

INVENTory: Project Report Part 4
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1. EVALUATION TECHNIQUES

We tested the usability of our meal planning application, Sous Chef, with a focus on assessing users' ease of navigation, clarity of UI language, and readability of system feedback. Our questions and observations sought to uncover users' level of confidence that the tablet application was able to accommodate their needs and had understood their requests.

Format of the study

Our usability test consisted of three parts: After administering a consent form, we asked users to complete a series of use cases couched in lifelike scenarios. Secondly, we administered a questionnaire to gather quantifiable subjective feedback about their experience navigating the interface. Finally, we wrapped up with an semi-structured interview to explore issues of disorientation, navigational inconsistency, feedback and utility.

User Characteristics

We selected users from among Georgia Tech students who had experience using touch screens and were familiar with their UI conventions. We also selected users who planned and prepared meals for themselves. Early on, we defined our target users as technologically savvy people willing to adopt a digital assistant into their meal-planning process. We also decided to cater our design to our first persona--a busy graduate student frustrated by spoiled leftovers, with little time to plan meals ahead, but cash-strapped and in need of a way to curb mounting expenses from dining out between classes. A pool of five students from Georgia Tech adequately represented this population. Unidentifiable descriptions of these participants are listed in Appendix A.

From error counts to think aloud: changes from Part 3

During part 3 of this report, we described a usability test that was timed and video recorded. However, we altered our script once we determined the real gains we'd acquire from collecting subjective feedback outweighed gains from objective measurements like error counts and completion times. We encouraged participants to think aloud so we could pinpoint moments then the UI had degraded. Users familiar with tablet interaction conventions could also offer valuable suggestions for improvement based on personal experiences with similar applications.

Critical Use Cases

We asked users to complete five benchmark tasks while thinking out loud.

Add items to the inventory

Remove items from the inventory

Participants were briefed on the mechanics of a simulated smart pantry shelf on the table near the prototype setup. The smart shelf consisted of a file folder for the shelf, cutouts of milk and peanuts to simulate items. Participants were told that the application automatically registered the presence and absence of items on the shelf. Originally, Mason had created a working prototype that registered the addition and removal of items and provided feedback on a LCD screen.

However, this prototype was fragile and required calibration to work correctly, so it remained a concept that was not introduced to participants during user testing. We asked users to complete these inventory-management tasks to understand how readily users would integrate automated sensor technology with the digital devices used to search and filter input data.

Search for an item that you want to cook now with these two ingredients.

Search for an item that you cannot cook now using these two ingredients.

In each case, participants were briefed with a scenario in which the task would realistically take place. We tested two scenarios to discover whether the UI clearly communicated a distinction between recipes that could be prepared immediately and those that could be prepared with more ingredients. We also wanted to see if the time to complete the recipe-selection task would decrease with practice. For this reason, we never administered these two tasks in sequence.

Add a new user profile

Users were handed a cue card with the name of a user, James, and parameters to enter for the macronutritional benchmarks associated with this user's profile. We administered this task to evaluate the ease of managing multiple profiles within one application.

To conduct a usability study that would produce actionable results under constraints of time, we focused and contained our usability study to the search and filter features of the meal planning application. We did not test the scheduling feature of Sous Chef. Technically, the meal planning task flow is similar to the recipe search flow, with the exception that the meal planning task begins with a calendar view. We also reasoned that the persona we designed for had limited time and would use the search for recipes to prepare immediately, rather than exhibit a pattern of advanced meal-planning.

Scripted Language

We were careful to script our prompts so that the words we used to describe the scenarios and administer tasks reflected, but did not repeat, the words on the interface. For example, we asked users to select a "main course" instead of an entree, and we asked them to select a recipe they "could not cook now" rather than a recipe they could cook "with more ingredients." This added a layer of complexity to the exercises in order to deter users from selecting items based on matching words, and encourage them to make decisions based on their needs.

2. RESULTS

What follows is a summary of key findings from our scripted usability tests and cognitive walkthroughs. Charted results of our questionnaire are included in Appendix B. The full coded data set is in Appendix C.

The subjective feedback participants expressed verbally and visibly through body language is grouped by the tasks that solicited it. Within the groupings we summarize general feedback related to navigation and clarity of language in more depth. The results are presented by task in the order of their increasing difficulty for participants.

