changing physical activity, allowing them to get relevant dietary recommendations. (2.2.1.3)

N4. Dietary Restriction Support: Users with dietary restrictions, such as lactose intolerance, require a system that considers and suggests suitable food items. (2.2.1.4)

N5. Cultural and Religious Dietary Support: Users with specific cultural or religious dietary guidelines, like veganism, need assistance in finding suitable food items. (2.2.1.5)

N6. Real-time Inventory Tracking: Users need real-time tracking of their fridge inventory to avoid overstocking or running out of essential items. (2.2.1.1)

N7. Accessible Interface: Users, especially elderly or less tech-savvy individuals, need an accessible interface that simplifies navigation and use. (2.2.1.5)

N8. Client Dietary Monitoring: Nutritionists requires a real-time dietary monitoring system to accurately track and adjust their clients' diet plans without relying on potentially flawed memory or manual logs. (2.2.2.2)

N9. Client Activity and Dietary Management: Nutritionists needs a client activity integration feature so he can automatically align physical activity with dietary recommendations, maximizing the number of clients he can assist each day. (2.2.2.1)

N10. Remainder System: Users need a reminder system for dietary restrictions when they are searching for meals, ensuring dietary restrictions, such as lactose intolerance. (2.2.1.4)

N11. Grocery List Maker: Users need a predictive grocery list maker which considers their previous patterns and dietary habits, saving time during their usual routine. (2.2.1.1)

N12. Grocery Ordering System: Users need an integrated grocery ordering system within the app, so they could conveniently order missing ingredients without switching between multiple platforms, streamlining her morning routine. (2.2.1.1)

N13. Automatic Grocery Ordering: Users need an option to automatically order needed items within the app to desired location without any intermediate actions.

N14. Searchable recipes: Users need a searchable recipe database within the app so they can easily find and select meals from a provided list that align with their workout intensities and nutritional preferences. (2.2.1.2)

N15. Recipe Nutrition: Users need a recipe nutritional information viewer within the app so that they can see the detailed nutritional content and breakdown of provided recipes from the database. (2.2.1.2)

N16. User account creation: Users require a system that can uniquely identify them, ensuring that their personal data, preferences, and interactions are kept private and distinct from other users. (2.2.1.5)

2.5. Usability objectives

U1. Efficient Learning Curve: Users will be able to navigate and use the NutriSync application effectively the first time they open it, without any prior training. First-time users should find essential features within two minutes of accessing the application, while expert users (frequent users) should achieve the same within 30 seconds.

Aligned with User Needs: Learning Efficiency (N1).

U2. Rate of Errors: Users should make minimum count of errors while using NutriSync. On average, users will not navigate to more than three incorrect screens or pages when completing a task. Critical errors, such as entering incorrect dietary restrictions or ordering the wrong groceries, should occur no more than 1% of the time.

Aligned with User Needs: Data Accuracy (N3), Efficient Grocery Management (N1).

U3. User Satisfaction: Users' subjective impressions of NutriSync should be highly favorable. On a scale of 1 (very appealing) to 5 (very unappealing), users should rate the application at least 2.5 on average.

Aligned with User Needs: Accessible interface (N7).

U4. Task Completion: Users should successfully complete tasks related to grocery management and dietary adjustments. At least 75% of users who add items to their

grocery list should proceed to complete a purchase. Furthermore, at least 95% of users who input their dietary restrictions or preferences should successfully use the system without encountering issues.

Aligned with User Needs: Efficient Grocery Management (N1), Dietary Adjustment Assistance (N3), Dietary Restriction Support (N4).

U5. User Engagement: NutriSync should maintain user interest and encourage regular use. At least 50% of registered users should revisit the application at least once per month to check their inventory, receive recommendations, and manage their dietary needs.

Aligned with User Needs: Efficient Grocery Management (N1), Customized Recipe suggestions (N2), Dietary Adjustment Assistance (N3), Real-time Inventory Tracking (N6), Remainder System (N10), Grocery List Maker (N11), Grocery Ordering System (N12), Searchable Recipes (N14), Recipe Nutrition (N15).

2.6. Examples of user interface designs

2.6.1. Samsung Family Hub fridge interface

Figure 1. Samsungs' Family Hub Fridge

The image above shows a neat user interface for fridge. It is a Samsung Family Hub fridge that have its own interface and shows current items in a fridge. It also has other useful features like interactive calendar, browse family photo gallery and other features. It inspired us to use a similar fridge interface design for NutriSync app.

2.6.2. Apple Health analytics app

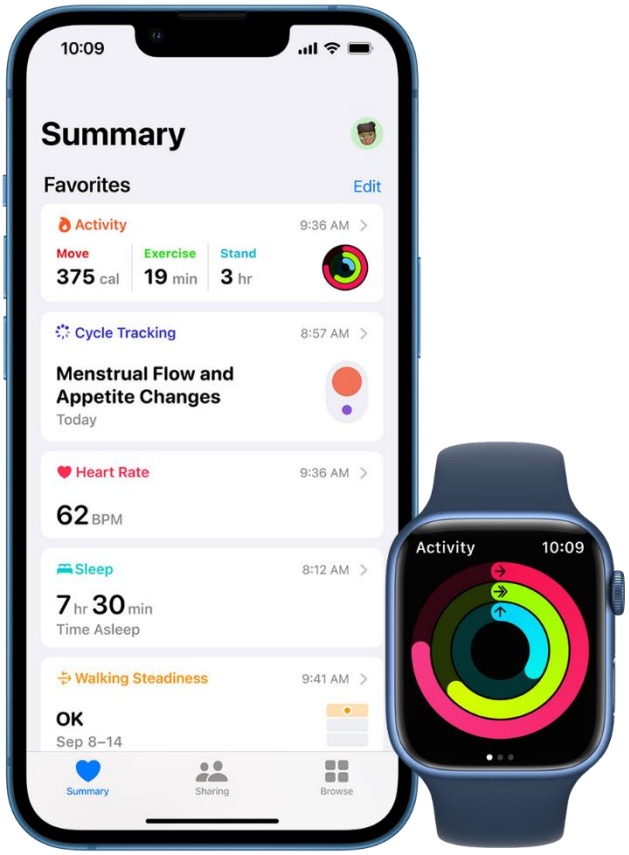

Figure 2. Apple Health App

The image above shows an Apple Health app interface on a phone and smartwatch devices. It inspired us for its smart interface that have all needed information about user's activity and how it can be simply represented in a small smartwatch screen.

