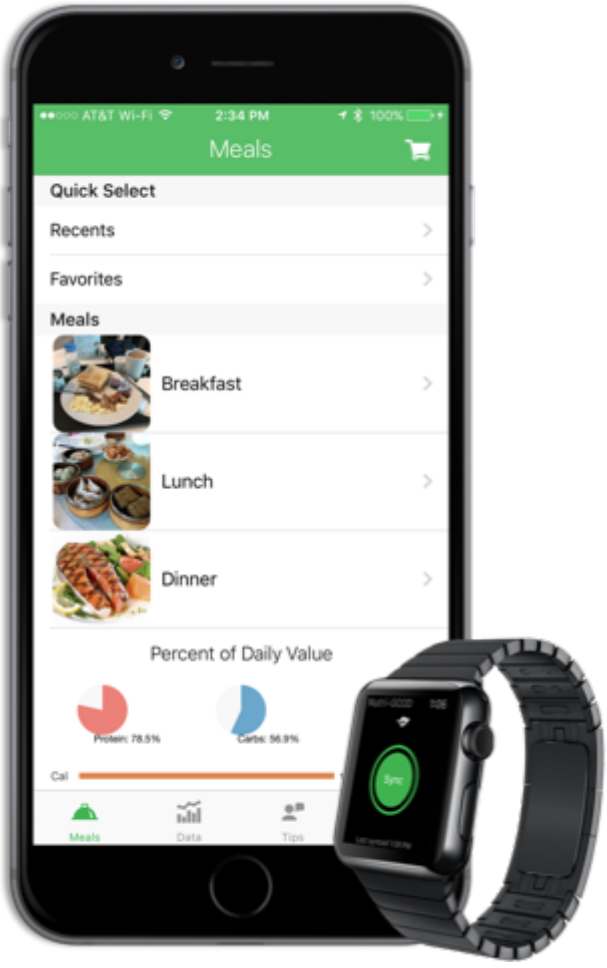
CS 147
HIGH-FIDELITY PROTOTYPE

NUTRI-GOOD

"Independent Nutrition, Delivered."

Andrew Barakat, Emmanuel Cortes, Andrew Fang & Jorge Garcia



Problem

Food and nutrition management is an important component of personal health. Further, poor nutritional intake can lead to chronic illnesses, obesity and diseases that cost individuals their health, and society its resources (Bhattacharya et al., 2014). As we age, it becomes only increasingly important to manage our eating habits, as the body begins to wear down. The population lacks a concise, easily understandable source of nutritional information that they trust, and the effort cost required to maintain healthy intake can prove to be a significant barrier to uptake and maintenance (Wansink, 2006).

Solution Mission

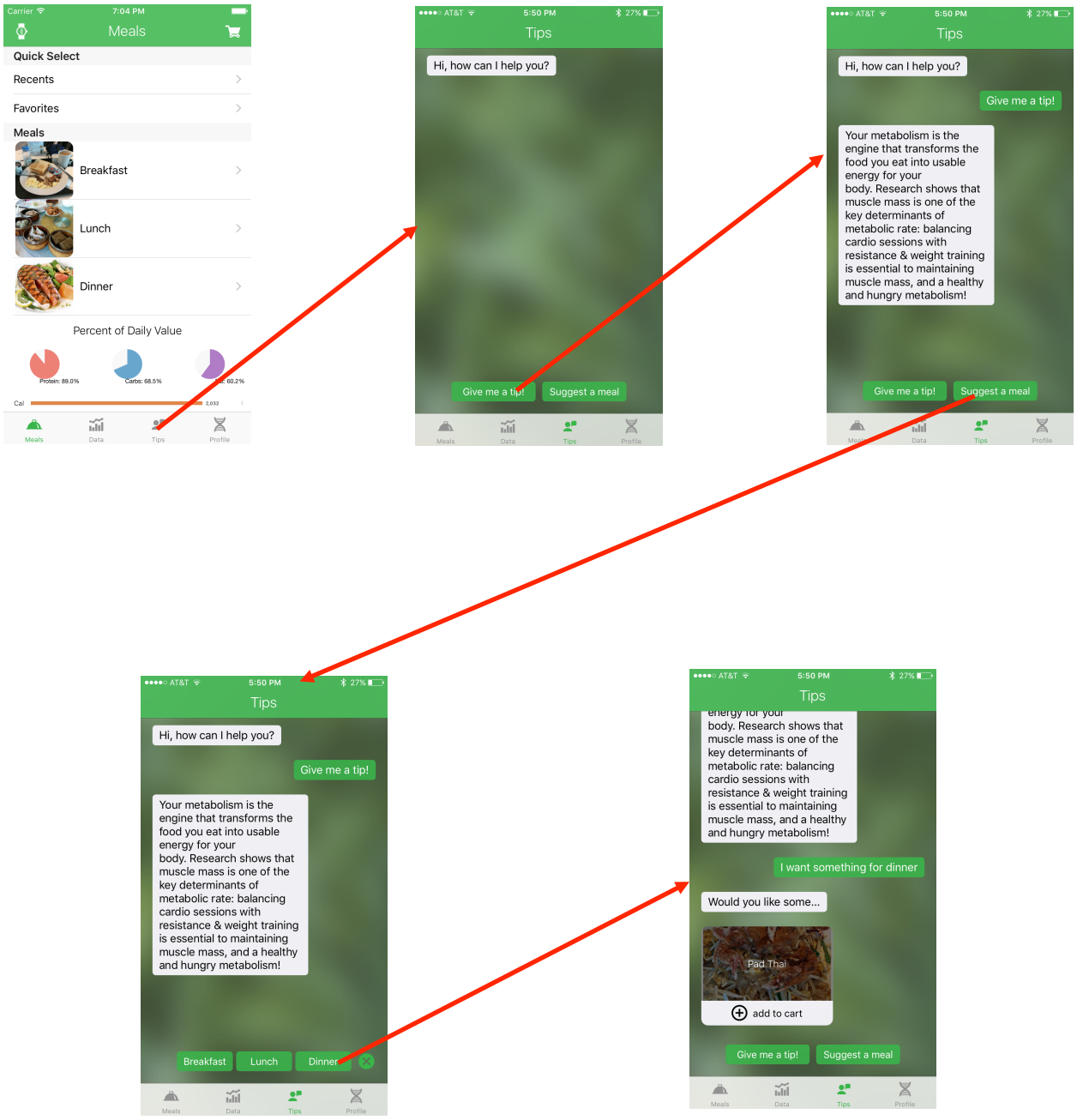
We are trying to help the elderly maintain healthy eating habits and preserve the independence they experience while cooking, by delivering them ingredients and recipes to make the food preparation process easier. Rather than implementing complex food-tracking software which obliges continued and laborious efforts from the user and has been shown to decrease maintenance (Consolvo et al., 2012), we intend to integrate the food delivery and nutritional analysis processes into a single program, allowing for the development of blood-glucose monitoring in wearable technology (Guzman, 2015).