Customize User Preferences

Participants identified the easiest task as customizing a nutritional profile. Multimodal inputs allow users to adjust numerical values through text boxes or sliders. Users said they preferred to use sliders on a touch screen because it's faster, but they said having the option to input precise values with a digital keypad was also nice. Users were satisfied with the feedback they received when they moved the sliders along the scale, and were able to accurately approach the target value.

Navigating to this screen from the home page, however, proved difficult. Participants were not confident that "Preferences" was the correct entry point to customize user profiles. They selected it through a process of elimination. Once they arrived on the page displaying the currently selected profile, users paused to assess how they might add a new profile. Curiously, most participants immediately clicked the arrow to release a drop down menu containing the names of all saved profiles, despite the "new profile" button located just to the right of this menu. One participant paused his thinking aloud to distinguish between two identical buttons in proximity. These buttons are labeled "edit profile" and "new profile." He suggested relocating the "new profile" button to the top of the screen and away from its current spot next to the edit button

Inventory Management

Remove item

Participants completed this task without difficulty. However, they were hesitant to click the minus-icon next to the item despite the lack of another option to remove an item through the UI. At the onset of the experience, each participant was told that the smart shelf prototype automatically removes items from the digital inventory that are removed from the shelf. But only one participant immediately removed the prototype milk carton from the shelf before thinking to use the "Manage Inventory" option through the tablet UI. This participant was also the only one who added an item without using the tablet UI.

Add Item

Four out of five participants used the UI to add the item, despite being prompted that anything they added to the shelf would automatically be added to their pantry. When asked why they chose to use the UI instead of simply removing the item from the shelf, participants laughed and said they weren't used to that sort of magic interaction. They said feedback for adding and removing items sufficiently confirmed that the system had performed the operation.

Recipe Selection

Through observation and by analyzing the pattern of responses from the questionnaire, participants clearly had the most difficulty with tasks related to filtering and selecting recipes. Moreover, each participant identified the same issues related to the ambiguous origination of data on these screens.

Users improved the time to complete recipe selection tasks the second time they completed them, but while using the UI they reiterated that it was confusing. This suggests that the design is learnable but its procedural flow is unclear.

The suggested recipe's surprise appearance

Participants were thrown off by the specific content that appeared on screen after they clicked "Cook Now." This screen displays one "Suggested Recipe" pulled from the user's meal plan, but this title is visually indistinguishable from "Find Something Else," which allows the user to continue on to a filtered search. Users spent more time on this screen than we had anticipated. After users encountered this unexpected display, they showed less confidence making selections for the remainder of the recipe-selection task. They moved slowly and deliberately through the tasks.

Straightforward preliminary recipe filter

Clicking through to "Find Something Else," users choose the type of recipe they want to cook. Our script directed users to look for a "main course" and participants had no trouble interpreting this task and selecting the correct option, "Entre" as the correct option. One user was distracted by the slider to adjust serving size, and he automatically moved the slider before recognizing he had completed the task. While thinking aloud he said, "So I assume I leave this serving size at one, since I'm just cooking for myself, right?"

This task was assigned before creating a new user profile set with this default, and before any recipe results displayed prices and nutritional information limited by the selected serving size. Therefore, the origin and purpose of this information was a mystery to this participant.

Main recipe search screen: Preselected ingredients

Users were all unsure of how to proceed with the task of selecting two ingredients by which to filter results when the "Selected Ingredients" box was pre-populated. No user was able to articulate an understanding that these ingredients reflected all items currently in their inventory. One user clearly stated his confusion was a result of the fact that the box was titled "Selected Ingredients" when he had not selected anything yet.

First, participants attempted to filter ingredients by tapping individual items in the list. They expected these items to be selectable, and only after discovering they were static did they select the "change" button. One participant never identified this button as the correct action, and needed to be coached through his mounting frustration.

Xuejiao changed her prototype so that users starting on the recipe search screen were greeted with a blank screen without preselected ingredients. Her additive approach to search was better

received than the prototypes with preselected items. She essentially prototyped the re-design we imagine where a “Search Recipes” screen is clearly separated from the list of recipes that can be prepared immediately. We describe in later sections how we might implement this new information architecture with distinctions between results derived from user input versus suggested recipes derived from existing inventory items.

