

A decorative graphic featuring three concentric blue circles of varying sizes. The largest circle is in the top right, a medium one in the middle right, and a small one in the bottom right. Two thin blue lines intersect at the center of the medium circle, extending towards the top left and bottom right corners of the page.

e la Carte

An inventory Management and Recipe System

Team One: Craske, Kratzat, Strzeszkowski

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Summary statement

The e la Carte food inventory and meal planning system is based on the concept of tying meals to available ingredients in one's home.

In order to understand the needs of potential users, the development team performed three contextual inquiries and interviews. The findings provided the basis for the project requirements.

Based on these usability requirements, the team designed and tested an interactive prototype. Test results indicated a high level of interest in the concept and also pointed the way to further development and refinement.

Setting and Project Scope

We will be pursuing a project focusing on meal planning and preparation by home cooks. We would like to design a system that would help home cooks decide what to prepare for dinner based on what ingredients are already on hand. The system would be aware of what ingredients are in the home and would suggest recipes. Our specific fieldwork setting will be the kitchen while a subject is deciding what to make for dinner that evening. Physically, we will be interested in the food pantry, cabinets and refrigerator – areas where the person is storing food. We will pay attention to the layout of the kitchen, too.

Also, it will be useful to see where the kitchen is in relation to other family members. For example, it may be that one of the steps that the cook goes through is to lean into the refrigerator while calling out to family members, asking them what they want to eat. Or the distance may be too great to ask for that kind of input. We are interested in observing people who are cooking for a partner, cooking for a family including children, and cooking for just themselves.

The time frame for the observation may be in the early evening close to when the meal is to be consumed. Alternately, it may prove to be early in the day for some subjects. For example, one might go through the decision making process in the morning so that meat will have time to defrost or a slow-cooker can be used. Once our subjects have been identified, we can find out what time will be appropriate for each.

Fieldwork activity and data collected

See Appendix A for full contextual interview plan

See Appendix B for full text and photos of all contextual interviews.

See Appendix K for full primary, secondary, and tertiary stakeholder breakdowns

Inquiry 1

Subjects 1 and 2: married couple, mid to late 50s

Context of meal planning and preparation: Couple's adult children and some grandchildren are coming to their home for a Sunday dinner.

Observations

- Subjects took a roast out of chest freezer early in the morning so it would have time to thaw.
- Subjects thought ingredients were available for side dishes, but they found out they were wrong – which led to a trip to the grocery store.
- Subjects couldn't find spices and had to search several locations.
- Placement of the subjects' cookbooks was not convenient to access during cooking.
- Subjects didn't cook from recipes, but did reference a cookbook for cooking tips (times for cooking meat).
- Subjects considered the preferences of their guests in planning the meal.
- Subjects organized their preparations based on the time they wanted the complete meal to be ready.
- Subjects left cabinets and refrigerator open during preparation even when they were not actually looking in them.

Inquiry 2

Subjects 3 and 4: domestic partners, mid 30s

Context of meal planning and preparation: Couple was preparing a week night dinner based on the planning they had done earlier in the week before grocery shopping.

Observations

- Subjects used "Clean Eating" magazine recipes when preparing their meal.
- Subjects shared utensils and artifacts in the preparation process.
- Food storage included a pantry that housed items other than food (floor mop, etc.)
- Subjects had some expired produce among their ingredients.
- Home computer was not conveniently located for use during meal preparation.
- Subjects failed to coordinate the meal preparation to ensure that all dishes were ready at the desired time.

Inquiry 3

Subject 5: single woman, early 20s

Context of meal planning and preparation: Young woman was preparing a week night dinner before an early work-dictated bedtime.

Observations

- Subject looked in cabinets for what looked good. The order was pantry (closest too the door when she comes home) then the fridge then back and forth until she found something.
- Subject and roommate had designated shelves in the pantry and fridge, and share a fruit bowl.
- Had to physically pull everything out of the full pantry to see what she had. Found expired food this way. Also found things that she bought that she will “never” eat.
- While making dinner set all food items out at once.
- All the food was prepackaged.

After the contextual inquiries were complete, each group completed an interview that included 30 questions about the subjects’ meal planning and preparation habits and experiences, summarized below:

Subjects 1 and 2

- Subjects like to go from favorite recipes rather than peruse cookbooks.
- Relatively new home is causing some confusion in terms of where ingredients are stored.
- Subjects have a lot of items on the countertops and sometimes have to clear areas for food preparation before starting.

Subjects 3 and 4

- Subjects plan four meals per week from recipes in “Clean Eating” magazine. Reasons are cost and health. Other meals are healthy prepackaged items such as Kashi frozen pizza.
- Subject 3 wants help in organizing his meal preparation so all dishes are ready together.
- Subject 3 sometimes is unsure if produce is still good. May phone mother to ask for advice.
- Subjects are interested in using technology in meal planning and preparation. Both have found recipes and ingredient substitutions online before.
- Subjects prepare grocery lists from the recipes in the magazine and follow list closely at the store.
- Subjects will go out to store to pick up one or two items for a recipe, but not a main ingredient. They may try to substitute for a missing ingredient, or just leave it out of recipe.
- Subjects want to be more efficient in their meal preparation.
- Subjects want variety in their meals to mimic the feeling of eating in restaurants with different cuisines.
- Subjects get aggravated preparing meals together. One reason is space in kitchen.

Subject 5

- No planning the night she makes dinner
- Buys a set list that she remembers while at the grocery. Doesn’t use a formal list. Also buys items that appeal to her.
- Never leaves to get extra food even if it sounds good or is needed to complete a meal. She will stop at the grocery if she is already out (on the way home from work, for example.)
- Because she doesn’t know what is in the back in the pantry, she buys extra of the same items.
- If nothing sounds good, she just goes to bed on work nights.
- Rarely cooks if something takes longer than 10 minutes unless she’s off work and really bored (this has only happened once, but she made enough for 5 meals or more).
- Likes to bake for fun – which she only buys ingredients for while at the store if she sees something that sounds like fun or good.
- Keeps leftovers.
- She selects items while at the store then gets other ingredients if needed according to the on-box recipe.
- She doesn’t really have time to cook on work nights, and there is no real interest in cooking for fun.

Work and activity models

See Appendix C for consolidated model designs.

The team members completed work models for each interview, and created five consolidated models: flow, sequence, cultural, physical and artifact. The breakdowns noted for each are listed below:

Flow model

- between meal planner and the food inventory
- between meal planner and cooking instructions
- between meal preparer and the cooking instructions
- between meal preparers trying to work together

Sequence model

- between plan and food inventory
- between plan and equipment inventory
- trying to share tools and artifacts between preparers
- in managing the timeline of the meal preparation

Physical model

- cook didn't find necessary ingredient where he thought it would be
- recipes are too far away from work area
- inventory is too disorganized for easy viewing

Artifact model

Findings

- recipes with ingredients and directions listed
- charts with cooking times by servings
- tips on executing cooking techniques
- photos with recipes

Breakdown

- not clear on what order to prepare and cook dishes so the meal comes together correctly

Cultural model

- Diner preferences (What sounds good right now?)
- Work schedule limits time for cooking (I need to prepare a meal in ten minutes or less so I can go to bed.)
- Guests (What will my grandchildren eat?)
- Health (I'm loosely following Weight Watchers.)
- Budgets (Use up food before it expires.)

Affinity diagram

See Appendix D for full affinity diagram detail

Team members also used the data from the interviews to generate an affinity diagram. We concluded our review with four top-level categories:

This is how I plan my meals

List of sub-categories:

- Sometimes I eat what appeals to me without planning
- I consider preparation and cook time when planning a meal.
- I consider health when planning a meal
- I sometimes plan special meals for others
- I don't plan my meal the same way every time.
- Cost is a factor in meal planning.

I want to improve my planning and cooking

List of sub-categories:

- Technology could help me in my meal planning.
- I need better cooking management skills.
- This is how I cook.

I want better kitchen organization

List of sub-categories:

- I need to organized my kitchen environment
- I want to know what food I have
- I want to maintain the quality of my food

These are my shopping habits

List of sub-categories:

- How I use shopping list.
- Why I go to the grocery store.

Requirement and Goals

The first three top-level categories in the affinity diagram became the focus of our project. The fourth – shopping habits – is something to be addressed in the future as we hope to expand the system to enable users to access it remotely, including while at the grocery store.

According to the affinity diagram, potential users have certain criteria that they use when planning meals for preparation at home. The system should allow users to choose their criteria, but should also assume that all users will base their search on items that are currently on hand.

It is this underlying premise that sets e la Carte apart from other meal planning systems. There are seemingly an infinite number of resources for cooks to find recipes, but we want to address the chief concerns among our subjects: time constraints, automating the inventory process (which eliminates the need to physically identify what's on hand and decreases supplemental grocery store trips) and managing the time for meal preparation.

Goals

- Improve planning and cooking
- Improve kitchen organization

Usability requirements

Effectiveness

- Show recipes based on the inventory and user criteria
- Provide a time management tool during cooking

Efficiency

- Eliminate need to re-input criteria
- Have the system maintain inventory with minimal input from user
- Touch screen interface for ease of interaction
- Auditory commands for ease of interaction

Utility

- Allow users to set criteria to narrow recipe search while maintaining basis for search as inventory on hand
- Allow users to search inventory
- Organize preparation time
- Provide cooking tips to enhance users' skill level
- Find substitutions for ingredients
- Have tutorial and help features
- Access inventory during shopping (future goal)

Safety

- Physical – monitor expiration dates on products
- Monitor for food allergies
- “e” invite for allergy check on guests
- Minimal input from user for maintaining inventory
- Ability to slow down or “pause” process as needed
- Finding substitutions for ingredients
- Waterproof hardware since system will be in kitchen
- Durable to resist breakage
- Screen easy to clean off (touch screen instead of buttons)

Learnability

- Display recipes in conventional way
- Display inventory using notation that user purchases items by (pounds for potatoes, individual units for grapefruit...)
- Have metric notation option
- Provide tutorial and help

Memorability

- Use conventional notation
- Provide tutorial and help
- Have a “favorites” button for commonly-chosen recipes
- System uses initial criteria choices as subsequent default
- Allow user to input inventory with auditory cues

Conceptual design

The system will facilitate meal planning by users who prepare meals at home. A key function of the system would be its tracking of the home's food inventory, which would allow the system to assist users in maintaining physical and financial health. The key concept is tying the meal planning to the food inventory.