Tasks & Final Interface Solution

1. *Gain new information about nutritional health (simple):*

To access digestible tips (pun intended), the user must tap the "Tips" icon in the banner at the bottom of the screen, before tapping "Give me a tip!" within that tab. The user can also ask for a meal suggestion for breakfast, lunch or dinner, by tapping "Suggest a meal!" and then tapping the desired meal choice.

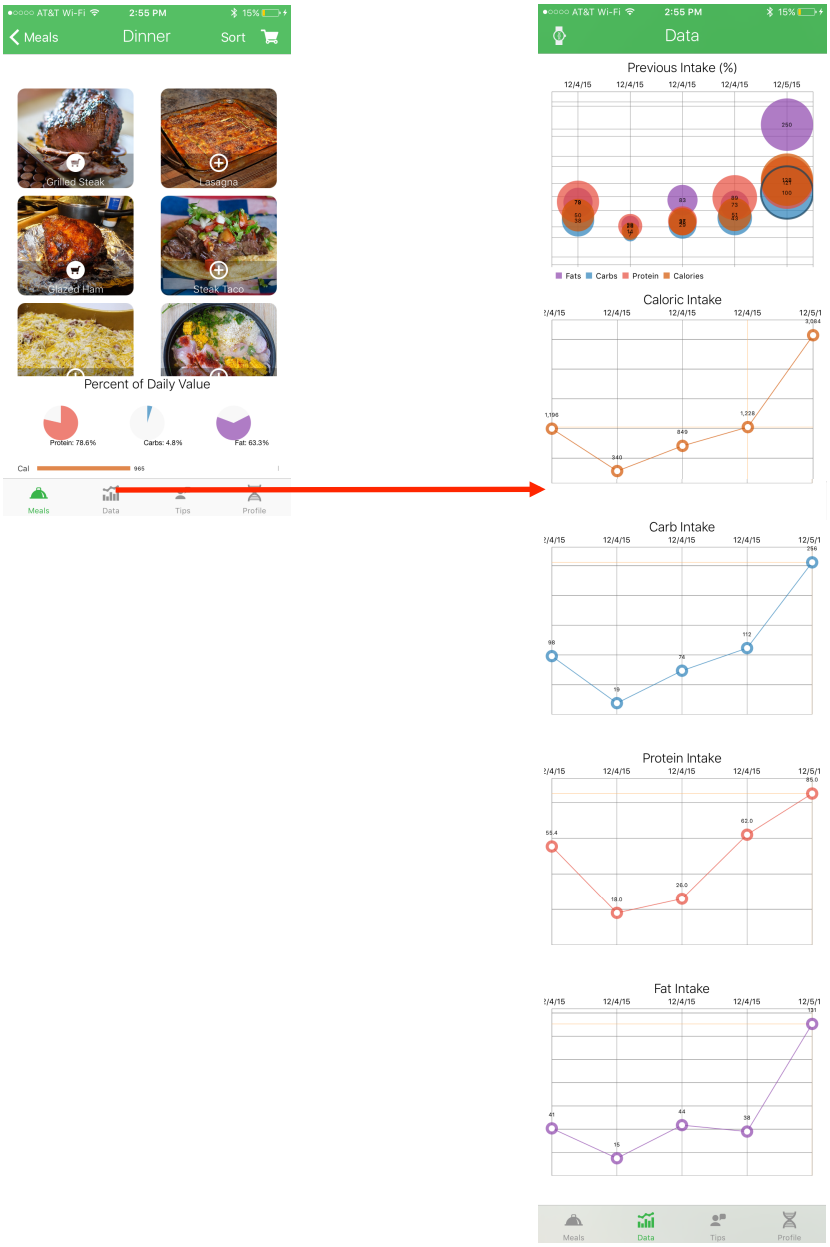
Since nutritional management is a near impossible problem to completely solve in an application, providing the user with actionable feedback on how they can better maintain their nutritional health outside of the application is a key component of Nutri-Good's goals. The task flow for this process is shown below.