2.6.3. Diet & Nutrition Tracking App

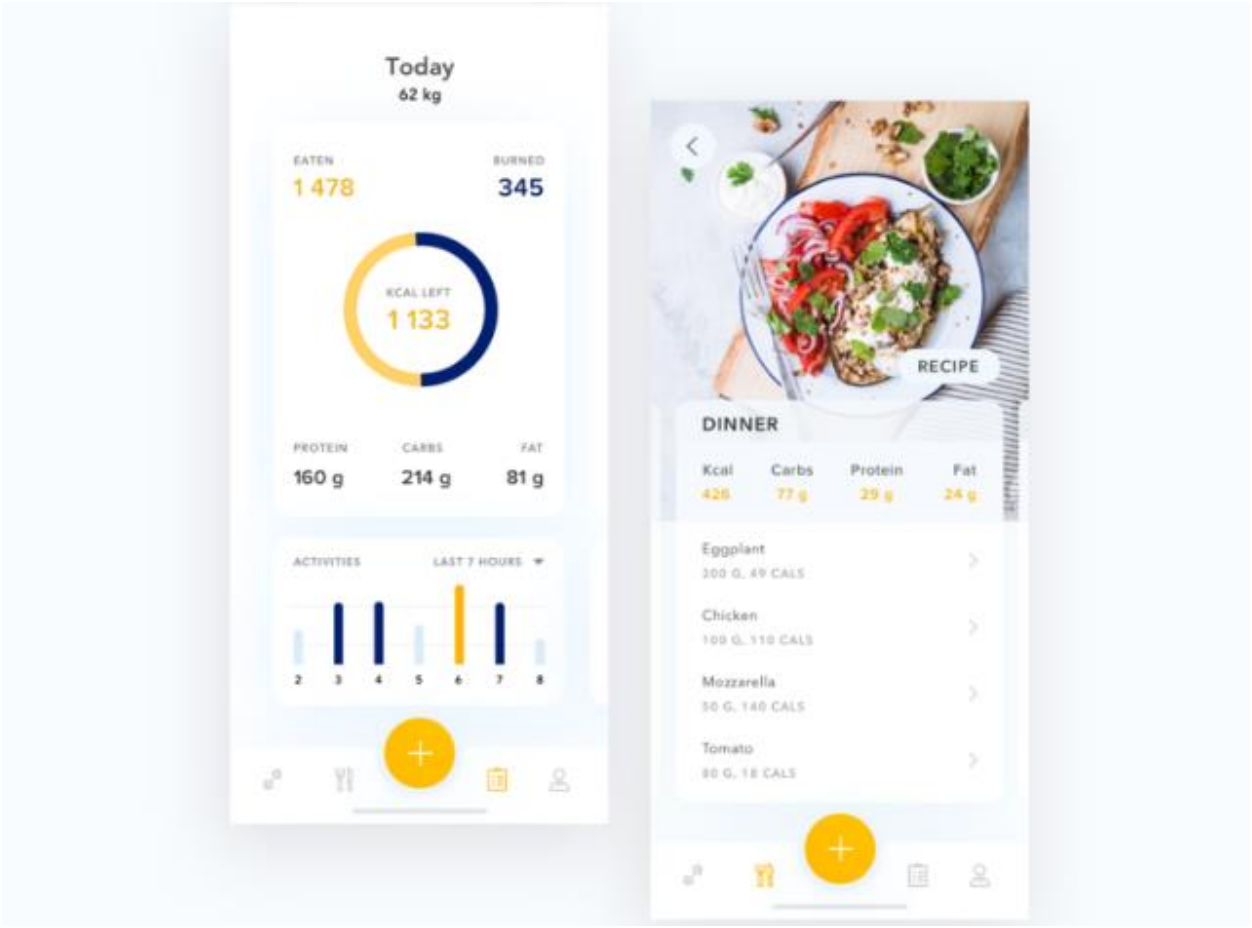

Figure 3. Concept design of diet and nutrition tracking app design

The image above shows a concept design of diet and nutrition tracking app. It is inspiring for its simplicity and how all need information about recipe nutrition can be shown on a screen, while preserving its interactiveness.

2.6.4. “Nutritics” - Nutrition Analysis Software

Figure 4. Nutritics app

The image above shows a Nutritics app design on a personal computer and phone devices. It is inspiring for us as a professionally looking recipe database design that could be used similarly used for NutriSync app and its own recipe database.