The system would be two-fold. The primary focus would be the kitchen appliance itself. This would sit somewhere in the kitchen so that it can be accessed while preparing the meal. The user would have the ability to access all the information right in the kitchen using both touch screen input as well as voice commands, giving the user the mobility they need while cooking yet still controlling the device.

Secondly, the system would be accessible via a website. Users could acquire the same information available on the kitchen appliance, but this allows them to do so anywhere. The user could then print off a grocery list before heading home from work, or even review potential recipes for the evening's meal.

The system will support many different ways to access and manipulate it since people have many different criteria when planning and preparing a meal.

System Architecture

The system has a central database for both user recipes and available ingredients, allowing the user to access all of this information via a website as well as the in-home application.

The in-home application will be run from a proprietary system placed in the user's kitchen. This system will give them access to all the information stored in the database.

Navigation / interaction

The user's main form of interaction will be via a touch screen on the physical device. The user will also have the ability to input information using voice commands, which will need to be easy to understand and quickly learnable. Lastly, there will need to be physical buttons on the system to turn the device on and off.

The website will use the user's existing computer for input. This will allow them to access their information anywhere. This will also allow the user to manipulate data using a device they are familiar with.

Interaction Types

Instructional

- User enters a favorite recipe
- Enter criteria to choose meals
- Voice commands to enter inventory
- Scale to measure food usage and enter it into inventory
- RFID tags to enter inventory

Exploitation & Browsing

- Exploring potential recipes
- Look at their inventory
- See new cooking techniques

Manipulation & Navigation

- Ability to extend, pause, rewind time line for meal preparation via voice commands and touch screen interface
- Change ingredients used on the fly
- Change the recipe while using/reading

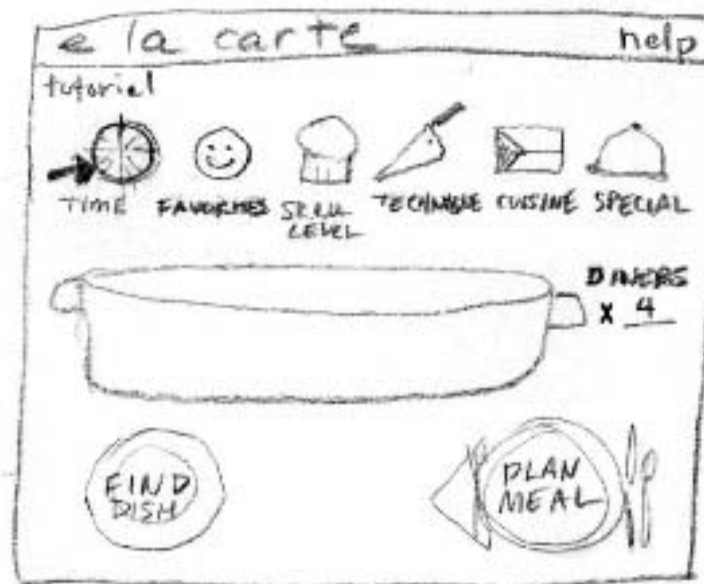
Conversing

- The system can use audio to inform the user where in the preparation timeline they are

Page design and prototypes

Low-fidelity prototypes

See Appendix E for additional low-fidelity prototype diagrams



Our low-fidelity prototypes highlighted the choosing of criteria by the user as the important main step. In discussing the prototypes, we realized that the criteria selection would be accomplished initially, and then it would remain as a default. We also realized there were no need for certain parameters when defining defaults. For example, in setting a time limit, the user would only need to set a maximum.

High-fidelity prototype

See Appendix F for additional high-fidelity prototype diagrams

See Appendix J for interactive dialogue model initial prototype is based upon



User Feedback

See Appendix G for the complete user-testing packet.

Our user-testing packet contained a scenario that explained our concept, a walkthrough of the prototype and a list of five tasks for the user to complete.

Two subjects completed the testing and an interview.

Summary of the user testing results

See Appendix H for the detailed user test results from both participants.

The questions in the structure interview ranged from task completion to ease of exploration.

Questions that were answered “no” by one subject included having enough visual clues to access all functions and ease of understanding.

Questions on the interface elements (the timeline and other visuals) – received high ratings from one subject, but one didn’t even notice the timeline until it moved. One subject commented that “blue [the interface color] makes people less hungry.”

Concept Interest

- Using e la Carte in current household: Subject 1: 6/10 Subject 2: 8/10
- With inventory being monitored automatically: Subject 1: 8/10 Subject 2: 9/10

Favorable Prototype Features

- Ability to scroll through recipes under a category (types of sandwiches, for example).

Comments included: *"I think the touch-screen slide feature would be really cool there, too. Inventory shows what I have. I don't have to search."*

Non-favorable Prototype Features

- Need more direction in process.
- Need to see how many steps are in a recipe.
- Need to be able to see all recipes before choosing, not just the ones within a multiple listing.

Comments included: *"For me, if there was a recipe that took 10 minutes, but had 12-15 steps, then I'm probably not going to make it, especially if I'm in a rush."*

Prototype Omissions

- More directions.
- Setting screen.

Comment: *"I think it would have also been neat to try to turn off foods (cuisines) that I know my family wouldn't eat, such as Thai, and see the system react accordingly. I think if that was shown, that would be cool looking."*

Improvements and future direction

- When user clicks on a dish, show the recipe so the user can see how many steps are involved, not only how long it takes to prepare.
- Provide clear directions on functions.
- Make timeline more visible and intuitive.
- Highlight the steps in the timeline more clearly.
- Prototype the settings interface and perform user testing.
- Work on fully automating the inventory process.
- Work on a multiple-user interface that allows other family members and guests to help choose recipes and also to allow for multiple cooks.
- To extend the product in the future: Think about the user taking elements of the system with him to the grocery store. This could be done with an application for a mobile device, or perhaps the interface itself is a tablet that can be removed and taken with the user.

Appendix A: Contextual Interview Plan

1. Criteria for identifying suitable subject:
 - a. He/she lives in a home with its own kitchen
 - b. He/she prepares meal there
 - c. He/she stores provisions there
2. Explain the project and what is being asked of subject:
 - a. This is a project for a graduate course in HCI
 - b. The subject is planning meals to be cooked at home
 - c. Participation will involve being observed (including the possibility of being videotaped and photographed) during the meal planning activity in the subject's home
 - d. Along with physical observation, the subject will be asked interview questions during and after the observation.
3. Give the subject an informed consent form to read and sign. Choose a time for the observation. That will depend on when the subject engages in the activity of meal planning.
4. Arrive at subject's home and tour the area for observation.
 - a. Take some photographs of the pantry, cabinets where food is stored and refrigerator/freezer.
 - b. Sketch layout of the home showing the kitchen in relation to living areas.
 - c. Decide on a vantage point for videotaping.
5. Questions at beginning:
 - a. Is this your usual time to begin planning the meal and preparation?
 - b. Are you aware of the items you have on hand?
 - c. Are you the one who decides what to serve?
 - d. Who else has a role in deciding?
 - e. What is the most important factor in deciding what to prepare?
 - f. What other factors go into your decision?
6. Follow the action and ask questions as necessary to clarify and also to explore the meal planning as it progresses.

Post-Observation Interview Questions

1. How do you define cooking a meal at home?
2. How often do you cook meals at home?
3. Are you the person or one of the people who plans meals in your family?
4. Do you plan meals:
 - a. daily
 - b. weekly
 - c. monthly
 - d. no schedule
5. Do you plan for particular dishes or for a main ingredient (for example, chicken)?
6. When do you choose the exact dish to prepare?
7. Do you plan the entire meal or just the entrée?
8. Do you use nutritional guidelines when you plan meals?
9. Rank in order from 1 (most important) to 8 (least important) the factors that go into your meal planning:

a. ingredients on hand	e. other diners' preferences
b. cuisine type	f. health issues
c. time available	g. nutrition
d. cost of ingredients	h. skill level necessary
10. How frequently do you shop:
 - a. daily
 - b. weekly
 - c. monthly
 - d. no schedule
11. Do you shop based on meal plans? Would you want to?
12. Do you prepare a list before shopping?
13. Do you plan meals based on what appeals to you during shopping?
14. Do you restrict meals to what ingredients you have on hand or pick up ingredients for a chosen meal?
15. What do you do if you've started cooking and you discover that you are missing an ingredient?
16. Do you ever decide not to cook at all if you don't find anything to prepare?
17. If you fail to identify a meal to prepare, do you:

a. skip meal	d. eat something pre-packaged
b. go out to restaurant	e. go out and buy ingredients and then prepare meal
c. order in from restaurant	

18. Do you plan for leftovers when planning meals?
19. Do you save leftovers and serve again?
20. Do you bring home leftovers from restaurants?
21. Do you purchase pre-packaged entrees for meals? Do you want to change that buy purchasing more or less?
22. How often each week do you cook from scratch?
23. Do you want to increase that frequency?
24. What reasons would motivate you to increase that frequency (choose all that apply):
- a. health
 - b. cost
 - c. time
 - d. enjoyment
 - e. pressure from others
25. What part of the meal planning and preparation process is the most enjoyable for you and why:
- a. planning
 - b. shopping
 - c. cooking
 - d. serving
 - e. eating
 - f. positive feedback
 - g. cleaning up
 - h. pride
26. What part is least enjoyable and why:
- a. planning
 - b. shopping
 - c. cooking
 - d. serving
 - e. eating
 - f. negative feedback
 - g. cleaning up
27. How are your meal planning and preparing patterns different on weekdays versus weekends?
28. What aspect of meal planning and preparation would you like to improve and why, first on weekdays and then on weekends:
- a. variety
 - b. cost
 - c. nutrition
 - d. skill required
 - e. level of cooking skill you have
 - f. time
 - g. clean up
 - h. ease of tailoring to other people's preferences
 - i. organization
29. Do you use current technology now related to meals (coupons, recipes, etc)? Would you like to increase that?
30. Are you interested in using computer technology to facilitate meal planning?