Ambiguous coding of selected ingredients

Once users clicked “Change” to filter ingredients, they encountered more uncertainties about the mapping of their actions to the change in system state. They were unsure whether the items they selected would be added or removed. The blue and white color coding proved an ambiguous indication of selected and deselected items. The classification was only made clear after users closed the window and compared their selection to the resulting list within “Selected Items.” Users then reopened the filtering window to adjust their selections to meet the assigned task.

Findability of recipes to make with more ingredients

Participants did not immediately equate the bar at the bottom of the screen labeled “With More Ingredients” as an actionable button that could slide up to reveal more recipes. One user said that the bar did not look like a conventional button or tab, and that it didn’t share the characteristics (color and shape) of other actionable buttons in the UI. Stronger visual cues such as a rounded shape, a sheen or depth could help signal the header’s capability of enacting a changed state when pressed.

Ease of selection

Users were able to decipher the meaning of the graphics for each recipe and make selections based on price and nutritional information displayed. Our observations of users’ confidence at this point were bolstered by the majority of participants’ agreement to statements in the survey that “using this application, I am less likely to prepare meals I consider unhealthy” and “The cost of each recipe in the search results was displayed in sufficient detail to make confident decisions about what to cook on a budget.” However, one participant said he did not know what the red line indicated and guessed it might be a national health guideline. He also said he could assess which recipe had the least fat from among all the results, but could not say exactly how many grams of fat were in each recipe since the graphs lacked numbers.

Navigation

Using Back/Next buttons

Users could not return to the home page easily using the Back and Next buttons. Specifically, from the initial recipe-type selection screen, it was impossible to navigate to the home screen without following the task through to the end.

One participant selected “Next” without yet selecting a recipe. Thinking that the Wizard-Style interaction would continue in the same fashion as the previous screens that asked for discrete input followed by pressing “next,” he was confused by the sudden availability of operations available to him on this screen. He pressed “Next” out of habit.

Objective Measures: Time to Completion

Since we asked participants to think aloud, we did not specifically measure user’s completion times with a stopwatch and compare these with target completion times. However, we did notice users spent more time than we had expected when selecting items from the main menu on the home screen. Especially when they were tasked with adding a new user profile. It was not immediately clear that selecting “Preferences” was the appropriate choice. “Preferences” appears last on the list of four menu items, requiring users to read through all the options before happening upon it. Participants also used a process of elimination to deduce the answer, and hesitated to select it.

3. DISCUSSION & INTERPRETATION

Implications with respect to design

Generally, users reported that the feedback they received from their selections was sufficient and clear, but discovering *how* to make a selection that would help them achieve their task was another matter. In other words, our application closed the **gulf of evaluation** and communicated the system state of the user, but the options presented and the means of navigating the application widened the **gulf of execution**. Looking critically at the results of our usability study, we take the following as implications of users’ behavior and good starting points for further iterations on design:

Clarity of language

At several points, participants could not identify the correct step to complete a task. Through interviews, we deduced that the problem is partly due to overlapping or ambiguous language suggesting multiple entry points for the same task.

For example, when tasked to add a new user profile, the correct menu item, “Preferences,” did not immediately stand out as a way to customize personal settings. One participant said that he associated the word “preferences” with general application settings (especially since it was the last item on the home screen). He suggested a more apt phrase like “User Profiles” replace it.

Additionally, confusion ensued when users were tasked with filtering a recipe by two items in their inventory and then selecting a recipe they could not cook immediately from among the results. Users deliberated between main menu options to “Cook Now” or “Schedule Meal Plan.” Either entry point leads to the recipe search screen, but users who start at a meal plan are first presented with a calendar. Users navigating to this screen felt no closer to selecting recipes from ingredients because they could only select a date. This confusion demonstrates the need to

unambiguously articulate the function of main menu items with precise language (ie. “Manage Meal Plan” instead of “Schedule Meal Plan”). However, it also speaks to a more fundamental issue of information architecture and conflated functionality that we address throughout this report.

Users on the recipe-search screen were thrown off by the label “Selected Ingredients” atop a list of ingredients they had never, in fact, selected. These ingredients comprise the user’s total inventory, so a more precise header like “Your Ingredients” could possibly dispel the cognitive dissonance participants experienced.