2.6.4.1. “Noom” – nutritionist coaching app

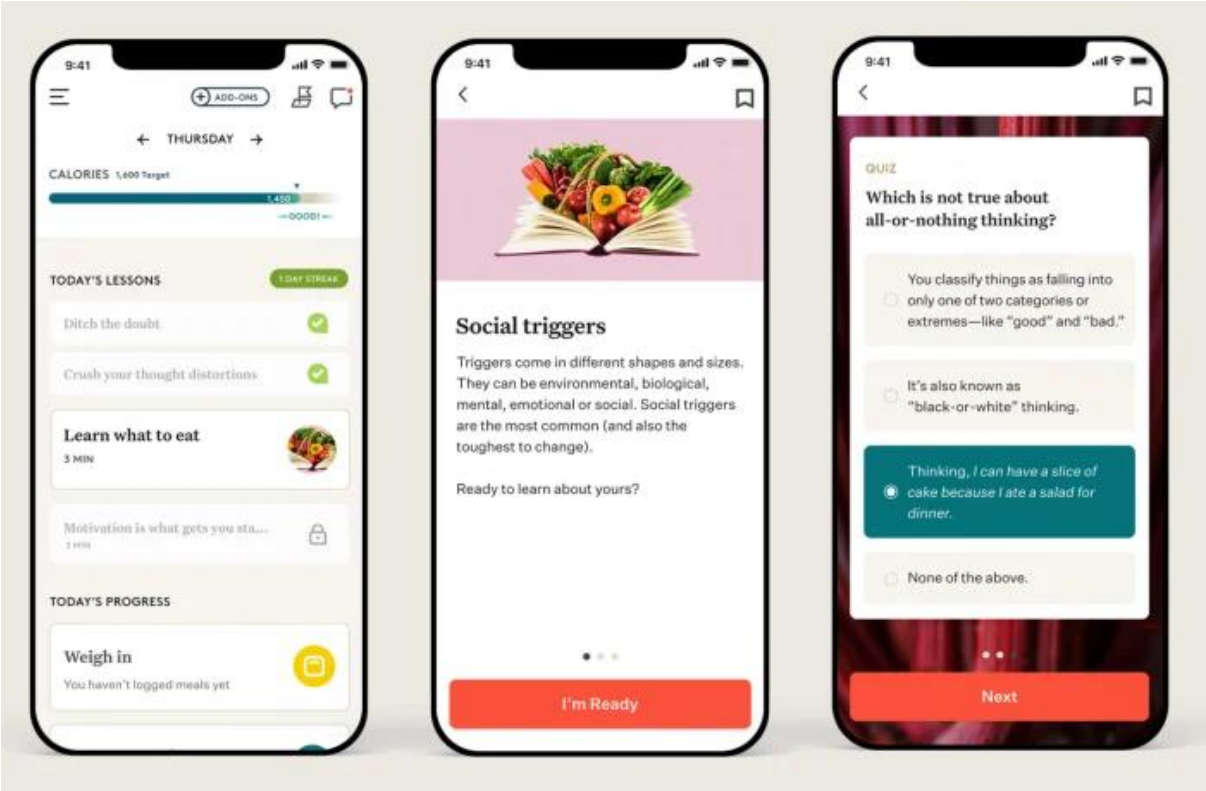

Figure 5. Noom app

The image above shows an Noom app interface on a phone device. It acts as a example of how the design of NutriSync app could look from nutritionist view. It has some of important features like tracking client’s activities and feedback about his diet.

3. Alternative wireframes

3.1. Implemented used needs

For this project, we have designed two alternative wireframes which implement some major user needs.

The first major user need is a grocery management system (N1, N6, N11, N12, N13) where the user could see his fridge inventory in real-time and make a grocery list for ordering products later.

The second major user need is a diet management system (N2, N3, N4, N5, N14, N15, N10). Using the diet management system, a user could see his favorite recipe, check his daily diet, and get meal and product suggestions according to his daily activity.

Both wireframes also implement a notification system. However, to navigate to them there are two different navigation hierarchies.

The system also has a nutritionist category, however, it is not implemented yet, as there are already 10 wireframes that implement two different major user needs.

3.2. Information architecture solutions

3.2.1. Type of ontology

For our "NutriSync" platform, we have chosen to implement a **coarse-grained** ontology within a **flat website hierarchy**. We made this choice to offer our users a user-friendly and easily navigable structure that simplifies health and dietary management.

3.2.2. Organization schemes

As our platform will be implemented with a coarse-grained ontology, we selected top-down design approach. By using this approach, we will start from the broadest categories and narrow down to the smallest categories for both wireframes.

3.2.2.1. First Wireframe

- **My Day (Home page)**
  - Your recent activity
    - Spent time
    - Burnt calories
    - Suggested meal

- Recipe suggestions
- Nutritionists' advice
- Running low on

- **Groceries**
  - Fridge inventory
  - Grocery List
    - Ordering
- **Diet**
  - Favorite recipes
  - Your diet
  - Suggestions
- **Nutritionists**
  - My advices
  - Clients
    - Diet plan
    - Daily Activity
- **Notifications**
  - Today
  - Earlier

3.2.2.2. Second Wireframe

- **My Day (Home page)**
  - Your diet
  - Nutritionists' advice
  - Notifications
    - Today
    - Earlier
- **Activities**
  - Spent time
  - Burnt calories
  - Suggested meal
- **Groceries**
  - Fridge inventory

- Grocery List
  - Ordering

- **Diet**
  - Favorite recipes
  - Your diet
  - Suggestions

- **Nutritionists**
  - My advices
  - Clients
    - Diet plan
    - Daily Activity

3.2.2.3. Wireframes' differences

These two wireframes offer the same functionality but have slightly different interfaces. The main difference between them is category hierarchy that can be noticed in the home pages.

3.2.2.3.1. My Day (Home page)

- The first wireframe has a "recent activity" section which includes "Spent time", "Burnt calories", and "Suggested meal". The second wireframe has moved these details to a separate "Activities" section.
- The first wireframe includes "Recipe suggestions" and "Running low on" in the home page, which are not present in the second wireframe.
- The second wireframe includes "Notifications" in the home page, which is a separate section in the first wireframe.

3.2.2.3.2. Activities (Only present in the second wireframe)

This section in the second wireframe encompasses details like "Spent time", "Burnt calories", and "Suggested meal" that were originally under "Your recent activity" in the home page of the first wireframe.