2. Know what you ate (medium):

To know what you ate, the user taps the "Data" tab, where they can review the nutritional content of previous orders, including their calories, protein, carbohydrates and fats, as a total percentage of the daily-recommended amount. This task requires some engagement from the user to understand what the data is saying, although we have made efforts but e

Tracking progress is another key component of nutritional management: presenting easily accessible data that can be used to inform the user on how they are performing over time is a "hooking" technique for maintenance. Here is the task flow for getting to the data management section:

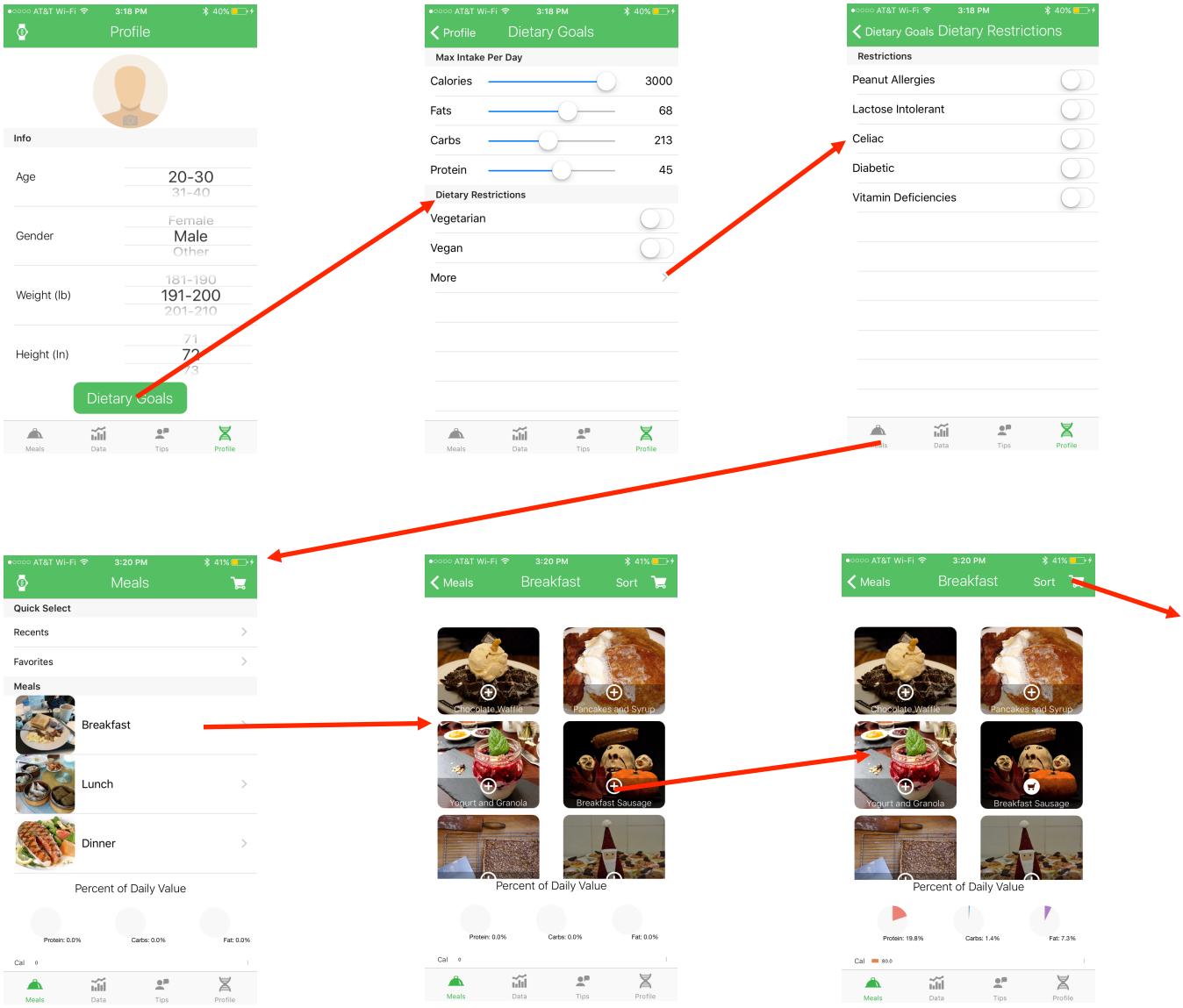


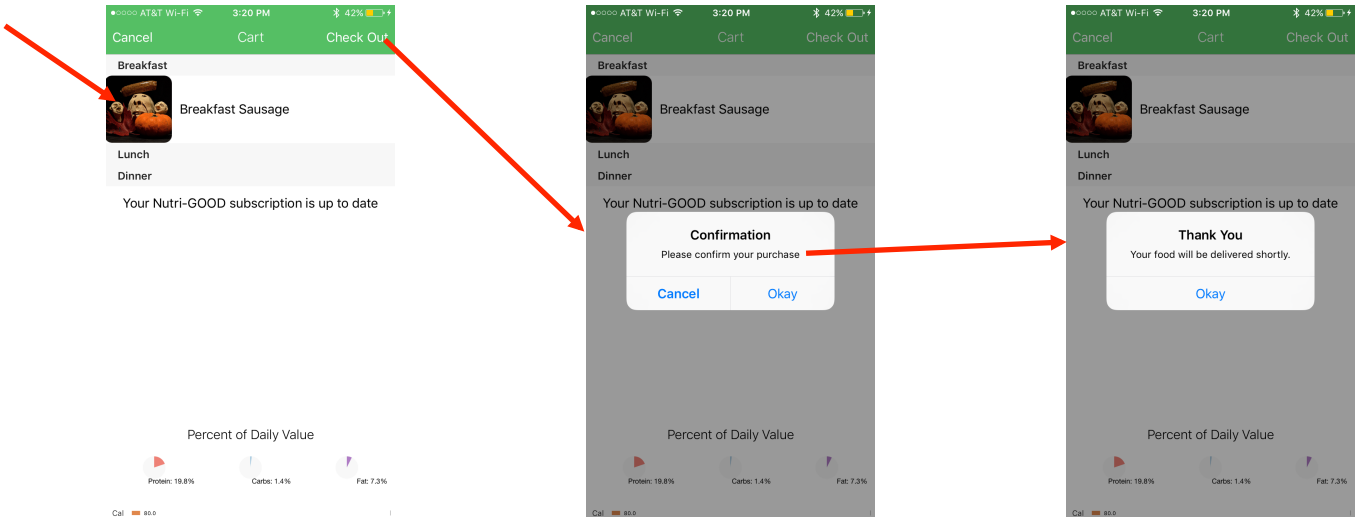
3. Selecting a well-balanced meal (complex):