Clarity of navigation

Users indicated on the questionnaire that it was more difficult to navigate between screens and return to previous screens. Navigation was limited to the Back, Next and Done buttons. Users might feel less disoriented and trapped in a workflow if these buttons indicated what exactly the “next” step is (“Next - View Recipe”) or what they can return to (“Back - Select Meal”). Since certain users also said that pressing “back” repeatedly to return home was cumbersome, the navigation could benefit from a persistent toolbar.

Persistent Links to Landing Pages

While the Wizard Style interaction works well to guide users forward through a process, it can strand the user in the middle of a process if he or she wants to bail out completely. The difficulties users had returning to the home screen indicate that a persistent toolbar with links to main landing pages would be a welcome addition to users. This ability to switch screens in the middle of a process is especially useful in scenarios like this following: While searching for recipes, the user realizes she needs to set up a new user profile for a vegetarian guest who will be joining for dinner in a few days. Currently, the user has to press the back button to return to home, and from there create a new profile. A persistent toolbar with quick links to the user profile and recipe search screens would allow them to quickly toggle between tasks in a dynamic planning environment. The Wizard style persists to accommodate users who prefer the guidance of sequential prompts, but expert or distracted users could interrupt their current tasks non-destructively and according to their situated needs.

Contextual operations

To address users’ hesitancy to complete actions that created or destroyed information, the app’s design could encapsulate certain functions within contextual operations. These operations would only appear as selections after the user carried out a previous operation that would require this additional functionality. Contextual operations, such as an undo button that appears after users delete an item in their inventory, might increase user confidence if they knew deletions due to misplaced fingers were not final.

Contextual operations like undo can help with error recovery, but they can also prevent users from making errors in the first place. When participants deliberated about which button to press in order to create a new user profile, a few described their trouble as stemming from the back that the “new profile” button was identical and near to the “edit profile” button. A slight layout adjustments that placed the “new profile” button above the currently selected profile would help. Going further and removing the “edit profile” button from the taskbar completely, the UI could exploit users’ tendency to select options from the select list, and would restrict users option to edit values only within the context of the currently selected profile.

Contextual Information

Similar to the concept of contextual operations is the idea of contextual information. During our cognitive walkthroughs in class, our peers were confused by the lack of clues indicating what each menu item did and how “Cook Now” differed from “Schedule Meal Plan,” for example. However, during usability testing, participants were overwhelmed by the amount of “help” text on the page at any time. This implies that our design must strike the balance between too much and not enough information about the function of each item on screen.

Working within the constraints of a touch-screen tablet application, we are unable to exploit the affordance of contextual help with a hover tooltip. Additionally, the screen real estate on a tablet comes at a premium since horizontal scrolling is not a conventional trope for the medium. The solution we see is to provide a persistent switch to toggle help on and off. This switch could be located in the global toolbar mentioned earlier.

A specific instance where contextual information could clarify the data presented to users is on the recipe results page. Users were able to compare relative nutritional quantities by comparing the length of the bar charts for each recipe. However, a few noted that the numerical quantities were impossible to ascertain. If each recipe result had an icon that revealed a pop-up of explicit values for nutritional parameters, the UI could fulfill users’ desire to focus on specific information within the context of recipe search results.

Intermediary Screen: The Recipe Suggestion

We designed our app’s workflow to align with the series of steps people complete in the process of selecting recipes without the use of technology. The “Cook Now” option first suggests a recipe based on the user’s saved meal plan. If the user decides to break from their plan, they can select the second option on screen, “Find Something Else,” which takes them to the landing page for the task of recipe selection.

As mentioned previously in our observations, this intermediary screen between the user’s decision to “Cook Now” and their ability to search was jarring. Participants got a recipe before they entered any parameters. This order ran counter to the conventional sequence of steps for

online search, where users enter ingredients before they get results. Users were instructed to search for a meal with specific ingredients. Some users expressed their confusion in the overall process, stating that they expected some sort of search box or query for the ingredients.