See Appendix F for the Consent Form for e la Carte

Appendix B: Full Text & Photos of All Contextual Interviews

Interview 1

Notes from the observation (17-JAN-09):

Mom and dad knew I was in town, and with both sisters and my sister's two kids available for dinner and visiting, my parents said we would have a family dinner. My grandmother lives in a one-bedroom attached apartment to the house, and would also be dining with us. Eight (8) diners in total: myself (35), mom (56), dad (59), grandmother (82), sister #1 (33), sister #2 (22), nephew (6), & niece (3).

My parents moved within 6 months ago to a new house after 30+ years in the same house. So, things are a little jumbled (even after 6 months of time passage) in regards to location of spices, knives, etc. in the kitchen. There are plenty of counter space objects that leave them minimized space to properly prepare large-scale meals without first preparing the area.

Knowing my sisters would not be down to Anna until approximately 4pm, they began preparing the meal (Ribeye roast, green bean casserole, cooked carrots in brown sugar, chopped salad, mashed potatoes, and dinner rolls, plus drinks). My grandmother would contribute a cherry cobbler to the meal she prepared the evening before.

The conversation started between my parents, after contacting both sisters, guessing on dinnertime being around 5pm. They had previously been given the roast and began thawing it before 10am (unknown when it was actually thawed).

I asked my mom when preparing meals for guests, does she typically use a cookbook, or does she go off favorites. She liked going off favorites, and has her own set of recipes in conjunction with a Better Homes & Gardens Cookbook.

Since their move to the new home, most cookbooks (save for a few slimmer, spiral-bound cookbooks) are now stored in a closet just outside the kitchen's north door. However because most cabinetry around the stove is full of spices, foods, and baking/dishware, the closet is still rather convenient to store less-readily used cookbooks. I asked where they kept cookbooks in their previous kitchen. They kept them in a small cabinet above a food-preparation counter near the stove and in a cabinet above the refrigerator (which was appx. 6+ feet off the floor).

Video #1 shows my mother beginning her unsuccessful search for soup cans for the casserole (though does find dried onions after a small search), while my father is reviewing recommended times/temperatures from the Better Homes & Gardens Cookbook, and mentions this to my mom. There is at least one large dog (Golden Retriever) in the kitchen, and there may be a second out of screen, which cuts down preparation maneuverability between stove, sink, prep-counter, pantry, and refrigerator. There is also uncertainty as to what cooking dish to prepare the main course in (again - unfamiliarity of location due to newness of house?). Something interesting: Mom seems to be reviewing instructions from the dried onions - which is the company's recipe for green bean casserole. I asked her if she had her own recipe, to which she **does** have the recipe in her own collection of favorites, but was just getting general ingredient amounts before beginning preparation.

Dad mentions there is a larger can of dried onions in the pantry, but mom states she probably wouldn't need it for the meal. There is a reiteration from dad saying he needs to get a can of soup, which triggers an action from mom to see if they need milk as well. She mentions the need for milk for the potatoes and for the kids for dinner, so that went on the mental shopping list (nothing was written down at that time). Video #1 ends with both parents beginning the initial preparation of courses (spreading out ingredients, and washing of hands)

(At this point, rather than my father going out to the grocery store for milk and soup, I did ... I had to be "son". However, this brings up an interesting point - personal relationships between master and apprentice should be frowned upon due to inadvertent skewing of data. However, for intents/purposes of this class project and as a learning experience - lesson learned)

Video #2 starts with both parents preparing individual courses (mom with the Ribeye roast, dad with the chopped salad). Mom leaves one spice cabinet open for the majority of the video. After taking the video, I showed it to her and asked if there was a reason for this - she said her primary spices she uses in everyday cooking are in that small cabinet. There were alternative spices in other cabinets. The refrigerator door is shown open at the outset, so it is acting similar to a cabinet, where available food is visible (similar to spices and other pantry items once the equivalent doors are opened). The refrigerator is not being used at the time with someone looking inside, but it is still open. This brings an interesting idea - can technology and engineering provide a method of giving a user a "window" to see what is inside a refrigerator without opening it, in the hopes of saving energy (removing heat from inside)?

Mom selects the salt from the spice cabinet and is fairly liberal sprinkling salt on the roast. There are no measurements performed. Mom then spends a good quantity of time looking inside the open spice cabinet, looking for ground black pepper. I asked whether ground black pepper is a regularly-used spice (confirmed). In her search for the black pepper, she reaches for cooking spray (already out of the cabinet), and again liberally coats the meat. Mom asks dad if there is any black pepper they know of. Dad doesn't know, but suggests she could get some from "mom" (my grandmother in the attached apartment). Mom goes to the other side of dad - away from the preparation counter - to find a peppercorn grinder (which dad approves of more than regular ground black pepper), and she cannot find the grinder either. She mentions the non-use of the grinder since Christmas holiday, so she's unsure where it is located. She ends up finding the grinder in an alternate cabinet, sprinkling the pepper in the meat. Again - no measurements are performed. Dad jokingly says it was his fault misplacing the pepper grinder. Meanwhile, he is preparing the salad over the sink, chopping accordingly.

While mom is prepping the roast with salt/pepper, dad begins his work on preparing the salad. He moves toward the stove, but does not see a cutting board. He then backtracks to the dishwasher between mom and the sink, and retrieves a recently-washed cutting board. I asked where they normally store their cutting boards, to which they are usu. between the stove and microwave (seen in the corner of the preparation counter), and if there are none, there is usually one in the dishwasher. I asked later if there is no cutting board available, and the boards are dirty in the dishwasher, what happens? They both said they would select the cleanest board from the dishwasher, wash the board by hand in the sink, dry the board, and use it for meal preparation.



Interview 2

Date of inquiry: 1/21/09

Subject 1: Male, 24-35 years old

Subject 2: Male, 36-45 years old

Inquiry location: suburban townhouse shared by subjects

Time: 7 pm, weeknight

Upon arrival, interviewer oriented herself with layout of the floor of the home that included the kitchen. She took photos of the pantry closet, the refrigerator and freezer, the counter areas for food preparation, the cabinet that held spices and the drawer with cooking tools.

The interviewer and the subjects discussed the procedure that the subjects had for planning their meals. A transcription follows:

The subjects talked about what they'd have this week for dinners before subject 1 went shopping.

They use "Clean Eating," a glossy monthly magazine, for recipes that include detailed ingredients lists. They like the magazine because they feel that the food offerings are healthy, and they like the way the ingredients are listed for ease of shopping.

Though they will both be cooking during the observation, they say that they rarely both cook at once due to conflicting work schedules and also to irritation with each other when they are both trying to work in the kitchen. Subject 2 mentions that he likes to use the slow cooker.

Some observations during the preparation: they have only one of each tool that they need, so are alternating using the same knife, which they need to wash between tasks. Also only have one cutting board, so they discuss a strategy for preparing the two different dishes – the potatoes first since the other dish is chicken. They frequently retrieve the tools they need from the dishwasher, which is full of clean items. They confirm that they do this often. Subject 1 gets each ingredient out as he needs it, and then replaces it. Subject 2 says he does that also, though if he's baking, he tends to get all ingredients out at once.

Subject 1 knock over a mop when he is getting items out of the pantry. They explain that they store more than food in the pantry due to space limitations. There are small appliances in there as well as cleaning tools.

Subject 2 is preparing a dish using raw sweet potatoes. He retrieves the potatoes from the pantry and discovers one that is spoiled. He also questions the color of another – is it too yellow? Interviewer questions him about the way he determines if food is spoiled. He says he may call his mother for advice. Interview asks if a system that could help answer that question about spoilage would be helpful. Both subjects say yes.

Both subjects are using the same magazine to follow their recipes. Subject 2's is simple, so it is not a big problem in this instance. Subject 1 notes that he does sometimes use his laptop perched on the kitchen counter to look at recipes. Subject 2 adds that he has used his iPod touch to look at recipes. The home's PC is located off the kitchen, and has also been used to look up recipes and to look up substitutions for missing ingredients. But the computer is not convenient to the food preparation area.

Already into the preparation, Subject 2 asks Subject 1 about cooking times for the different dishes. He realizes that his dish requires a much longer cooking time. He notes that this is an area that he would like to have assistance – in planning the meal so that all dishes are ready at the appropriate time.



Interview 3

The interview was conducted at my sister's apartment at dinnertime. I had called a few days ahead to make sure it would be ok that I come and observe her making dinner. The scheduled time was for January 27th 2009, however due to weather conditions I was unable to make the appointment. I called and rescheduled for Thursday January 29th.

She is a single girl living in an apartment with another girl roommate. She is a full time nurse usually working 12-hour shifts for up to 4 days a week with days off at a time. She is very social and active. Often she will go to the gym for hours on her days off to get out of the apartment. She enjoys going out with friends or having them over, rarely for dinner parties.

Upon my arrival, my sister informed me that she has just gone to the grocery store. It was her first day off in a few days. She told me that she tries to go shopping about twice a week when her schedule permits.

I proceeded to ask questions about her shopping experience since I would be unable to accompany her, and she was not more than 3 hours ago the information and procedures would still be fresh in her mind.

I was able to find out that though she creates a shopping list, sometimes even taking it with her, she rarely uses it. The list is created on her fridge during times of wants. She will write something down if it is sounding good at the time. Rarely is it something she will need like milk or bread.

While at the store she will walk up and down each aisle, sometimes multiple times, looking for things she wants. While looking for these wanted items she selects the standard items that she always picks up such as fruits, bread, etc. Most often if something looks or sounds good while shopping she will pick up this item. If the item is something that is used in a recipe she will read it the recipe in the aisle then locate the other needed items. The example she gave me was a box of brownies.

On her trip to the store she stumbled upon the brownie section. It sounded good so she picked up a box. Read the recipe and ingredients. Since there were a few things missing she went back through the store and found all the needed ingredients to make brownies.