Selecting a well-balanced meal involves the user entering a degree of personal information that a fully realized version of this application would use to conduct the relevant nutritional analysis, before putting together a personalized meal set. This involves navigating to the “Profile” page, and entering gender, age, weight and height. If the user would like to further customize their dietary goals, they may do so, adjusting their daily calorie, fat, protein and carbohydrate intake,

or opt for a variety of different meal choice options, including vegan, vegetarian, diabetes, peanut allergies, etc.

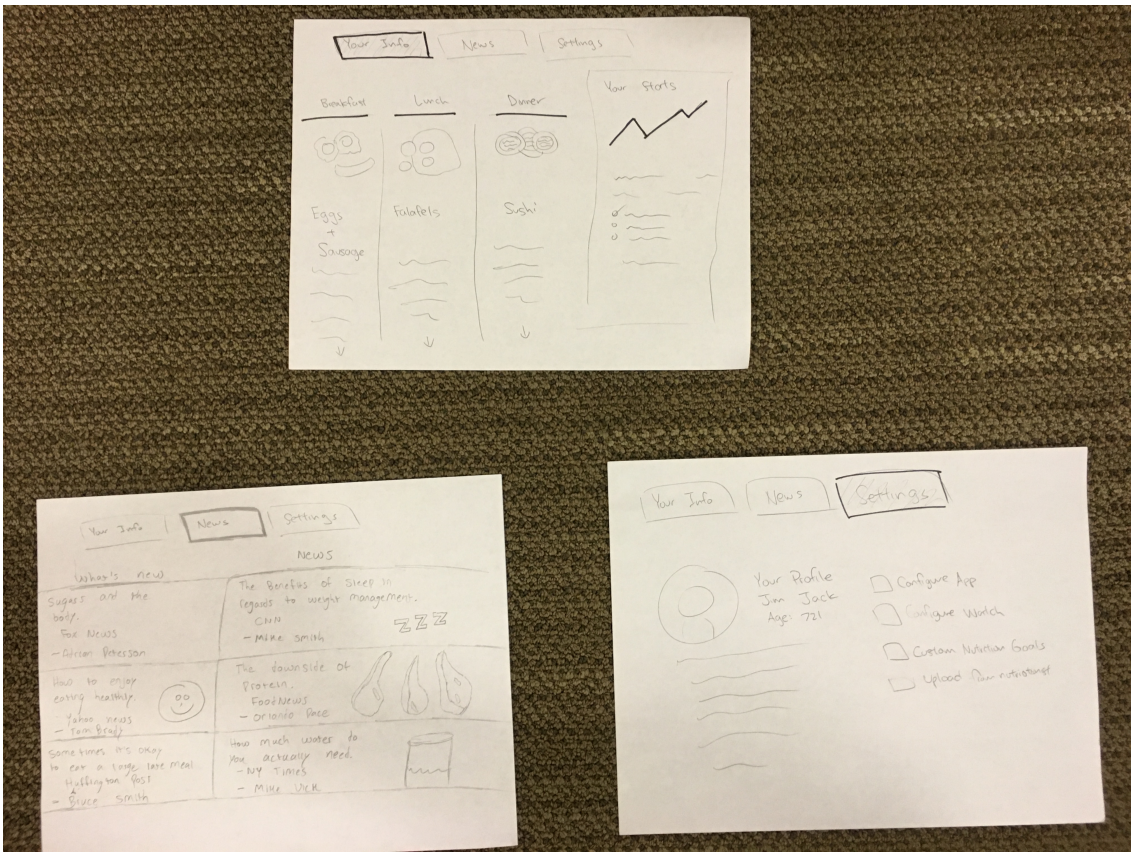
Back on the meals page, the user must choose “Breakfast,” “Lunch,” or “Dinner.” From each of these menus, a selection of meals is made available. There are two ways to add a meal: tapping the small, white “+” button on the image of the meal sends it to the cart directly. Alternatively, tapping on the image of the meal directs the user to a more detailed screen about its nutritional content, and gives them the opportunity to either add it to the cart (again using the “+,” this time larger and in green) or add it to their favorites.





Design Evolution

Sketches

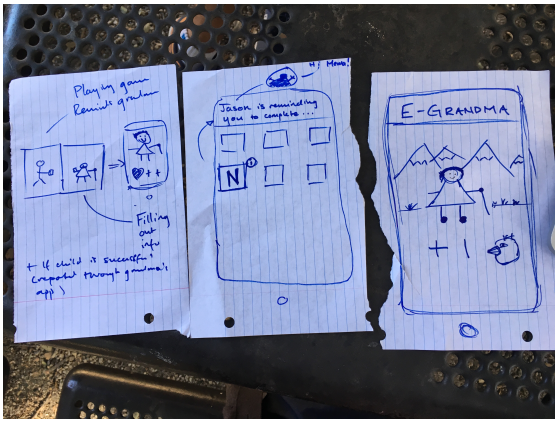


In our sketching, we prioritized quantity over quality, to become acquainted with as many different ideas as possible. Our first three main design ideas included two possible designs of an iOS application, and a website. We decided to go with an iOS application because we felt a haptic interface of the iOS format was the best way to abstract away complexity, and translate