This confusion carried through for the remainder of the recipe-selection task. This unease was the team's first indication that we needed to clearly differentiate the recipe suggestions originating from three different sources: the user's scheduled meal plan, items in the inventory, and input parameters through a recipe search screen. We return to this issue repeatedly in this report, since it is the cornerstone of our application's functionality and lies at the heart of its flawed usability.

Unknown origin of pre-populated search criteria

Once users arrive at the main recipe search screen, the application presents recipes to prepare immediately using currently stocked food items. This screen sought to emulate conclusions people make about recipes they can prepare immediately after a quick visual scan of one's pantry. The application harnesses the power of computation to take inventoried items and filter a database query by those parameters. The calculated search results seek to reduce the cognitive burden on a user who, without technology, must tap their food literacy to identify possible combinations.

However, user testing revealed that emulating a non-technologically mediated cognitive workflow actually defied users' expectations for the digital medium's search functionality. Arriving at search screen and seeing results before ever entering parameters was disorienting. As one participant said, "This is strange, I see this says 'Selected Ingredients' at the top and lists a bunch of items, but I haven't actually selected anything yet." The Wizard style dialog that ushered users up to this point essentially disappears.

Prototypical Discrepancies

There was a disconnect between our virtual pantry and the physical pantry platform we used while testing. The ingredients presented as being in the user's virtual inventory were not present on the physical pantry platform which led to further confusion about the search results.

Changes made during testing

After doing an initial draft of the design, we ran the first cognitive walkthroughs. One of the major concerns that was repeated was the lack of instructions associated with each of the task options in the home screen. Below are the screenshots of the initial design and the revised design.

<Home - Original. png>

<Home - Modified.png>

The home screen was modified to include appropriate instructions under every link. This allowed users to alleviate their confusion by looking at the description before clicking on the link.

The Recipe Selection screen was another screen that underwent heavy modifications over the course of cognitive walkthroughs and user testing. The screen was originally designed to be a simple step with very focused and limited options that are filtered based on user preferences.

<Cook Now Iteration 1.png>

However after two rounds of cognitive walkthrough, the screen went through multiple changes and developed into the most feature rich screen in the application.

<Cook Now Iteration 2.png>

<Cook Now Final design.png>

The current design now has options to add or remove individual ingredients for the recipe filtering, sort options, nutrition information for all recipes allowing side by side comparison and an option to quickly change serving sizes to filter the recipe options.

The preferences screen also went through changes to accommodate additional options, as well as layout changes to better reflect flow of control/hierarchy.

<Preferences- Original.png>

The name of the selected profile is now featured prominently in the top, along with a dropdown that shows the currently active profile. Explicit options to edit nutritional requirements and create a new nutritional profile are provided which were hidden in the original design.