When she gets home from the store she places all of her groceries in "their place". Since she has a roommate there are assigned shelves in both the pantry and refrigerator. She treats her shelves as a stack. She places all the newly bought food on the shelves never rotating the older food forward. In pointing this out she pulled all the food out of one of her pantry shelves. She went through all of it and noticed that some of the items had passed their expiration date, some by over a year. After putting all of the food back into the pantry it was time to observe how she goes about making dinner.

Since it was a little after the time she normally eats, and it wasn't a night she worked I had her walk me through how that differs from a night she has off work. The main difference is that on work nights she is pretty tired so when she comes home she goes right to finding out what to make for dinner. On nights she doesn't work she tries to eat around the same time, but doesn't feel as rushed.

The process of finding out what to eat is literally just her opening the pantry looking to see what "sounds good" at the time. This doesn't include her looking in the back of the pantry. If there isn't anything that sounds good in the pantry then she moves to the fridge/freezer and does the same thing. This as I observed can go on for a number of iterations. If after a bit of time she decides nothing sounds good she will just skip the dinner and go to bed. This is done on work nights more than anything. On nights she doesn't work the next day she will spend more time figuring out what sounds good.

Tonight she was able to find something that sounded good, a Veggie burger, with asparagus and water. I noticed that all of this food was in some sort of prepackaged form. The Veggie burger was frozen, the asparagus came from a frozen bag and the buns were a new type of bun she stumbled upon in the grocery that she thought looked like something she wanted to try.

Since all of this would be cooked in the microwave (which is how she “cooks” most of the time) she had to multitask so her food would be done and hot at the same time. She knew which food would take longer to cook by just making it before. So she put the one that takes longest in the microwave while getting the plate and fork and water ready. Then pulled the asparagus out and put in the burger. While doing that she readied the bun with mustard. After the burger was done she put it all together.

Since it isn't a large meal she said she might have a snack later in the night if she is still up or if her and her friends go out.

When done eating she rinses the plate and puts all the utensils in the dishwasher.

Additional Notes from Interview 3

- Looks in cabinets for what looks good. The order is pantry (closest too the door when she comes home) then the fridge then back and forth until finds something.
- No planning the night she makes dinner
- Buys a set list that she remembers while at the grocery. Doesn't use a formal list.
- Never leaves to get extra food if it sounds good or is needed to complete a meal
- Since living with a roommate they each have their designated shelves in the pantry and fridge. Except the fruit bowl, they share it.
- The Pantry is full and she doesn't know what is in the back. She buys a lot of extra or the same items because of this. Had to physically pull everything out to see what all she had. Found expired food this way. Also found things that she bought that she will “never” eat.
- If nothing sounds good just goes to bed on work nights.
- While making dinner sets all food items out at once.
- All the food is prepackaged
- Rarely cooks if something takes longer than 10 min., unless she is off and really bored (this has only happened once, but she made enough for 5 meals or more).
- Likes to bake for fun – which she only buys ingredients for while at the store if she sees something that sounds like fun or good.
- Finds what she wants at the store
- Keeps leftovers that she makes if there are any or if she goes out to a restaurant (usually with family or friends).
- She selects items while at the store then gets other ingredients if needed according to the on box recipe.
- Makes a special trip to the store because she is out or something just sounds really good only when she is already out, like coming home from work.
- She doesn't really have time to cook on work nights, and there is no real interest in cooking for fun.



Post-Observation Contextual Interview Results

Interview 1

1. Subject 1 – from a recipe
Subject 2 – from a recipe or a pre-packaged meal
2. Both agree it's 4 times a week. Motivations are cost, nutrition/health. They also eat in another 3 times from pre-packaged (ie Kashi frozen pizza). They are not planning to eat out at all.
3. Plan together most times.
Retrospective account of different time: Subject 2 wanted to make a lasagna recipe and he told Subject 1 about it. When he hadn't done it, Subject 1 asked about it over the course of several days. Finally, Subject 2 prepared the lasagna one night after dinner and served it the next day. Time was ticking on the ingredients still being good.
Supplemental question: how often do you both eat together?
Answer: 4 times per week. They don't necessarily know which day a planned recipe will be prepared. Subject 1 says he will at times look at his available ingredients to decide which meal to prepare on a given night. And sometimes both subjects will look for a recipe to accommodate an ingredient they've had hanging around (a retrospective account gave the example of quinoa).
4. Weekly
5. Particular dishes because they want to replicate the variety of eating out. That's a goal for them.
6. When they are getting the shopping list ready.
7. Entrée. They sometimes only have one dish for the meal.
8. Subject 1 says no. Subject 2 says he is following Weight Watchers loosely right now, so yes. They say the magazine "Clean Eating" focuses on healthy, so the recipes they are choosing from are healthy.
9. Time, other diners' preferences, skill level, cost, nutrition, health, cuisine, ingredients
10. Once a week for a big shopping with two extra small trips.
11. Yes.
12. Yes.
13. No. Because we are on a budget.
14. One or two ingredients, yes, we'll pick up. Every ingredient, no.
15. Fake it or leave it out. A system that would give a substitute would be helpful. Subject 1 has used the web to check for that information in the past.
16. Yes.
17. First choice is go out to restaurant.
18. Yes, Subject 1 more than Subject 2.

19. Yes.
Supplemental question: Are you good at using leftovers?
A. Not always. Don't have a lot – we know how much we need. We don't buy in bulk because it hasn't worked well in the past for perishable foods. We will buy non-perishable foods in bulk at Costco.
Q. Do you freeze stuff?
A. No. We keep ingredients fresh.
20. No.
21. Yes. Subject 2 is fine with doing that because he buys healthy stuff.
22. 4 times.
23. No.
24. Cost might be a factor. But they don't think pre-packaged is really more expensive for the two of them. Lack of variety in healthy pre-packaged entrees might be a reason to buy less.
25. Subject 1 – planning. It's fun talking about it.
Subject 2 – positive feedback. He likes when he tries something new and it's enjoyed.
26. Subject 2 – shopping. Takes so long and hate carrying stuff in to second floor kitchen. Hates whole process. Makes him want to eat out.
Subject 1 – cleaning up. Because he's a slob.
27. Subject 1 – I might try more involved recipes on weekend with more time.
Subject 2 – We tend to eat out more on the weekend.
28. Subject 1 – On the weekdays, time. Just being more organized. Many times it takes longer to prepare a dish than the recipe says it will. Be more efficient. On the weekends it doesn't matter.
Subject 2 – Retrospective account: 'When I planned these sweet potato fries I remembered how good they were but not how long it takes to make and cook them. Now I see how long it takes and the chicken will be ready first.' He uses this story to illustrate his frustration with his skill level in organizing the timing of cooking the meal. He would like to know what order to prepare and cook dishes so the meal comes together correctly. He is also frustrated at the prep time in preparing raw ingredients for use. He thinks he could purchase healthy, already cut up potatoes to save time at a cost that is not too prohibitive. He's looking for time-savings.
29. Yes. Use technology for recipes and food knowledge. No coupons. Don't use coupons because we don't buy the items you see coupons for.
30. Yes. Especially an application on iPod. Subject 1 says one web site he uses has a feature where users can plug in ingredients and it spits out a recipe. He thinks the idea of having a smart system that knows what ingredients users have would be great. He mentions Chumby as technology that might be useful (chumby.com). Subject 1 would like to be able to access information on expired items while he is shopping – maybe on a removable tablet or an iPod). He'd like to be linked to the home inventory while out shopping.
Subject 2 – He's trying to lose weight and thinks it would be useful to have a system that can generate meal plans based on calorie intake, and make a plan for an entire day.
- Both subjects would enjoy using a want or gun to scan items to maintain inventory.

Interview 2

1. Cooking and then sitting down to eat—not “on the run”
2. 3-4 times a week
3. Yes
4. no schedule
5. Usually pick the main dish first then add the rest depending on what I have
6. Varies. No particular order.
7. The entrée and then decide on the rest to compliment it.
8. Just low salt and low fat
9. c, e, a, g, d, f, h, b,
10. weekly
11. Yes when I have a plan
12. Yes
13. Yes
14. Both. I pick up what I need when I have time
15. Try to improvise to may have to go to the store
16. Yes
17. go out to restaurant or eat something pre-packaged
18. No
19. Yes
20. Yes
21. Yes
22. 2 times
23. Yes it would be nice
24. Health, cost, enjoyment
25. Planning, cooking, serving, eating
26. Shopping, negative feedback, cleaning up

27. Weekends are more relaxed with more time. Weekdays are more difficult because schedules are different each night and I may be by myself so I don't know how many to plan for.
28. Variety, level of cooking skill you have, time, organization
29. Not really. Microwave is great—as well as convection which I would like to have again on my oven. Anything to save time
30. If it is was easy and saved time after learning it. If the learning curve was too great.

Interview 3

1. Easy, cheap and fast
2. 6 days – might eat small meal outside (“snacky” type of food)
3. yes
4. d
5. ingredient
6. when I get home from work or 5 pm
7. entire meal – if I cook which is rare
8. sometimes
9. f, c, h, g, a, d, b, e
10. Twice a week. Might forget something or run out of something also fruits spoil if kept too long so I just buy a few days of fruit.
11. No, No
12. Yes, but I don't use it. Wouldn't use it even if it is with me. I just get bored so I make the list.
13. Yes
14. What she has
15. Looks to see if roommate has it, if not goes without
16. Yes
17. Small snack or cereal
18. Yes
19. Yes
20. Yes
21. Yes, No
22. 0

- 23. No
- 24. None really but A since none isn't an answer
- 25. E
- 26. Planning, no idea what to cook. Also it is a pain to cook for one since you can't just buy single serving sizes of ingredients that spoil quick
- 27. Have time to plan a bit more
- 28. Marsh card
- 29. A – Sick of cereal twice a day. C – likes to eat healthier
- 30. Nope