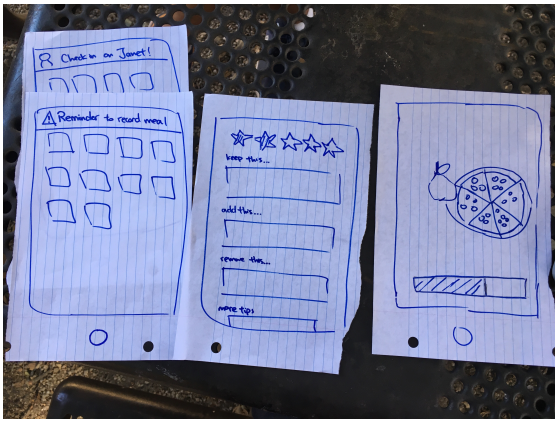
the task flows we were hoping for into action. We also decided to pair this with a wearable application, with the forethought that wearable technology will soon have meaningful contributions for the field of blood-glucose tracking, and that we might be able to incorporate this into later versions of our prototype.

1. Experience Prototype

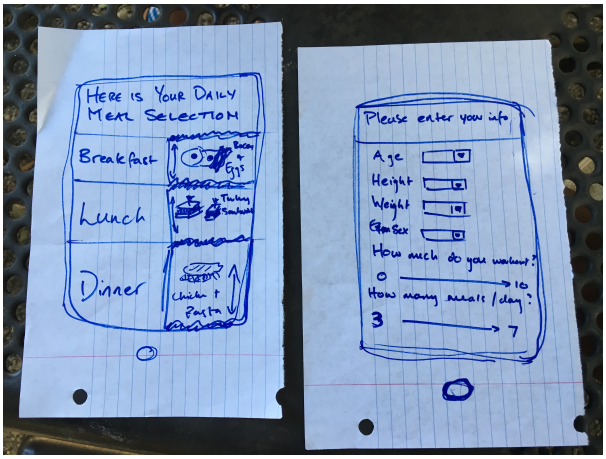
A. First Prototype (Gamifying Nutritional Management