3.2.2.4. Labelling system, content organization and search patterns

- In the first wireframe's home page all recent activities are organized in chronological order using exact content organization scheme. They are labeled by dates and activity icons.
- All favorite recipes are organized in chronological order using exact content organization scheme. They are labeled by icons.
- All products in fridge inventory and grocery list are labeled with icons and have names for them.

3.2.3. Navigation Patterns

For both wireframes to navigate through the top-level categories the most suitable way was to use the tab bar that appears at the top and is always fixed to help users navigate through the system. The tab bar was the most used navigation pattern in our wireframes not only for the top-level categories, but also for navigating the second level categories. The main reason why we used it was its simplicity and how little space it takes for mobile devices as our system is designed for them.

3.2.3.1. My Day (Home Page)

- Your Recent Activity:
  - Features a scrollable bar populated with daily activities.
  - Each activity serves as a shortcut, leading to the detailed activity wireframe.
  - After the activity details, there's a shortcut leading to a suggested meal based on that activity.
- Recipe Suggestions:
  - Presents a selection of suggested recipes.
  - Each recipe acts as a shortcut, guiding users to the detailed recipe page.
  - The main aim is to inspire users to explore a diverse range of recipes.
- Nutritionists' Advices:
  - Similar to the Recipe Suggestions, this section offers shortcuts to advice provided by various nutritionists.
  - These shortcuts lead to the "My Advices" category, ensuring valuable insights from nutritionists are easily accessible and not buried deep within the app.

3.2.3.2. Groceries

- Grocery List:
  - Displays all products currently added to the shopping cart.
  - A prominent button at the bottom navigates users to the ordering wireframe.
- Ordering:
  - Presented as a pop-up, it confirms that the products have been successfully ordered.

3.2.3.3. Diet

- Favorite Recipes:
  - A scrollable bar showcases users' favorite recipes.
  - Each entry is a shortcut, directing users to its corresponding detailed recipe wireframe.
- Your Diet:
  - Provides an overview of the user's consumption habits, detailing the products they consume and the meals they prepare from the recipe list.
  - All items, whether they're products or recipes, are visually represented with distinct icons.
- Suggestions:
  - Personalized to the user, this section offers recipe recommendations based on the user's recent activities.
  - Every suggested recipe serves as a shortcut, leading directly to its detailed page.

3.3. Used prototyping tools and instructions for evaluators

For prototyping we chose to use Figma tool. It lets to easily share our made wireframes and keeps up with the changes.

To test wireframes interactively, we have provided links for two alternative wireframes:

1. Figma wireframe 1
2. Figma wireframe 2

To open the editor to view all the wireframes together, there is a button NutriSync -> Open in Editor at the top of the screen.

4. Usability Testing

4.1. Introduction

This usability testing plan for the NutriSync app is tailored to assess specific user needs implemented in the wireframes. The focus is on evaluating how well the app meets these needs through its design and functionality.

4.2. Participants

4.2.1. Recruitment Method

Participants will be sourced from university channels, local fitness centers, and nutrition clinics, ensuring a mix of primary and secondary user groups.

4.2.2. Demographics

The testing includes participants of different age groups, interests and most importantly computer literacy, as the potential target market of NutriSync platform is very wide. However, the testing will focus on people with the following characteristics:

- **Age Range:** 20–70 years
- **Occupation:** Includes health-conscious individuals, fitness enthusiasts, dieticians, nutritionists, and elderly users
- **IT Skill Level:** Moderate to high, with some elderly users having lower skills

The particular participants that correspond these characteristics and took part in testing are presented in Table 1.

Participants that took part in the testing process:

Age	Computer literacy level	Experience with other similar applications	Occupation	Time spent daily using computer/smartphone/tablet/ smartwatch
18-25	High	No	Health-conscious individual, programmer	More than 8 hours
18-25	Moderate	No	Fitness enthusiast	3-8 hours

18-25	High	No	Athlete	3-8 hours
18-25	Moderate	Yes	Programmer	More than 8 hours
18-25	Low	Yes	Athlete	1-3 hours

Table 1 Participants' demographics

4.3. Methodology

4.3.1. Testing Goals

The primary goal of usability testing for NutriSync is to determine how well the app meets the diverse needs of users, including efficiency in grocery management, dietary adjustment, and inventory tracking. We aim to validate the user experience, focusing on how intuitively users can navigate and complete tasks within the app. Feedback and observations will inform necessary improvements and the selection of the final wireframe design.

Each goal corresponds to a user need implemented in the wireframes:

- **Efficient Grocery Management (N1, N6, N11, N12**): Assess the app's ability to manage grocery lists and orders efficiently.
- **Diet Management System (N2, N14, N15):** Examine the app's effectiveness in offering personalized diet management, such as custom recipe suggestions.
- **Notification System (N1, N2, N6, N10):** Test the effectiveness and helpfulness of the app's notification system, ensuring that it visibly alerts users to essential grocery management actions, notifies inventory levels in real-time and accelerates the ordering of missing products.

4.3.2. Testing tasks with success criteria

1. Find any recipe that the app suggests to you and see how it is made. (N2, N14, N15)

   Success criteria:

   - Participant sees information about a recipe. In 1 wireframe the participant is in tutorial page, in 2 wireframe the participant is in overall recipe page.

2. Go to the fridge inventory to see what products are in the fridge and try to order new products. (N1, N6, N11, N12)

   Success criteria:

   - Participant navigates to the fridge inventory then goes to the product cart and places an order.

3. Find which products are missing/running low on from the fridge and order them.

   Success criteria:

   - Go to the app notifications, look what products are missing and order them by navigating to the cart by using notification.