Consolidated Artifact Model

Consolidated Artifact Model

ITEM TO COOK

DESCRIPTION

INGREDIENTS

DIRECTIONS

TIME

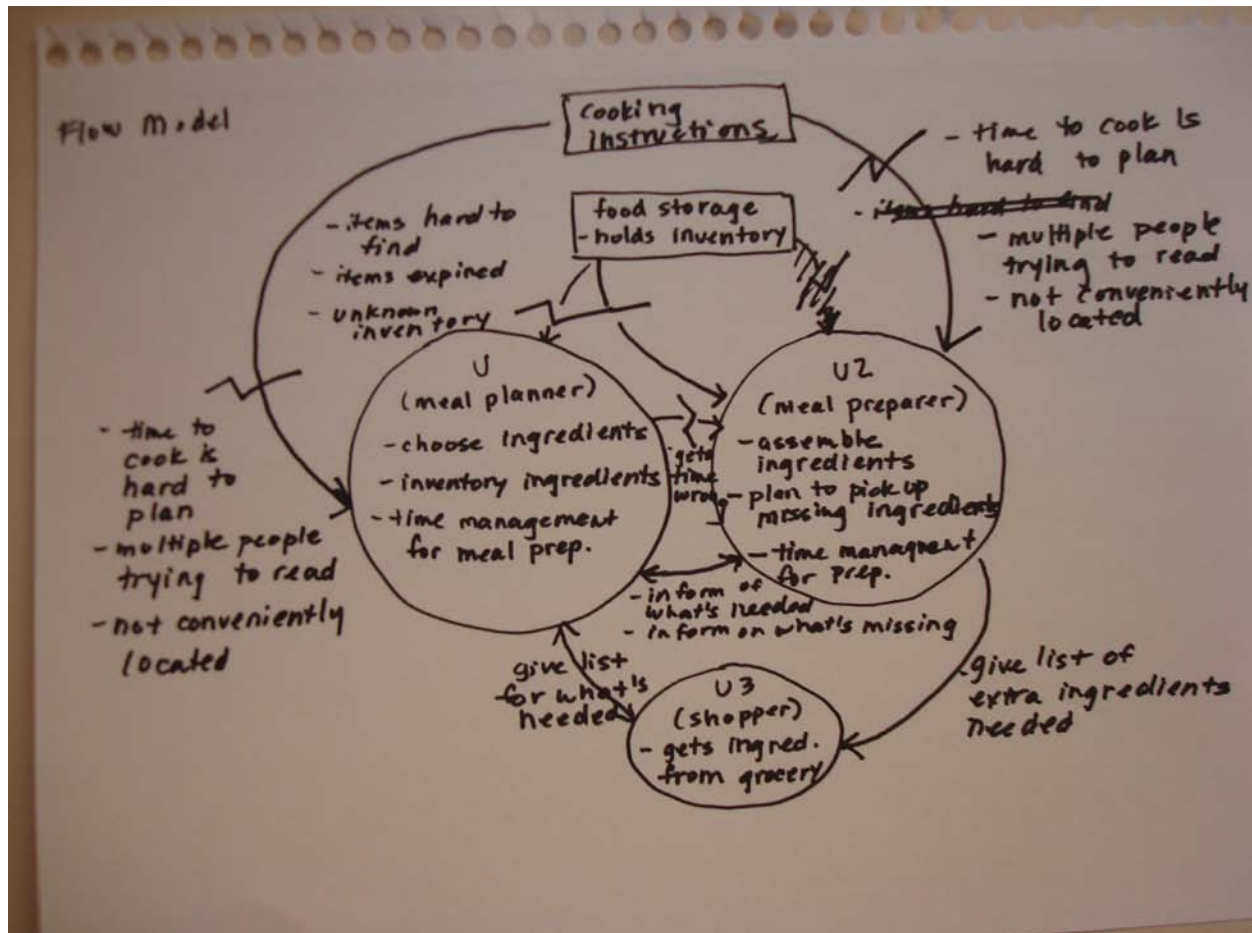
AMOUNT

PHOTO

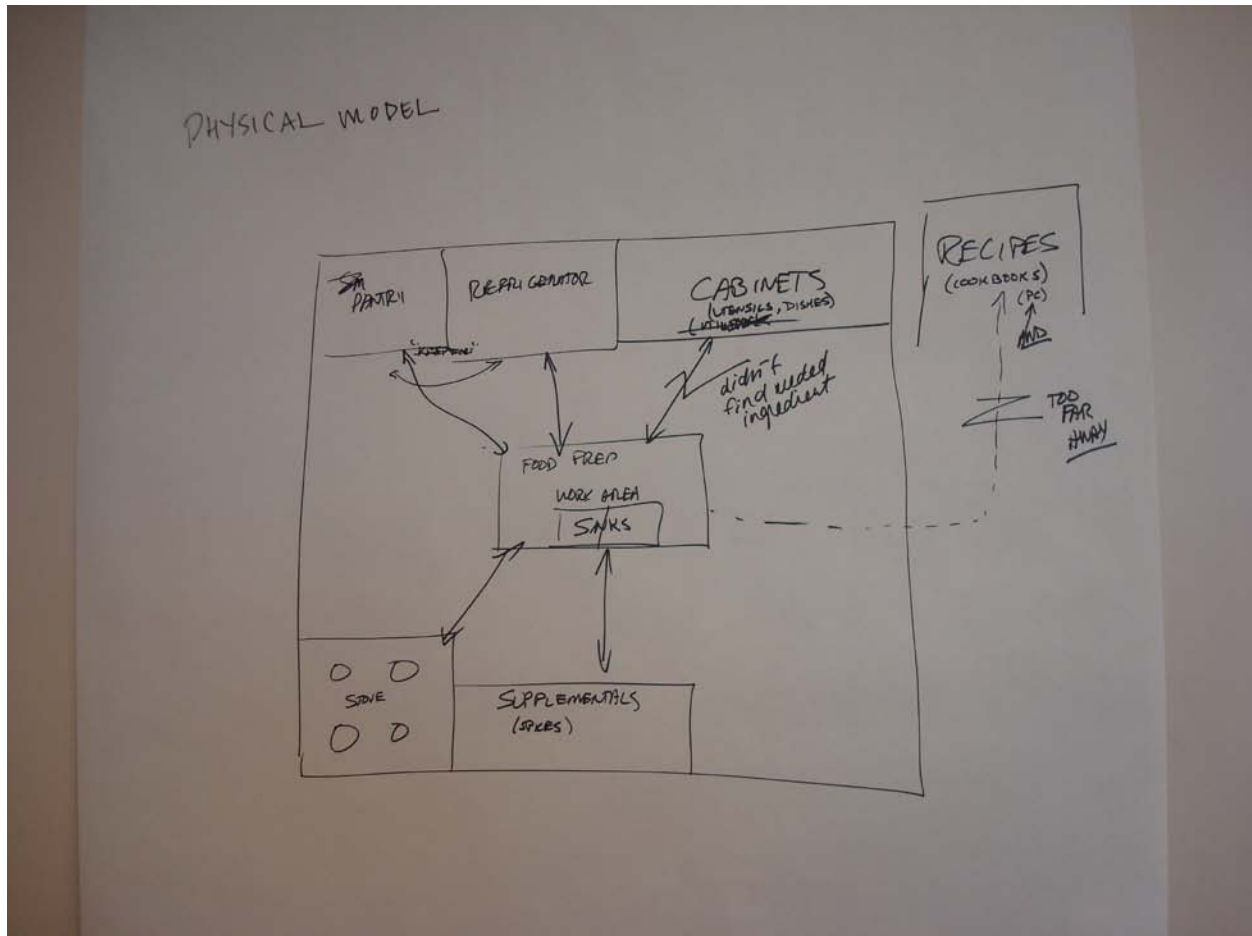
NUTRITION

TIPS

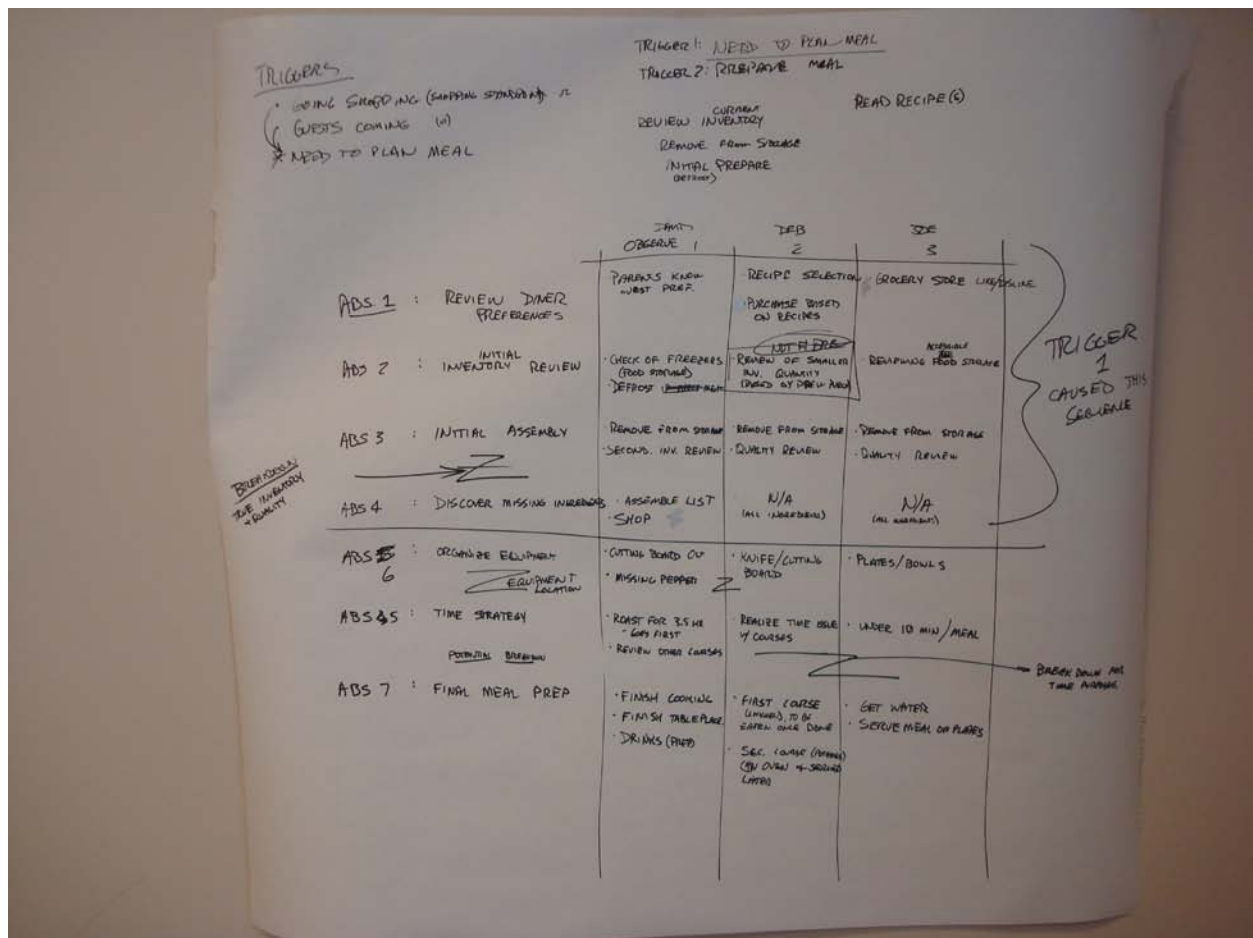
Consolidated Flow Model



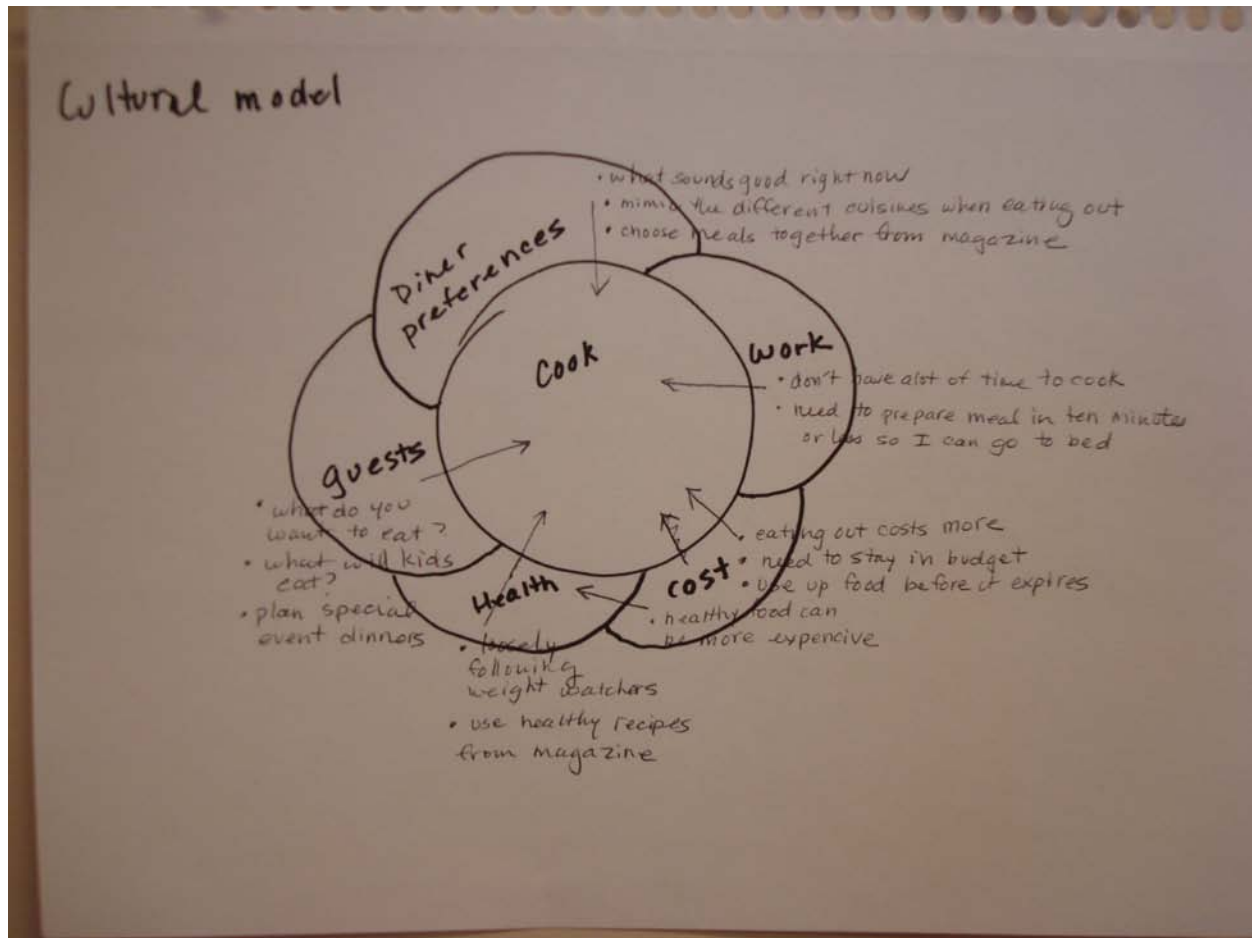
Consolidated Physical Model



Consolidated Sequence Model



Consolidated Cultural Model



Appendix D: Affinity Diagram Breakdown

G1: THESE ARE OUR SHOPPING HABITS

G1-P1: How I use shopping lists

G1-P1-B1: I make a physical shopping list

- 1.1.1.1: I keep a grocery list, and take it with me, but never use it in the proper sense
- 1.1.1.2: I use a magazine to assembly a shopping list

G1-P1-B2: I make a mental shopping list

- 1.1.2.1: I make mental note of what is needed for this meal at the store
- 1.1.2.2: I keep a mental not of what is read in recipes
- 1.1.2.3: I make calls to person at the store if they forget to tell the person going to the store

G1-P2: Why I go to the grocery store

G1-P2-B1: I will pick up specific ingredients as needed

- 1.2.1.1: I mainly go to the store while cooking for things to complete the recipe (ie, salt)
- 1.2.1.2: The grocery store is one mile up the road
- 1.2.1.3: I did not put away "special run" groceries
- 1.2.1.4: Money is passed out to shopper before going to the store
- 1.2.1.5: I don't shop with meals in mind, but rather for "needed" items.

G1-P2-B2: My shopping habits are routine

- 1.2.2.1: I grocery shop once every ten days
- 1.2.2.2: We grocery shop, and get everything for a week
- 1.2.2.3: I will not make a special trip for food, but when I'm already out, I will stop by for things I remember

G2: THIS IS HOW I PLAN MY MEALS

G2-P1: Sometimes I eat what appeals to me without planning

G2-P1-B1: Sometimes I choose to eat something because it sounds good

- 2.1.1.1: I go to a store, walk up aisles to find something good, find something good, and get remaining ingredients
- 2.1.1.2: I'm concerned about health, but if I feel like it, I'll still eat it
- 2.1.1.3: I will cook the same meal twice out of the magazine
- 2.1.1.4: I am not a vegetarian, but do not usually eat meat all the time.

G2-P1-B2: I don't know what I want to eat

- 2.1.2.1: If there is nothing in the pantry (trip 2), I go back to the fridge/freezer for a second look
- 2.1.2.2: I turn to the pantry first, because it is physically located before the refrigerator (for work nights)
- 2.1.2.3: I looked in the freezer for what to make for the meal