B. Second Prototype (Journal Logging + Interacting with Physician)

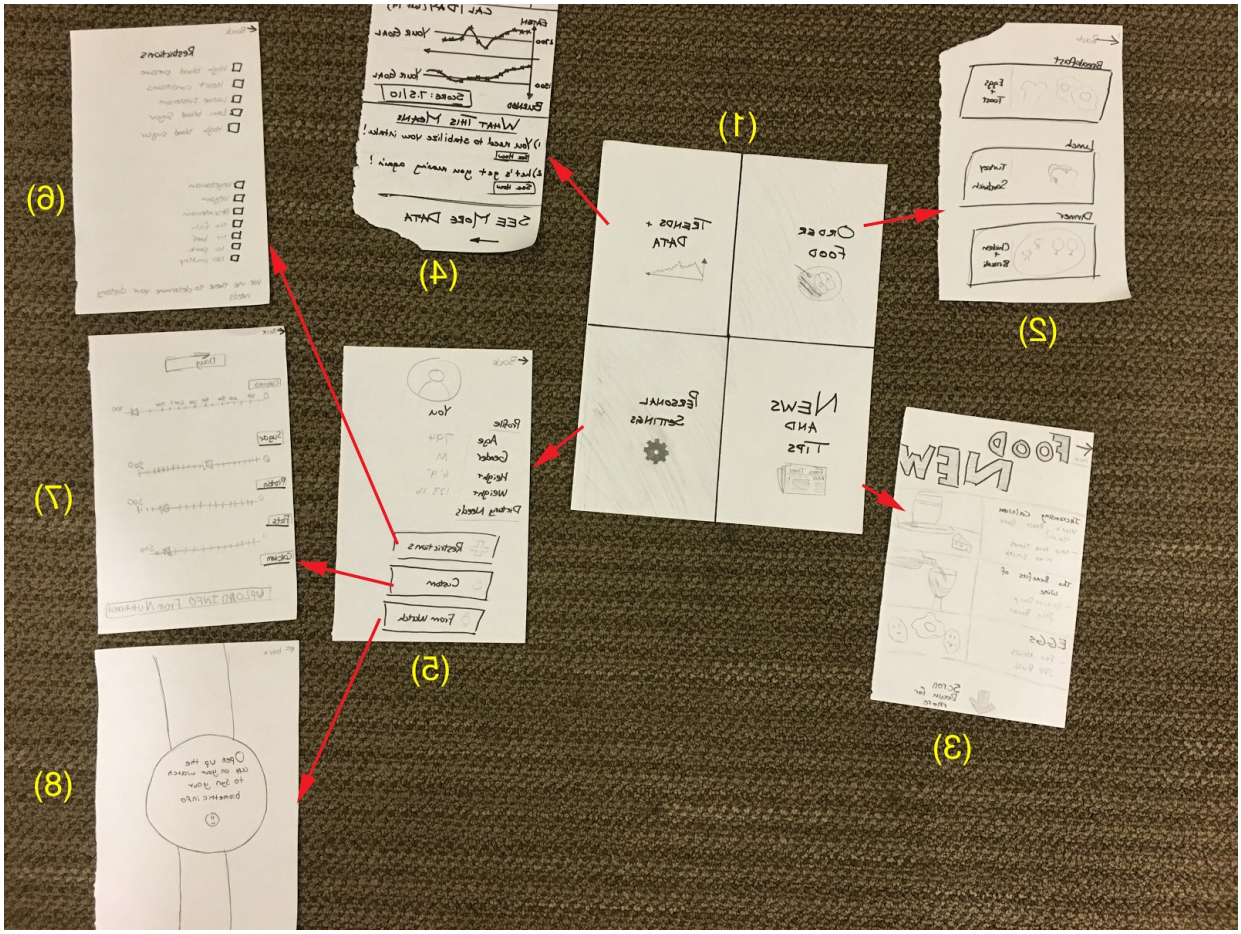


C. Third Prototype (Meal Selection)



We made our experience prototypes on paper, and ran three different prototypes based on our need-finding interviews and our point-of-view analysis. The first involved linking the nutritional maintenance of the user to a video game played by their grandchildren: the idea was that as the kids played the game, they would get to a point in the storyline where checking in on their grandparents was integrated into one of the game tasks. The second prototype was a platform that involved users reporting nutritional habits to a primary care physician through a combination of photo-tracking and meal-logging. Our third prototype was a personally-tailored meal selection application that later became Nutri-Good.
Based on the feedback we received from our experience prototyping, we developed some point-of-view statements to encapsulate the ideas of our interviewees (see POV write-up for more details). It was clear that Nutri-Good was the most suitable application to meet the needs of our interview participants: they wanted to be in charge of managing their own nutrition, and many of them did not have grandchildren, which proved to be a flawed assumption for our demographic

2. *<u>Low-Fi Prototype</u>*



We used the interactive application, "Pop!," to quickly transform our experience prototypes into a functional user interface. Our medium-fidelity prototype used *Marvel* to bring many of these features into an application-based UI, so much of the description that follows for the low-fidelity prototype describes the exact functionality of the Medium-Fidelity prototype.

Our low-fi prototype is a sketch representation of an iPhone application that allows the user to navigate to different pages depending on the needs of the user. Each of the numbers in the photo above will be referenced and described below.

The main screen of our prototype (1) is the paper with the four quadrants. To navigate between pages, the user always starts from this home page. The idea behind this is that we've heard from many people that they get "lost" in the app, and they can't find anything after they're a few screens in. To fix this, we created this main menu that easily and simply lists out each of the functions of our app. We will make sure that this page will be reachable from any of the screens in our app so at any point, the user can jump back to this page.

The users would mainly interact with the app through touch and voice recognition, giving the user flexibility in terms of how they choose to get information from the application. Many of the pages would be organized around blocks of text and pictures, ensuring that users would not waste time finding hidden icons that would return them to the homepage.
The meal selection screen (2) boasts three swipeable views. This interaction is a bit different than the other pages, but it will allow us to house lists of foods without overwhelming the user. By swiping and tapping, the user can make a choice on their desired meal.

Another screen would present information from the news (3). The first thing that the user will see is a list of headlines of news articles with relevant images, with each pair of article and image enclosed in a box (similar to Windows 8 app icons) . These articles would provide the users with evidence and references that they could pursue to learn more about nutrition, and would be primarily concerned with health and nutrition that is most relevant to their personalized well-being, helping users to comb through the massive amount of data that is present online.

The data and analytics (4) is the page that evaluates the user's nutritional/food intake on a weekly, daily, or monthly basis. This page offers quick tidbits on what the user is doing well, what the user is not doing well, and what the user can do to improve. In addition, we want to include graphs and other images to help the user visualize the amounts of nutrition (calories, proteins, vitamins, etc.) that they are consuming. The user can specify the type of nutritional information that they want to track on the settings page.

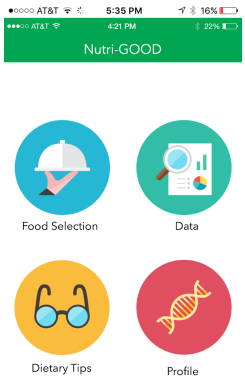
In the settings page (5), we ask the user to input personal information so that we can custom tailor their meal based on their age, gender, height, and weight. Beyond this, there could be other needs that could affect their dietary needs. Screens (6), (7), and (8) are three different ways in which the user can configure these advanced parameters.

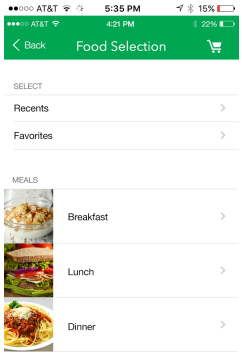
One way to configure these additional needs is by checking things off a checklist. In the restrictions page (6), the user can mark off medical conditions or personal traits that apply to them. We use these factors to figure out the best meals for them.

Another way of configuring is to manually adjust their desired intake levels of calories, fats, sugars, and carbs.(7) This information could come from a nutritionist, and it allows for some fine-grained tuning.

Lastly, we want to embrace the use of wearable technology. We envision a wrist-based device that can easily sync biometric information about the subject. This watch would be able to get details such as blood sugar levels and perhaps blood pressure. If the user possesses such a device, this information should be automatically synced. Screen (8) just informs the user that such a feature exists.

3. *Medium Fi Prototype*





Our Medium-Fi Prototype was more or less an iOS-type version of our low-fidelity prototype. We used the *Marvel* software package to create this mock-up. Many of the key features were hard-coded in, which limited user interaction. However, this stage in our iterative design allowed us to what design features worked on an IOS application and what did not work. This led to two key major changes in our design for the application: (1) the visual affordances on navigation (2) data representation.