4.3.2.1. Success criteria for all:

- The user is able to complete a task within two minutes of navigating the app (U1 Efficient Learning Curve). Testing second wireframe the task should be completed within 1 minute.
- The task is completed with no more than three errors (U2 Rate of Errors)
- User reports satisfaction with the ease of doing the tasks with a rating of at least 2.5 on average on the provided scale (U3 User Satisfaction).

4.3.3. Testing Environment

Testing will be conducted remotely by using Discord application, with participants using their own computers or phones to access the app's wireframes while sharing the device’s screen.

4.3.4. Testing Session

4.3.4.1. Testing Procedure

Prior to testing procedure, participants sign the consent form. Then every participant fills a pre-test form. All participants are divided into two groups by simply assigning every second participant to the corresponding group: the ones who start from the first wireframe and others who start from the second wireframe. Testing starts by giving each participant series of tasks to perform on the app. This crossover design helps minimize potential bias from the order of presentation.

4.3.4.2. Thinking Silently Protocol

Participants stay silent as they navigate the app. After doing all the tasks, they provide insights about their decision-making processes and any usability issues they encountered.

4.3.4.3. Recording and Observation

The sessions are recorded with the participants' consent and capturing screen interactions.

4.3.5. Questionnaire and Data Collection

Before and after completing the tasks, participants fill out a questionnaire to collect and qualitative data (e.g., user satisfaction, perceived ease of use). Also, while participants are doing the tasks, task completion time is also recorded and how many errors they made for quantitative data.

4.4. Findings

4.4.1. Ease of use and learn

The charts presented below represent if it was easy to use (Chart 1 and 3) and learn (Chart 2 and 4) NutriSync platform during testing of the first and second wireframes.

4.4.1.1. First wireframe

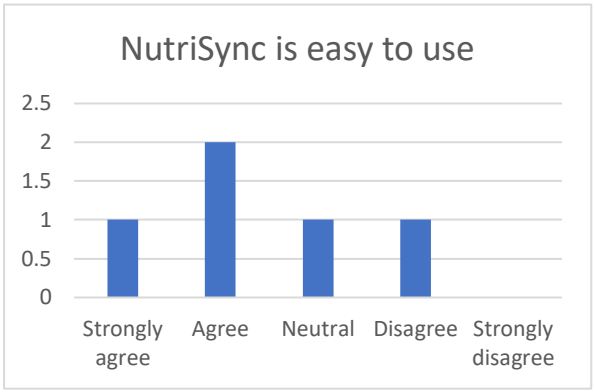

Chart 1

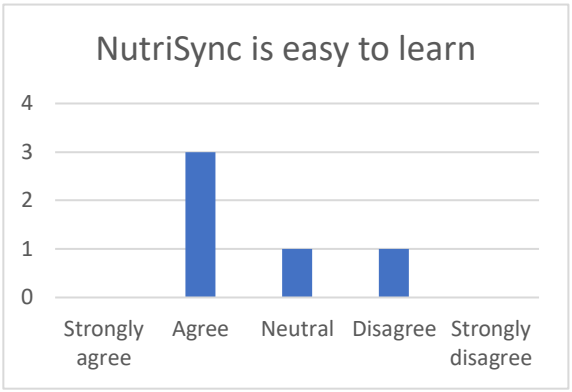

Chart 2

4.4.1.2. Second wireframe

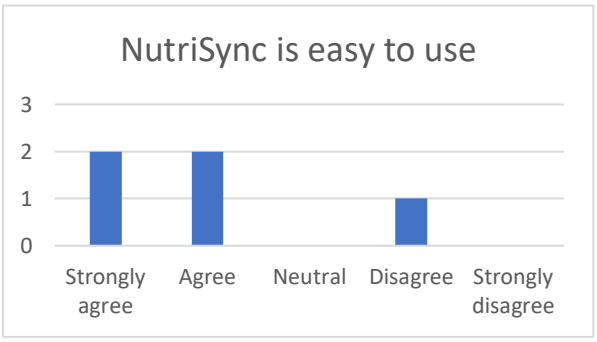

Chart 3

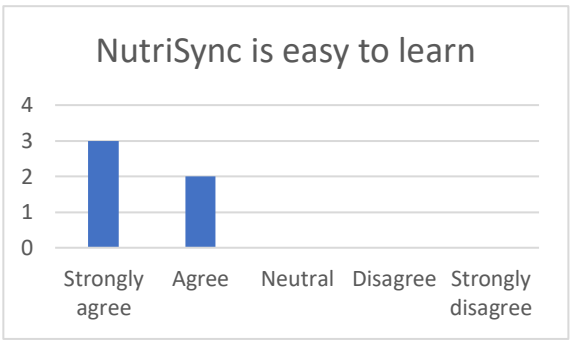

Chart 4

4.4.2. Satisfaction of doing tasks

The charts presented below represent if it was easy to complete the stated tasks in NutriSync platform during testing of the first (Chart 5, 6, 7, 8) and second (Chart 9, 10, 11, 12) wireframes.