- 2.1.2.4: I will look in the fridge and freezer at the same time
- 2.1.2.5: There are nights I will not have dinner at all (if nothing seems good to eat)
- 2.1.2.6: If nothing is in the fridge/freezer, I will return to the pantry for a further look

G2-P2: I consider preparation and cook time when planning a meal

G2-P2-B1: I want to cook fast sometimes

- 2.2.1.1: I usually get meals based on what I can make quickly
- 2.2.1.2: I usually have prep time under 10 minutes (or I won't cook it)

G2-P2-B2: Convenience is a factor in my cooking meals ahead

- 2.2.2.1: I will make meals for leftovers for convenience purposes
- 2.2.2.2: I prepare some meals for work purposes
- 2.2.2.3: I prepared Brussel sprouts (which were pulled from the freezer in tupperware)

G2-P3: I consider health when planning a meal

G2-P3-B1: I like recipes that use fresh ingredients

- 2.3.1.1: I plan using a recipe magazine for a week
- 2.3.1.2: I will hunt for a recipe to use an ingredient before it goes bad
- 2.3.1.3: I buy fresh each week and use it up

G2-P3-B2: I consider health benefits when planning a meal

- 2.3.2.1: I have health concerns
- 2.3.2.2: I buy healthy stuff that can be cooked quickly
- 2.3.2.3: I plan what to cook by using a magazine "Clean Eating". It's healthy and it details out ingredients
- 2.3.2.4: I find a veggie burger in the refrigerator
- 2.3.2.5: I am trying to lose weight
- 2.3.2.6: I buy healthy premade food

G2-P4: I sometimes plan special meals for others

G2-P4-B1: I cook meals on special occasions

- 2.4.1.1: When David comes down to visit, there is a family meal
- 2.4.1.2: I called everyone to see who was eating
- 2.4.1.3: I have a couple days to prepare for a large meal

G2-P4-B2: I take other diners' preferences into account

- 2.4.2.1: I believe other diners' preferences are a factor
- 2.4.2.2: People relayed what wouldn't be eaten, but the cooks have to remember what people don't like
- 2.4.2.3: I talked to each other and planned what to cook

G2-P5: I don't plan my meal the same way every time

G2-P5-B1: I plan my meal around the main dish

- 2.5.1.1: I plan on the main dish
- 2.5.1.2: I pick the main part of the meal, then find out how to cook it
- 2.5.1.3: I sometimes only have a main dish
- 2.5.1.4: I start with the entrée, then figure out what else to make with it

G2-P5-B2: I am not committed to cooking a 'real' meal every night

- 2.5.2.1: On some nights, I just have cereal
- 2.5.2.2: I tend to eat in "snacky-form" as well, due to my schedule
- 2.5.2.3: The veggie burger is complete