<Preferences - New.png>

Changes made with more time

High Fidelity RFID Shelf

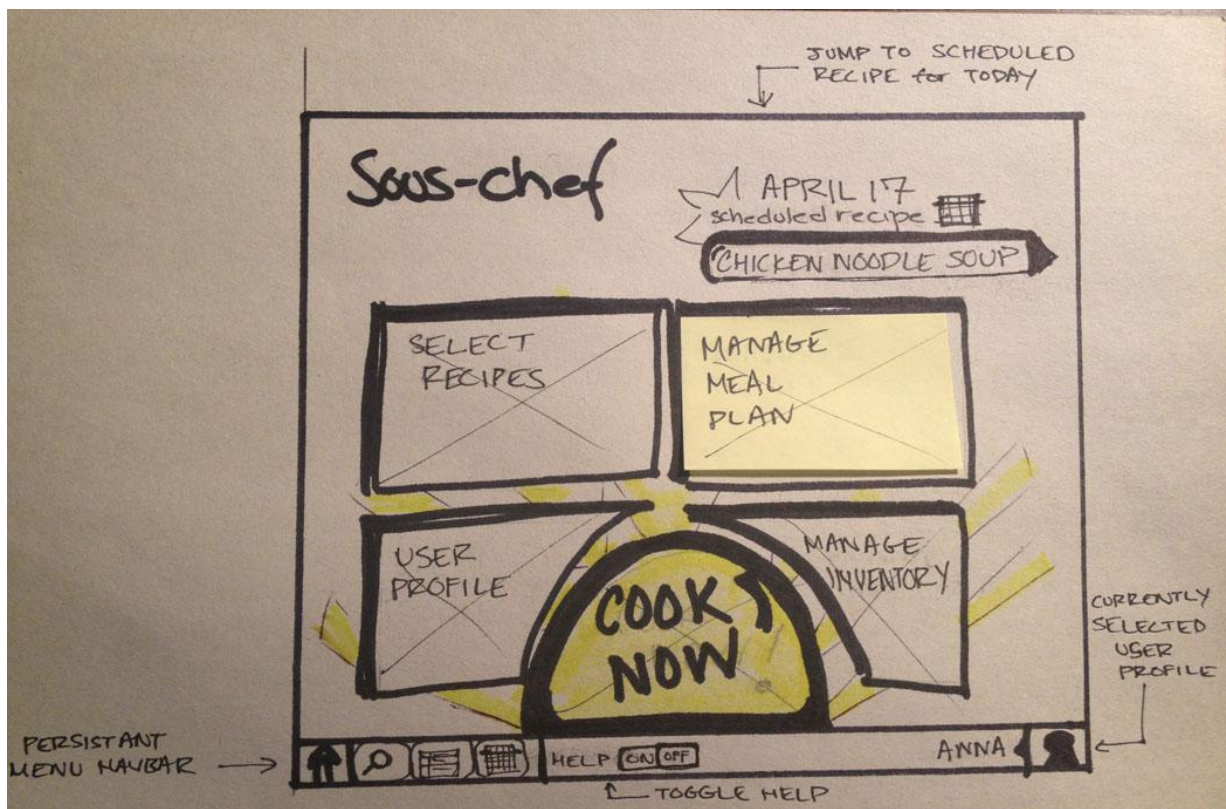
We would make a more high-fidelity prototype of the “smart shelf” and let users interact with it before running the test. An existing product that would allow for ease of integration and an inexpensive solution is the GreenGoose (<http://www.greengoose.com/>) which uses passive RFID tags on stickers to acquire data on objects the stickers are attached to. We could tag pantry items for easy tracking and use weight sensors to calculate current quantities. The usefulness of adding these features is to make users fully aware of the shelf’s ability to detect items and situate them

firmly in the futuristic scenario where we imagine this application being realistically used. We could close the gap between the hardware and software so interaction between the two would be less ambiguous.

Split Recipe Search Screen into “Cook Now” and “Search Recipes”

To clarify the origin of returned recipe results and dispel confusion about the filtering functions on the recipe search screen, we would separate this screen into two. The “Cook Now” option would limit results to the recipes that users could cook using items in their pantry. The search function would be removed completely, since these items are already added and removed from the search input by managing physical inventory.

A new menu item, “Search Recipes” would behave according to users’ expectations: it would start from scratch without pre-filled search parameters, and allow users to dynamically update results based on ingredients of their choosing (inventory items would be clearly marked as such). The area of the screen reserved for recipe results will be blank with the exception of contextual help that prompts users to take action in order to see results (“Add ingredients from your inventory using the menu above to display recipe results.”)



(Plans for redesigned front-page, illustrating the separation between “Select Recipes” and “Cook Now.” A persistent menu provides links to main landing pages, with a switch to toggle help displays. The currently selected user profile is displayed as well as scheduled meals for the current day, drawn from the current user’s saved meal plan.)

Clarify filtering mechanics on “Search Recipes” screen

To conform to the wizard style interactions, the header would be reworded from “Selected Ingredients” to “Choose your ingredients,” in order to communicate suggested action to users. The button now labeled “Change” would be reworded to “Add Ingredients” so that users know anything they select will be added as filtering parameters. Currently, users are unclear whether the items selected from this list are added or removed.

Once items are added to the list, they will be displayed as dynamic buttons, each encapsulating a close button that removes the item from the list. Participants in our study already attempted to remove items first by clicking the text.

This redesign seeks to accommodate users mental models of search and filter functionality that are reflected in online recipe websites. But it also strives to preserve the value of our application for the time-strapped user. Namely, the ability to assess what recipes you can cook instantly using items in your pantry as a starting point.