4.4.2.1. First wireframe

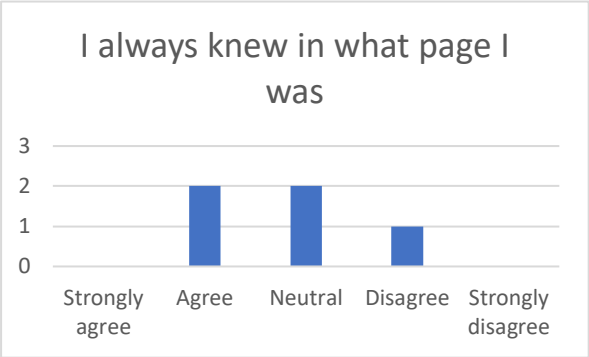

Chart 5

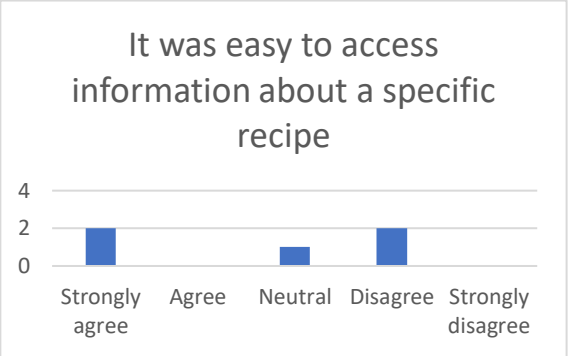

Chart 6

Chart 7

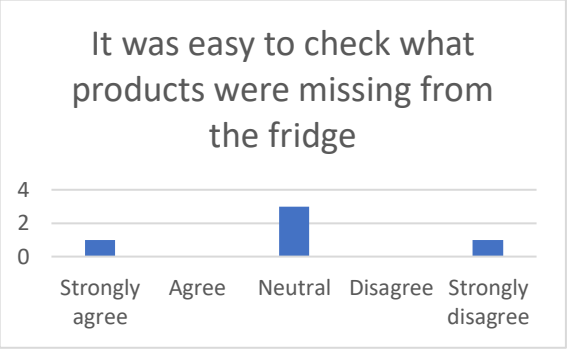

Chart 8

4.4.2.2. Second wireframe

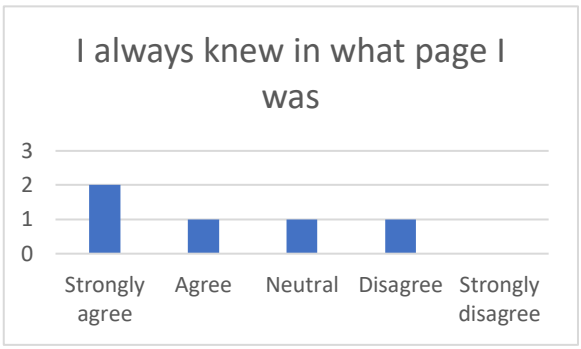

Chart 9

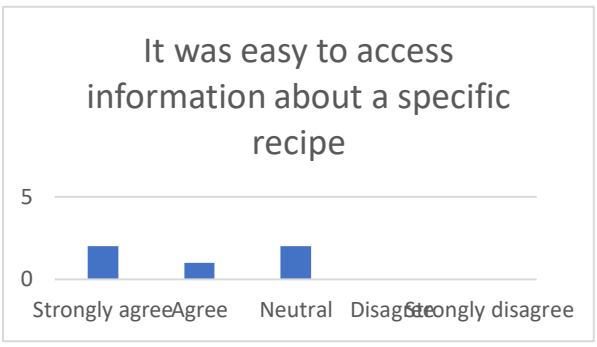

Chart 10

Chart 11

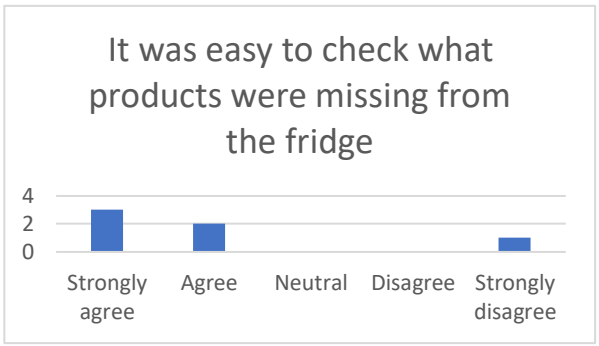

Chart 12

4.4.3. Time spent with tasks

The charts presented below represent how much time participants spent during testing of NutriSync platform in the first (Chart 13, 14) and second (Chart 15, 16) wireframes.