G2-P6: Cost is a factor in my meal planning

G2-P6-B1: I am concerned about meal cost

- 2.6.1.1: I cook at home due to cost
- 2.6.1.2: I use a Marsh Grocery card

G3: I WANT TO IMPROVE MY PLANNING AND COOKING SKILLS

G3-P1: Technology could help me in my meal planning

G3-P1-B1: I want technology to help me with my cooking and shopping

3.1.1.1: I use technology now for recipes

3.1.1.2: I like to know what I need to buy when I'm at the store

G3-P1-B2: I would like technology in cooking if it's easy to use - not a burden

3.1.2.1: I believe it would have to be 100% seamless for use

3.1.2.2: If technology was not convenient to use, I probably wouldn't use it

3.1.2.3: I just want it to work

G3-P2: I need better cooking management skills

G3-P2-B1: I need my recipes visible

3.2.1.1: I keep my recipes out while cooking

3.2.1.2: I look at a recipe book as a reminder of things needed as well as temperatures (quick reference guide)

G3-P2-B2: I need help coordinating cooking times

3.2.2.1: I hadn't timed the cooking right, and the main meal was done way before the side dish

3.2.2.2: I prepped and cooked the dish based on cook time

3.2.2.3: Since there were two of us, and two dishes, we prepared the dishes at the same time

3.2.2.4: I prepare and cooked one dish at a time synchronously

3.2.2.5: I knew the time constraints of each dish, and times to have everything out, ready and hot, when everyone arrived

G3-P2-B3: I need help coordinating preparation time

3.2.3.1: Since items are in the freezer, I need to defrost it

3.2.3.2: I pull what is needed for meals out before cooking

3.2.3.3: I do not set out secondary ingredients for side dishes until ready to prep and cook it

3.2.3.4: Once I find out what to make, I will set it out

G3-P3: This is how I cook

G3-P3-B1: I use my microwave

3.3.1.1: I cook my Brussels sprouts in a bowl and microwave

3.3.1.2: I put the veggie burger in the microwave

G3-P3-B2: How I get ingredients out when I cook

3.3.2.1: If I am baking, I assemble ingredients all at once

3.3.2.2: I get ingredients out one-at-a-time, then put them away once I'm done

3.3.2.3: I got a glass of water while cooking the Brussels sprouts

G3-P3-B3: I would like to cook this way in the future

3.3.3.1: I like to use a slow cooker

3.3.3.2: I like to bake, and look forward to being able to cook more often

3.3.3.3: My grandmother wants to make everything under the sun

G4: I WANT BETTER KITCHEN ORGANIZATION

G4-P1: I need to organize my kitchen environment

G4-P1-B1: I have to share kitchen resources

- 4.1.1.1: Two cooks planned and cooked the meal
- 4.1.1.2: I will have dinner when my roommate will be having breakfast due to our schedules
- 4.1.1.3: I had to manage my cooking utensils when cooking
- 4.1.1.4: I rarely cook with my partner because we get irritated with each other from time-to-time

G4-P1-B2: I am unhappy with the organization of my pantry

- 4.1.2.1: I have trouble finding ingredients I need
- 4.1.2.2: My pantry has more stuff than just food (Swiffer, mop, etc.)
- 4.1.2.3: My pantry is too far away from the kitchen

G4-P1-B3: I need help managing kitchen utensils

- 4.1.3.1: I pull plates out before serving a meal
- 4.1.3.2: I had to search for cooking utensils
- 4.1.3.3: I had to search for utensils to cook with

G4-P2: I want to know what food I have

G4-P2-B1: I don't really know what is in my inventory

- 4.2.1.1: I inspect ingredients I see available, but I do not know everything in my pantry
- 4.2.1.2: I negotiate ingredients I have versus what I "think" I have
- 4.2.1.3: I don't know what secondary ingredients are available until I pull them from inventory
- 4.2.1.4: I search the pantry and other dry storage after the main entrée is figured out

G4-P2-B2: I need a way to sort my food

- 4.2.2.1: I have three freezers I use
- 4.2.2.2: I use separated shelves between myself and my roommate
- 4.2.2.3: My roommate and I share a fruit bowl
- 4.2.2.4: The deep freeze stores mainly out of the way items (not daily used items)

G4-P3: I want to maintain the quality of my food

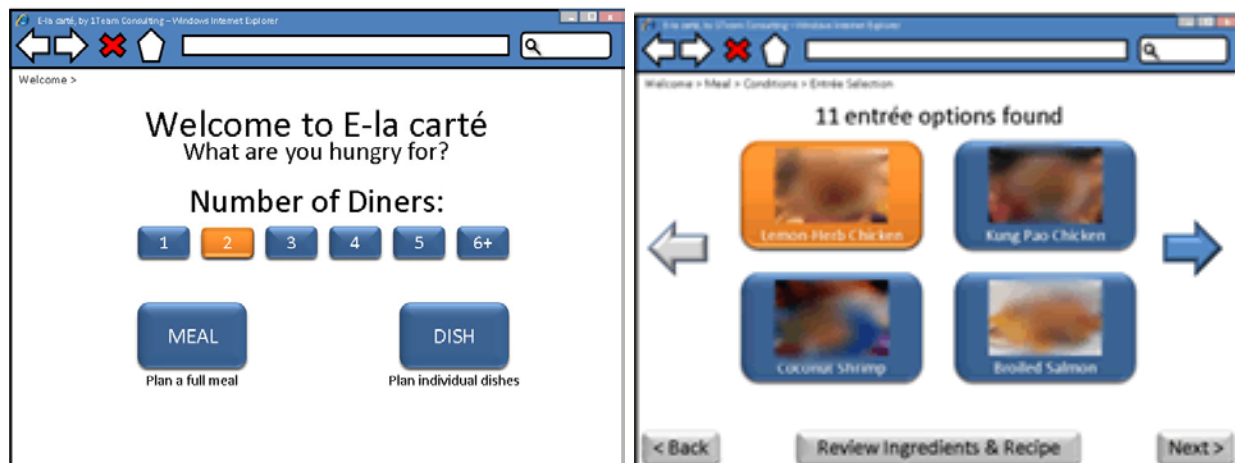
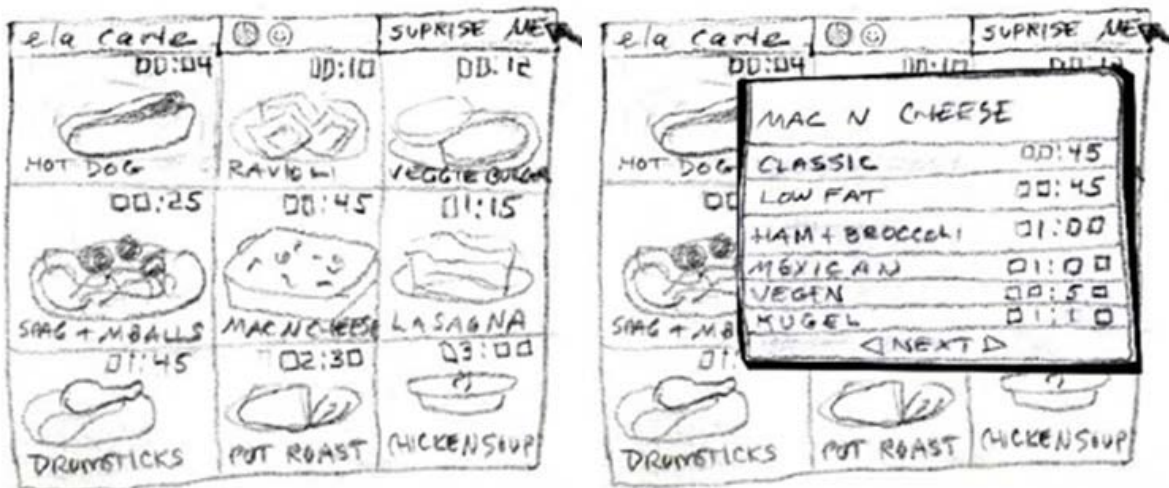
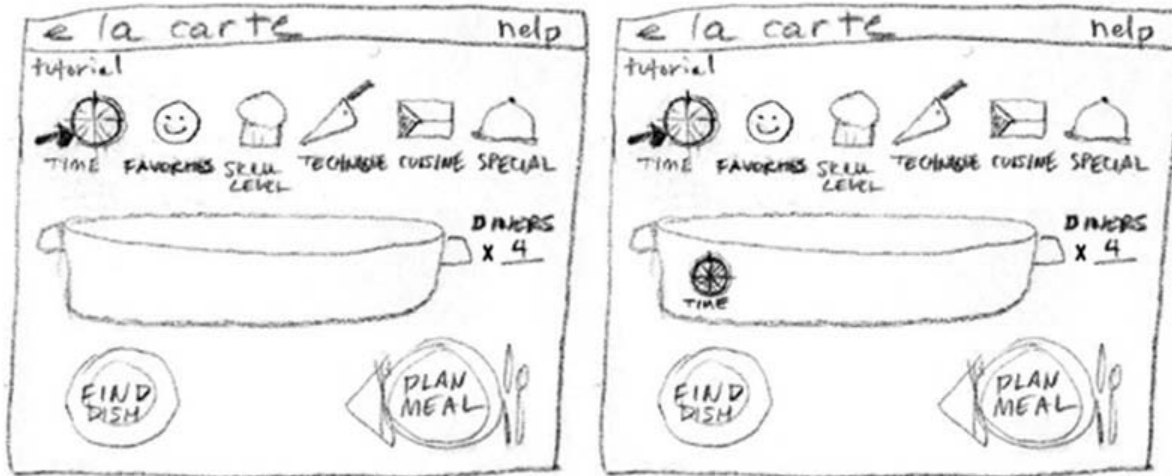
G4-P3-B1: I want to know when my food expires

- 4.3.1.1: I could not tell when some food was good or bad
- 4.3.1.2: I do not know when pantry food goes bad
- 4.3.1.3: I look at expiration dates
- 4.3.1.4: I review the quality of food when pulling off shelf items at home

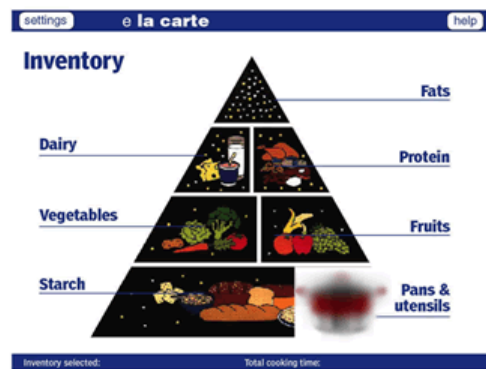
G4-P3-B2: I want to know how long items have been in the freezer

- 4.3.2.1: I keep notes on items in the freezer (Month/Year)
- 4.3.2.2: I keep mental notes of expiration dates in the fridge and freezer
- 4.3.2.3: I have ten-year-old fish frozen in the freezer

Appendix E: Low Fidelity Screenshots



Appendix F: High-Fidelity (Interactive) Screenshots



Appendix G: Consent Form for e la Carte

I state that I am over 18 years of age and agree to participate in a contextual inquiry project administered by graduate students at IUPUI. Participation includes being observed in my home by a member or members of the team of students and being interviewed by members. The students will be videotaping the observation and will be taking still photographs.