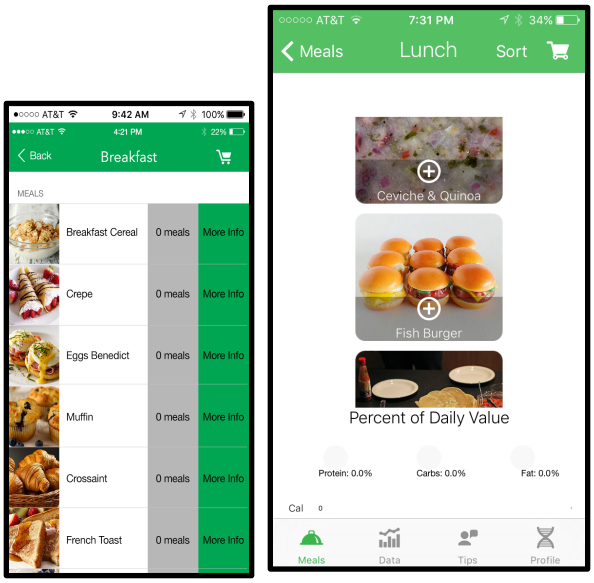
We changed the menu to provide more visual affordances on where to tap to navigate through the application. A simple, clear background focused on what regions to tap on to move to different a page. In addition, in the section of tips and data, we decided to include arrow icons on each news header to emphasize that the text and images are linked to articles that could help the user learn more about nutritional management.

In low-fi prototype, data and how the data should be interpreted was located on the same page. We decided to format the data in a way that the user can draw their own conclusions and to learn more about their nutrition through the “news and tips” section. As a result, we organized data in a way that different elements of their nutrition can be compared and contrasted, such as comparing the number of carbs that they ate with the number of carbs that they burnt.

Major Usability Problems Addressed

1. [*H2-2. Match between system and the real world*] [3]

Brief Description Of Violation: On the Breakfast selection page, it is not obvious that each “0 meals” can be tapped on to change the number of meals.



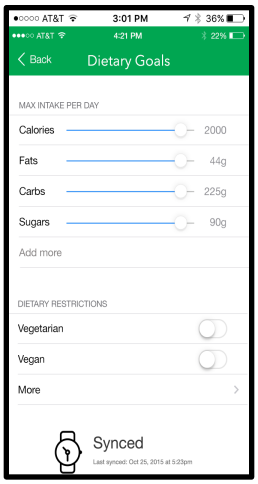
A. Medium - Fi *B. High - Fi Prototype*

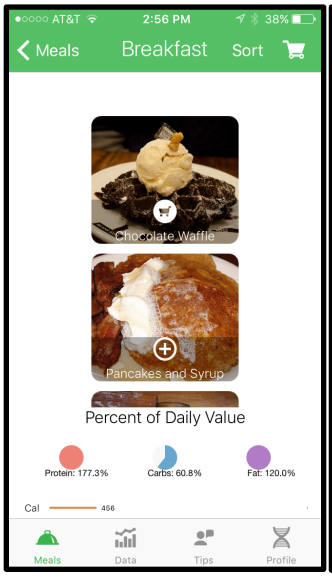
We decided to reduce the option of selecting the number of meals to simply choosing a meal and ordering it once during a single transaction. Unfortunately, the system does not prevent the user from ordering multiple times and does not stop the user from choosing multiple breakfast options, dinner options, and lunch options.

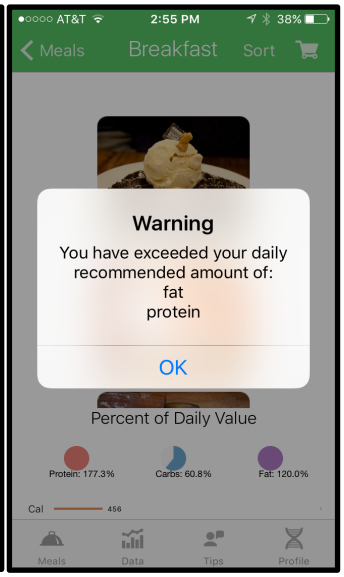
Both designs offer direct and simple information to the user about the meal selection process. In the earlier design (*Medium-Fi)*, we did not provide enough visual affordances to help the user identity that the option of the “number of meals” can be selected. Therefore, the recent design (*High-Fi*) emphasizes on what the user should choose, namely the meal, and proceed forward to checkout. However, in our final prototype, without proper communication from the application, the user can accidentally decide to choose more than one meal in a single order. The design needs to better communicate how many meals the user can order and when these meals can be chosen.

2. [*H2-4. Consistency and standards]* [3]

Brief Description of Violation: On the Update Dietary Goals page, the user chooses max intake (e.g. calories, fats). It is not obvious from the prototype how changing these settings affects functionality of ordering and viewing meals in the Food Selection setting.







A. *Medium-Fi*	*B. High-Fi (Visual pie graphs of intakes)*	*C. High-Fi (Warnings on dietary restrictions)*

Corrections & Changes:

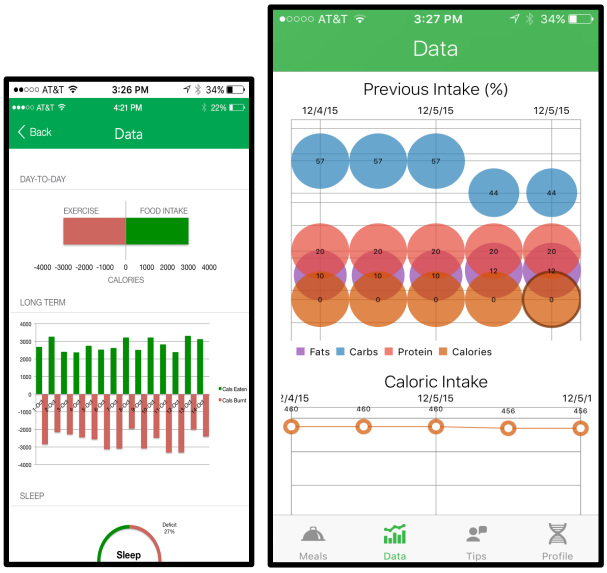
The ordering and viewing of meals is not changed within the food selection section. Instead there are different thresholds that the user will be notified of when selecting their meals. There is also a visual at the bottom of the food selection page that shows how these max intakes are being met.