4.4.3.1. First wireframe

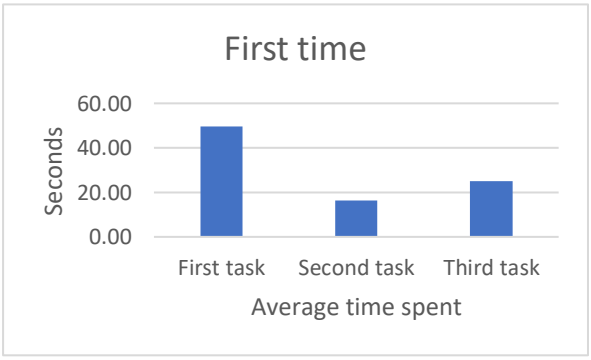

Chart 13

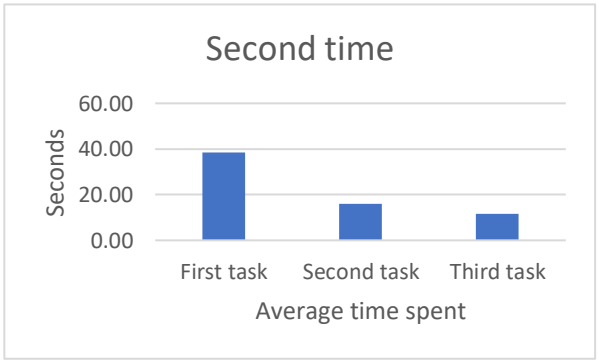

Chart 14

4.4.3.2. Second wireframe

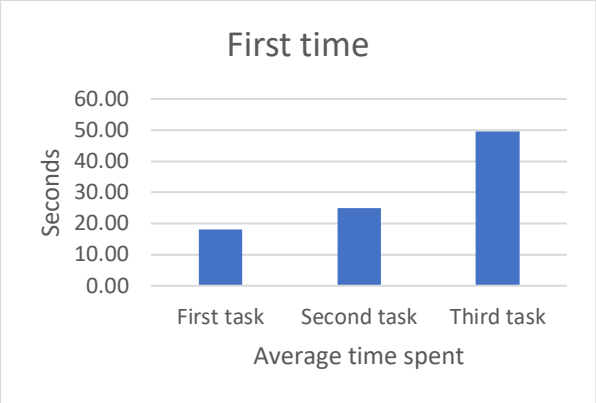

Chart 15

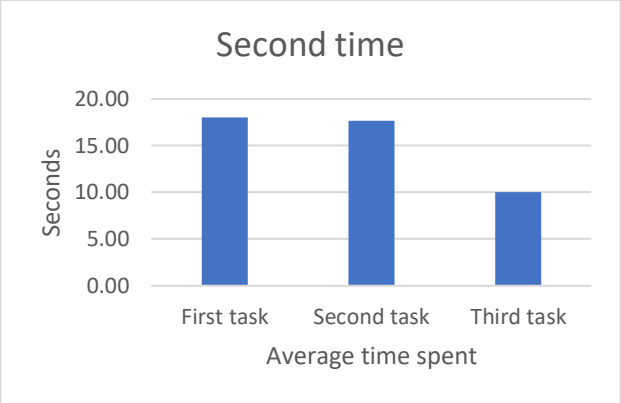

Chart 16

4.4.4. Rate of errors

The charts presented below represent how many errors participants made during testing in NutriSync platform in the first (Chart 17, 18) and second (Chart 19, 20) wireframes.

4.4.4.1. First wireframe

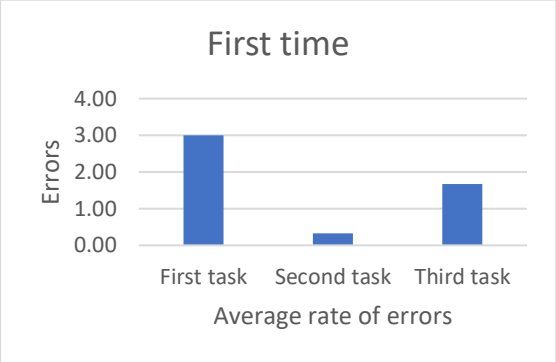

Chart 17

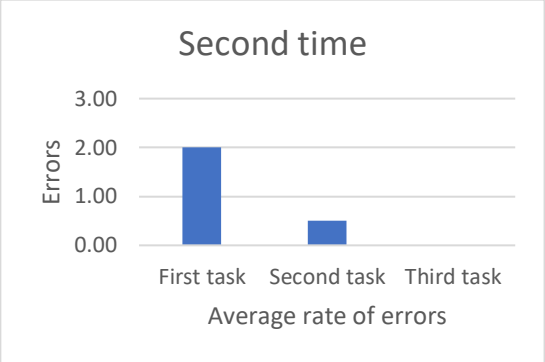

Chart 18

4.4.4.2. Second wireframe

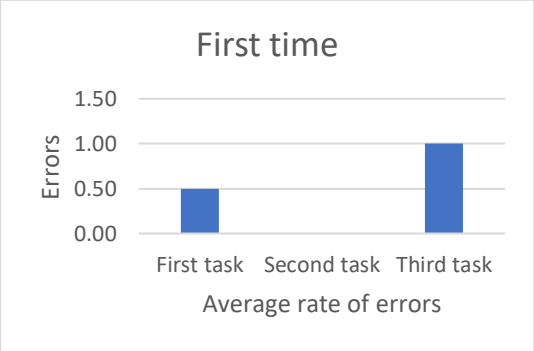

Chart 19

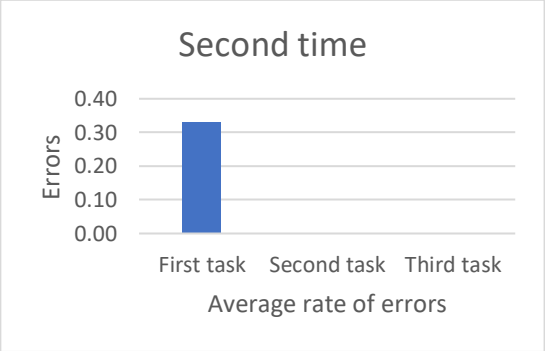

Chart 20

4.4.5. Comments and suggestions

4.4.5.1. First wireframe

- Too much icons, almost no text, really hard to navigate. Running low section is hard to find
- It would be benefitial to add product names on the main page in both tested apps in order to make the navigation faster and easier.
- Clicking on a recipe on the homepage does not bring up the selected recipe right away, you have to select it again. Selecting a recipe shows the ingredients first, whereas it would be more convenient to show the recipe first or the recipe and ingredients together in one window.
- Too many buttons. Notifications are hard to see.

4.4.5.2. Second wireframe

- Bug with back to home screen. Did not know what is screen with food categories about
- Back button
- Notifications are hard to see

4.5. Recommendations

4.5.1. Interface and Design Improvements

- **Reduce Icon Overload:** Simplify the interface by reducing the number of icons and incorporating more text labels to enhance navigation.
- **Enhance Product Visibility:** Include product names prominently on the main page to facilitate quicker and more intuitive navigation.
- **Streamline Recipe Access:** Modify the recipe selection process so that clicking a recipe immediately brings up the full recipe details, including both the ingredients and preparation steps in one view.
- **Improve Button Design:** Decrease the number of buttons and improve the visibility and design of essential buttons like notifications.

4.5.2. Functionality Enhancements

- **Optimize Recipe Interaction:** Ensure that when a user selects a recipe, they do not have to select it again to view details. This will reduce clicks and streamline the user journey.
- **Fix Navigation Bugs:** Address the bug that hinders users from returning to the home screen, and clarify the purpose and content of the food categories screen.

4.5.3. Content Optimization

- **Running Low Section:** Make the 'Running Low' section more prominent and easier to find, so users can quickly identify which products need to be restocked.
- **Notification Visibility:** Rework the visual design of notifications to make them more conspicuous and easily accessible.