Incorporate graphic elements for clarity and affect

Double encoding information with images and words helps users identify and confirm the correct selection from an array of options. But it also conveys a sense of fun that engages users through humor or aesthetic appeal. Even though users said that setting benchmarks for individual users’ nutritional intake was the easiest task, there is room to improve the overall fun factor of the application through the use of graphics. Users were supplied the numerical values to set for calories, fiber, fat, and so on. But what if the application could help a user set benchmarks in the absence of knowing what hard numbers are acceptable? A visual icon associated with each nutrient could change state based on the position of the slider to communicate the upper and lower bounds of healthy intake. This idea is borrowed straight from the WYSIWYG editor for MailChimp’s HTML email template, which recommends an optimal width of 600px. As the user scrubs the controls that widen the page beyond the recommended value, a monkey’s arm anchored at the top left of the page stretches along the width of the container. Beyond 900px, it detaches from the monkey’s body entirely, leaving a bloody vectorized nubbin of bone exposed to communicate the dangerous implications of such unsound decisions.

Persistent Navigation Bar

We would implement a persistent navigation bar at the bottom of the screen. This would house quick links to main landing pages (Home, Cook Now, User Preferences, Meal Plan). It could also extrinsically display the state of the application state of the application (such as the name of the current user profile, or an indication that a suggested meal is scheduled for the day). Additionally, it could have a toggle switch to turn help on and off so that users could decide on

any screen to receive the contextual help that otherwise crowds the screen in a touch-screen application without the affordance of a tooltip on hover.

4. LESSONS LEARNED

About UI Design

Designing for limited space

The limited space of a tablet poses unique design challenges. Users have no hover state and must enact each change with a new finger gesture. This means that they will have to make selections more frequently than they do with a WIMP interface, and buttons have to be sufficiently large to accommodate fingers. What this means for design is that text on buttons and in menus should accurately describe the content they reveal. Also, users should be able to undo selections if they are not satisfied with the outcome of their exploration. Because of the limited space and the few affordances for contextual help on hover, the user should be set up to succeed in incremental steps, but they should be able to recover from failure. Additionally, to help users recover and orient themselves in digital space after clicking deeper into the application, it's imperative that the UI include a persistent navigation bar with links to home and landing pages for separate workflows.

Usability Testing: enormous insight from just a few participants

Usability gurus have authored articles debunking the myth that testing prototypes has to be conducted in special labs and with hundred of participants at great expense in order to be valuable. Jakob Nielsen states that, with respect to usability testing, "After the fifth user, you are wasting your time by observing the same findings repeatedly but not learning much new," (<http://www.useit.com/alertbox/20000319.html>). Taking from this valuable insight, our own usability tests confirmed that a team of UI designers and developers can gain valuable insights from just a few participants using low-fidelity prototypes. The major issues of navigation, orientation and transparency were identified early and repeatedly by our users.

For example, all participants were similarly confused about the wording of items on the main-menu screen, and were unsure why multiple items were already selected when they arrived at the recipe search screen. After just two usability tests, it was immediately apparent that we needed to divorce the search functionality from the presentation of items that users could cook immediately, rather than rolling both results under the menu item "Cook Now." Additional testing provided a "long tail," or diminishing returns, of insights that mainly offered constructive suggestions for how we might improve the interface. For example, by changing "Selected Ingredients" to "Choose Ingredients" or by adding a persistent home link so that the user did not have to click the "Back" button to get home.

The value of graphic design

From the onset, our development cycle privileged the working functionality of selections made by the users. And our usability tests demonstrated that the feedback users received for their selections sufficiently communicated the transparency of a system that understood their requests. However, a gulf of execution arising from the text-based interface prohibited users from easily identifying elements of the UI that would lead them to the correct screen or identify the correct button that would get them to the next step of completing their task. We learned the value of good graphic design (especially iconography denoting settings, users, edit and add functions). If our main menu used graphics to accompany textual descriptions, users may have more quickly identified the correct option from the array of entry points into our application. For example, if a standard user icon was displayed near “Preferences,” the double encoding of text and iconography could have eased the cognitive burden on users otherwise forced to read.

Visual elements could also be used to encode meaning of the data driving the application and provide a more fun experience through aesthetic appeal. For example, on the screen displaying recipes that could be made with more ingredients, the saturation level of a photo could quickly communicate the number of ingredients remaining before the recipe could be cooked immediately. A photo almost grey would denote an item with ten or more ingredients remaining, whereas a photo almost in full color denotes a recipe with only a few ingredients missing.