There is a lack of interaction in the earlier design. As mentioned in the violation, the user can change and manipulate a lot of information on the application. However, the user has no way how these changes affect their nutritional management and meal selection process. The update design now includes notifications and visuals that reflect the dietary restrictions and goals of the user. As the user selects and orders food, the app tracks the nutritional content, provides warnings when the user is about to exceed a maximum intake, and updates a visual to show what and how much the user has consumed.

3. [*H2-6 Recognition rather than recall*] [3]

Brief Description of Violation:

On the data page, there is no information about the nutrients eaten. For a user to know this, they would have to remember the nutrient values for each individual food to make sure they met their target nutrition goals. Furthermore, one of the tasks is “knowing what you ate”. Right now, users also have to recall what meals they actually ate each day or even in general, as there’s no place to see the meals you have ordered in the past, or assign a day to when you ate them. Because this functionality doesn’t exist, there is no way to know whether you actually met or will meet your nutritional goals each day.



A. Medium- Fi *B. High-Fi*

Corrections & Changes:

The data page has graphics for protein, carbs, and calories eaten by the user. When selecting a meal, there is also individual information on the food being selected. If the meal is selected for the cart, there is a visual at the bottom of the page that keeps track of how nutritional content is being met.

The initial, earlier design (*Medium-Fi)* was really static and limited in terms of what the user can see and understand from the information. And with a lot of information packed together, it was hard to interpret any information regarding the health of the user. Is the person eating well? Has the user’s carbs eaten increased over this weak? In addition, the earlier design (*Medium-Fi)* had only two colors. These colors led people to assume that the data reflected good and negative points and instances of a user’s nutritional diet. Unfortunately, these color

were not meant to illustrate this concept. Health is a holistic evaluation of one's healthy habits and routines over an extended period of time. To help provide this type of evaluation, we decided to update the data management section to include data points that tracked what the user ate over time, on a weekly basis. In addition, the new management design allows for side-by-side comparisons of how much carbs, proteins, fats, etc. consumed by the user.

The updated design's (*High –Fi)* visuals cues and aids need to do a better job at communicating the nutritional information. This design continues to have the problem of packing a lot of information packed into a small region. In the "previous intake" graph, the circles are bunched up together, and information is overlapping, making it difficult to see what is being shown and what is important. Currently, the size of the circles does not reflect the amount of nutritional content consumed by the user. If the size of the circle reflect the corresponding percentage of nutritional content consumed, this will help the user visually understand the nutritional makeup of their eating habits.

Other Changes & Updates:

1. *Improving Visual Affordances to Personalize and Update Profile and Dietary Goals*

In the previous design (medium-fi prototype), the user can click on the age, gender, or weight section, and then update this information to reflect his or her own information. However, we wanted to provide better visual cues that help the user see what information on the application can be manipulated and changed by the user. In addition, we wanted the process of updating information to be faster. Therefore, in our updated design, we included menus for each section of data that can be changed and filled it out with pre-filled values that user can select.

2. *Making Nutritional Management Educational and Engaging*

One of our three main tasks focused on learning how to eat and manage your nutrition better from their meals that they choose. In our earlier design, our prototype had a section known as "dietary tips." This section began with a list of options that the user had to scroll through to find the article that they needed. However, we want to tailor our application to specific needs, concerns, and questions of the user. As a result, we wanted the "dietary tips" section to focus on the questions and needs of the users. We prototyped a tip-based AI where the user can ask for a suggested meal or a nutritional tip and the AI would directly provide direct and clear answers and tips to the user. Some of the tips include links to articles that reference different ideas as possible. Rather than giving users entire articles to reader, we able to give users a direct channel towards clear answers to their questions and curiosity.

Prototype Implementation

The entire application is implemented through Swift. Different IOS libraries and templates are used to create the data that is shown to the user. XCode is very helpful to those who are familiar with building native applications on the IPhone. However, it is difficult to sync changes that are made by different individuals to the same project. Furthermore, some of the updates that are made are not reflected on the master folder.

All of the nutritional information and data is not completely accurate. In addition, the watch is only simulated through XCode. The tips that are shown to the user are hard-coded into the system. All of the tips are stored in a lookup table, and when the user asks for a tip, a random tip is selected from the lookup table and shown to the user. In addition, the database for the meals are completely hard-coded. Our system yet has not implemented a robust filtering system based on the personal needs of our user.

Because of time constraints, some features were not implemented in the final prototype. Currently, the application is personalized based on dietary restrictions. However, in the future, we would like to further personalize the meal selection process and data management through age, gender, height, and weight. In addition, the watch is not working at the moment. If this project is pursued further, we will like to have the watch sync the user's biometric information and use this information to further customize and personalize the meal selection process.

Summary

Today, information is plentiful and everywhere. Many people are overwhelmed at the amount of the information that lies on their fingerprints. Technology has been used to get us access to this information. We believe technology can be used to understand this information efficiently. Through our initial need finding and empathy work, we discovered that the elderly have a tough time managing their nutrition. Although they have access to numerous sources of information where they can begin to look for nutritional content, many of these people do not know where to begin. In order to help the elderly provide a clear channel towards managing their nutrition, we initiated our iterative design process with the goal to come up with a solution simplify the access to nutritional data and the extraction of actionable goals from what they ate for the purpose of improving one's health.

CITATIONS

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