4.6. Appendices

4.6.1. Informed Consent Form

https://forms.gle/r8aWjchKxqEQFfs66

4.6.2. Questionnaires

4.6.2.1. Pre-test

https://forms.gle/nT8scQU8VhLZNcuq5

4.6.2.2. Post-test

https://forms.gle/RpN4aMBbDmy67eru9

4.6.2.3. Testing results

https://docs.google.com/spreadsheets/d/10_eT72f4UKgyoCudgudgwI1SQOPE8rd8Q7ZJhSVp7xg/edit?usp=sharing

This plan focuses on specific user needs implemented in the NutriSync app's wireframes, ensuring that the final product is not only user-friendly but also aligns closely with the intended user requirements.

5. High-fidelity prototype

5.1. Final user needs

N1. Efficient Grocery Management: Users need a way to efficiently manage their groceries to ensure they have the right items on hand after physical activities. (2.2.1.1)

- Users can purchase missing food for recipes, order food missing based on routine, or reorder previous order.

N2. Customized Recipe suggestions: Users need a recipe suggestion feature to quickly find meals that align with their recent workouts, helping them during meal preparations. (2.2.1.2)

- Users can find suggested recipes based on their preferences, previously liked recipes and recent physical activity.

N3. Dietary Adjustment Assistance: Users need a dynamic dietary adjustment tool that reacts to changing physical activity, allowing them to get relevant dietary recommendations. (2.2.1.3)

- Users can get grocery suggestions based on their preferences, recent physical activity and their routine.

N4. Dietary Restriction Support: Users with dietary restrictions, such as lactose intolerance, require a system that considers and suggests suitable food items. (2.2.1.4)

- Users can choose their dietary restrictions, including alergens.

N5. Cultural and Religious Dietary Support: Users with specific cultural or religious dietary guidelines, like veganism, need assistance in finding suitable food items. (2.2.1.5)

- Users can choose their dietary restrictions, including ethical and lifestyle choices, such as veganism.

N6. Real-time Inventory Tracking: Users need real-time tracking of their fridge inventory to avoid overstocking or running out of essential items. (2.2.1.1)

- Users can at any moment synchronise their fridge contents with the app.

N8. Client Dietary Monitoring: Nutritionists requires a real-time dietary monitoring system to accurately track and adjust their clients' diet plans without relying on potentially flawed memory or manual logs. (2.2.2.2)

- Trainers can look through statistics of their clients.

N9. Client Activity and Dietary Management: Nutritionists need a client activity integration feature so he can automatically align physical activity with dietary recommendations, maximizing the number of clients he can assist each day. (2.2.2.1)

- Trainers can look through recommended recipes individually tailored by the recommendation system.

N10. Reminder System: Users need a reminder system for dietary restrictions when they are searching for meals, ensuring dietary restrictions, such as lactose intolerance. (2.2.1.4)

- Users can see reminders both inside and outside the app.

N11. Grocery List Maker: Users need a predictive grocery list maker which considers their previous patterns and dietary habits, saving time during their usual routine. (2.2.1.1)

- Users can add a list of items to cart that are missing from their usual routine.

N12. Grocery Ordering System: Users need an integrated grocery ordering system within the app, so they could conveniently order missing ingredients without switching between multiple platforms, streamlining their morning routine. (2.2.1.1)

- Users can purchase all the needed groceries with a single click, without needing to search for item providers.

N13. Automatic Grocery Ordering: Users need an option to automatically order needed items within the app without any intermediate actions.

- Users have an option to configure settings, that include automatic groceries re-ordering.

N14. Searchable recipes: Users need a searchable recipe database within the app so they can easily find and select meals from a provided list that align with their workout intensities and nutritional preferences. (2.2.1.2)

- Users can search through recipes, the system takes preferences into consideration when viewing recipes.

N15. Recipe Nutrition: Users need a recipe nutritional information viewer within the app so that they can see the detailed nutritional content and breakdown of provided recipes from the database. (2.2.1.2)

- Users can see detailed nutritional information of every recipe in the database.

N16. User account creation: Users require a system that can uniquely identify them, ensuring that their personal data, preferences, and interactions are kept private and distinct from other users. (2.2.1.5)

- Users can create accounts to securely store and retrieve their data.

5.2. Instructions for evaluators

For the high-fidelity prototype the main design prototyping tool has been chosen “Figma”. Using the links below will allow the evaluators to both overview the individual components of the prototype and an interactive view to grasp how the app should **look** and **feel**.

Figma project:

https://www.figma.com/file/QKLVW85PYapLhEzByB43uT/NutriSync-4-High-fidelity-Prototype?type=design&mode=design&t=yU84Ie3jhhf2bUQh-1

Figma interactive prototype:

https://www.figma.com/proto/QKLVW85PYapLhEzByB43uT/NutriSync-4-High-fidelity-Prototype?type=design&node-id=8-45&t=G1ZUIPE5pMj8RHsj-1&scaling=scale-down&page-id=0%3A1&starting-point-node-id=8%3A45&mode=design

Important notes:

When running the interactive prototype it is necessary to select “Fit to screen” under the options at top right.

When changing components in any way or form in the project, reused components may be changed elsewhere as well, and should be detached for usage beyond their original intent.

Tools used for the project:

Figma design platform to Design the prototype

Figma plugin “User Profile” by Janis Rozenfelds for Profile photos

Figma plugin “Unsplash” by Kirill Zakharov for Recipe photos

Figma plugin “Random name generator” by Dario Ferderber for User names

Figma plugin “Iconify” by Vjacheslav Trushkin for most Icons

DALL-E by OpenAI for Recipe photos

UIX Academy on YouTube for various Component creation

Figma on YouTube for Platform usage and functionality training