About group work and ourselves

Mason:

As an electrical engineer with my primary experience being in hardware design, robotics, and wireless systems, I rarely had the opportunity to explore the development of interfaces for my designs. The course as a whole has opened my eyes to this realm of design that was once so foreign. The project has expanded this knowledge and given me an effective means of applying it in a realistic scenario. I now have an appreciation and understanding of the usefulness and utility of the design principles we have discussed. Working with a group with such a diverse educational and cultural background has given me more confidence in communicating across these bounds and interacting with people in general.

Ashton:

I learned that the key to successful group work is consistent and scheduled communication. Each member of our group comes from a different academic background, so the task of establishing a common understanding of HCI’s approach to analysis and iteration was a thing we converged on upon the course of the semester. As an interaction designer, my career requires managing expectations of clients, stakeholders, designers and developers from a variety of backgrounds, so the experience of working with such a diverse group was invaluable to me. I learned that usability testing is actually fun, and that participants can become deeply invested in understanding the prototype present.

Bala:

During the course of my career prior to tech, I usually worked at a stage when requirements were solidified, and my focus was purely on designing/engineering interfaces. This course has given me the opportunity to get involved in the entire cycle, starting with the requirements gathering,

and ending with delivery of a prototype and testing. Personally, I think this project could have been done even better if we had started off with a simple design at the end of the requirements gathering and then repeatedly iterated over the course of the semester, culminating in a final prototype that is much more usable and looks like a finished product, rather than an unfinished prototype.

Mia:

It was a happy time to work in this group. All team members have different academic backgrounds; thus the way we were thinking may be varied regarding a certain question, but it is really exciting to see other thoughts from different perspective. As an industrial designer, I realize the significance of interface design, which can make a good product better, that is the reason why I chose this course. The course and group work has given me invaluable experience and knowledge on UI design as well as evaluation. Also it taught me how to collaborate with people with different background.

Starting points for iteration

If we could start over, we would set up a development environment that allowed each of us to contribute incrementally and according to our specialties. The platform we used, Blend, is constrained to the Microsoft OS so those of us with Macintosh computers were unable to collaborate nimbly. The graphical elements of our UI suffered for this reason. If we developed the application using Web technologies like JavaScript and PHP, we could share and develop the program remotely like an agile team. We would use a version control system to take more risks with branches of our development and make “hotfixes” when we noticed a bug that would impede our progress.

We also see the value in creating design specifications early, if only for a prototype. Often we negotiated elemental designs due to inconsistencies between the width of UI elements, and the width of the allotted space in the grid. Other inefficiencies due to lack of a design spec included matching color and type treatments based on visual assessment rather than conforming to standards, all of which increased the time needed for our team to collaborate on a final design.

We felt that our script was strong. Users were not confused by the instructions which made their difficulties attributable to flaws in the UI. Our script went through several revisions and we pilot tested it between Part 3 and our usability studies. This quick turnaround and can be attributed to the agile tool we used to edit the script collaboratively and non-destructively, Google Docs. If we could start again, we would set up our development environment to be as accessible and transparent as our script-editing tool. This ability to have many eyes on incremental changes could detect wrong turns before the next meeting, and overall increase the efficiency of collaboration and quality of our final project.

When making changes to the design based on unscripted testing, it is important to clearly differentiate between Usability enhancements, as opposed to Feature/Functionality enhancements. Especially during the Cognitive Walkthrough process, we made a lot of changes and enhancements based on feedback from other HCI students. However these changes were not always beneficial, because we ended up making a few screens very feature rich, but this ended up confusing users by providing too many options. If we had done cognitive walkthroughs earlier with lay users as well, we could have had a better understanding of the actual usability problems.

Part 4 Responsibilities:

Bala: technical development and implementation, UI design and revision, conducted cognitive walkthroughs, analyzed usability results, authored presentation materials

Ashton: user testing, UI design and revision, analyzed results, authored presentation materials, assembled final report.

Mason: user testing, UI analysis, analyzed usability results, authored presentation materials, graphically illustrated data collected, created physical prototype with electrical components

Mia: user testing, UI analysis, analyzed usability results, assembled presentation templates and materials.