The purpose of the observation and contextual interview is to gather data about how people go through the process of planning and preparing dinner in their homes.

The student(s) will observe me as I decide what to cook for dinner and progress to cooking the dinner. I will also be asked to provide demographic information.

I will be asked to answer questions relating to the activities described above.

All information collected for the study will be kept confidential. I will be assigned a number by the design team and my identity will remain anonymous in the results. Any photographic or videographic artifacts will be used solely for the purpose of completing the class assignments.

I understand that I may withdraw from the testing at any time with no penalty.

Signature: _____

Date: _____

(Adapted from Interaction Design: Beyond Human-Computer Interaction, 2nd Edition)

Appendix H: User Testing Packet

Tasks

1. Check vegetable Inventory
2. Choose a Turkey and Cheese Panini
3. Unselect the Panini instead choose veggie burger and a baked potato as a side dish
4. "Cook" the meal
5. When done "cooking" the meal check vegetable inventory

Walkthrough

1. Click See inventory
2. Click Vegetables (or image)
3. Click Done
4. Click Sandwiches
5. Click Select
6. Click Turkey & Cheese Panini
7. Click Veggie Burger
8. Click Done Selecting
9. Click Baked Potato
10. Click Done Selecting
11. Click Ready to cook
12. Wait for cooking timeline to complete
13. Click Done Cooking
14. Click See Inventory
15. Click Vegetables (or the icon)

See Appendix F for the consent form (given to users that hadn't participated during the Contextual Interview)

See Appendix I, Simulation Scenario 3 for scenario that was provided to test subjects, in conjunction with walkthrough review

Appendix I: User Testing Results

Structured Interview Questions & Tabulation

ID	YES/NO QUESTIONS	RESPONSES (TOTALS IN YELLOW)	
1	Were you able to access your current food inventory?	Yes (2)	No
2	Were you able to review all possible sandwich recipes?	Yes (1)	No (1)
3	Were you able to review estimated preparation times for your selections?	Yes (2)	No
4	Were you able to select a sandwich from the available choices?	Yes (2)	No
5	Were you provided suggested side dishes with your entrée?	Yes (1)	No (1)
6	Did e la Carte give you a <u>final</u> estimated preparation time before cooking?	Yes (2)	No
7	Did e la Carte give proper step-by-step instructions for preparing your selections?	Yes (2)	No
8	Were you able to see inventory quantities change after preparing your meal?	Yes (1)	No (1)
9	Did it take you 5 minutes or less to plan your evening meal?	Yes (2)	No
10	Did you find e la Carte easy to interact with?	Yes (2)	No
11	Did you find e la Carte easy to understand?	Yes (1)	No (1)
12	Was e la Carte easy to explore in depth?	Yes (2)	No
13	Did e la Carte offer enough visible clues to access the current functionalities?	Yes (1)	No (1)
14	Was e la Carte supportive of your creativity in creating a meal planning experience?	Yes (2)	No
15	Was e la Carte interface attractive (aesthetically pleasing)?	Yes (2)	No
16	Did you receive enough feedback from e la Carte to confirm you were performing the correct functions?	Yes (2)	No
17	Would you want to store default settings in e la Carte, based on your (or your family's) preferences?	Yes (2)	No
18	Do you like the ability to select different meal settings (ie, cuisine, preparation time, etc)?	Yes (2)	No
19	Do you like the ability to select dishes based on recipes you can make using your current inventory?	Yes (2)	No

ID	SCALED QUESTIONS	(1 – LOW, 4 – HIGH) (TOTALS IN YELLOW)
1	I believe the meal pictures in e la Carte provide a pleasing aesthetic for the application.	1 – 2 – 3 – 4 (2 responses – 4)
2	I believe seeing the amount of preparation time for dish selections is important.	1 – 2 – 3 – 4 (2 responses – 4)
3	I believe seeing the amount of preparation time for my entire meal selection is important.	1 – 2 – 3 – 4 (2 responses – 4)
4	I believe the color scheme of e la Carte is appropriate.	1 – 2 – 3 – 4 (1 response – 3, 1 response – 4)
5	I believe e la Carte can be used by a variety of households (single, married, families, etc.).	1 – 2 – 3 – 4 (1 response – 3, 1 response – 4)

OVERALL SCALES (1 – LOW, 10 – HIGH) (TOTALS IN YELLOW)									
Based on what you have seen, how interested would you be using e la Carte in your current household?									
1	2	3	4	5	6 (1)	7	8 (1)	9	10
If an automatic inventory tracking system (ie, tracking inventory once they are purchased) were build in conjunction with e la Carte, how interested would you be in using e la Carte?									
1	2	3	4	5	6	7	8 (1)	9 (1)	10

OPEN-ENDED QUESTIONS
What functions in the current e la Carte interface did you enjoy the best, and why?
<ul style="list-style-type: none"> Inventory shows what I have and I don't have to search Going to Sandwiches, being able to scroll all the available choices. I think the touch-screen slide feature would be really cool there, too. Each sandwich I reviewed had an estimated time, not just the first time I saw on the main screen. I like that it started at the fastest time and worked upwards
What functions in the current e la Carte interface did you enjoy the least, and why?
<ul style="list-style-type: none"> Needs more direction in the process. The "select" in the smaller menu was great, but when it's the only one in the category, no recipe shown. I'd like to preview the recipe before selecting. How many STEPS are there to do, not just time. For me, if there was a recipe that took 10 minutes, but had 12-15 steps, then I'm probably not going to make it, especially if I'm in a rush.
How might you change the meal planning experience using e la Carte?
<ul style="list-style-type: none"> Nothing I think if the user were presented the actual recipes, and you clicked on the "Select" button for the recipe itself, I think that's probably the thing I'd change the most. If there were only one recipe available, then that's OK, just don't show the left/right arrows, or let them attempt to flip through the recipes.
What, if any, information was missing in each step that might have better assisted you to complete the tasks?
<ul style="list-style-type: none"> Needs better directions The number of steps presented to the user for each recipe, esp. those that are not shown when performing the initial recipe selection. I think it would have also been neat to try to turn off foods (cuisines) that I know my family wouldn't eat, such as Thai, and see the system react accordingly. I think if that were shown, that would be cool looking

Notes from Subject 1

Did e la Carte give you a final estimated preparation time before cooking?

That was great, esp. with all recipes intermixed

Did it take you 5 minutes or less to plan your evening meal?

I'm sure with some practice, it would be quicker. I can see the kids wanting to choose, too

Was e la Carte easy to explore in depth?

With what was available, yes.

Did e la Carte offer enough visible clues to access the current functionalities?

Triangles told me I could expand

Was e la Carte supportive of your creativity in creating a meal planning experience?

Liked seeing lots of choices based on what I have.

Was e la Carte interface attractive (aesthetically pleasing)?

Wasn't too busy; colorful

Notes from Subject 2

1. Check vegetable inventory

Time: 16 seconds

- Knew how to use pyramid (fits the program), but didn't really know you could click

2. Choose a turkey and cheese Panini

Time: 22 seconds

- Clicked around to leave inventory didn't see "done" button
- Didn't see the next arrows right away while looking the sandwiches
- Didn't know arrows meant more

3. Unselect the Panini instead and choose veggie burger and a baked potato as a side dish

Time: 30 seconds

- Had trouble finding side dish
 - Clicked around until she found it
- Didn't understand timeline at this step
 - Didn't understand the diamonds at all in this step
 - Didn't really care they were there at this stage after they were explained

4. "Cook" the meal

Time: 9 seconds

5. When done "cooking" the meal check vegetable inventory

Time: 8 seconds

- Need more feedback on the food pyramid because it doesn't look like you can click anything.

Appendix J: Scenarios for e la Carte

Conceptual Scenario 1

James makes a New Year's resolution to lose weight. He decides to loosely follow Weight Watchers, using their online tool to follow their exchanges. Since he wants to eat healthier and lower calorie, he decides that he will do more cooking at home and less eating out.

James and his partner do their grocery shopping on the weekend, stocking up for the week ahead. They include ingredients for four home-cooked meals from scratch and three meals prepared at home from healthy, pre-packaged Kashi entrees. Their budget is another factor that goes into their meal planning.

In order to compile their shopping list, they go to their smart inventory system that tracks what food they have in their home. The interface is a touch pad screen that is level with the countertop in the kitchen. They choose meal planning from the interface menu. They then choose the criteria for the menus for the week: first – items they already have that need to be used up; second – healthy, conforming to the Weight Watchers system; third – different than what they ate last week; fourth – not too time-intensive, since both will be working. The system comes up with various options which are displayed based on the couple's criteria. They make their choices.

James then chooses the shopping list function on the touch pad. Based on the inventory that the system is tracking, a list is already compiled to restock various items to their usual levels. Any new items that the couple needs to cook their selected recipes are added to the list by the system. The list can be accessed during shopping on the couple's mobile phone.

After shopping, the couple brings the groceries into the kitchen. The system uses a combination of scanning of RFID tags, photo imagery and auditory cues to check in the items purchased. Any ingredients that are removed from their original packaging – such as sugar and flour – are entered into the inventory by placement onto a smart scale. The weight is added to the existing stock of the item. For example, the sugar canister still had some sugar in it, and now the new sugar is added and the new weight is in the system. The couple is only responsible for placing items in a certain spot – they do not need to enter any information for the scale and the photo imaging to work. For the auditory cues, they simply say the item -- for example, "six pink grapefruit; 12 Granny Smith apples' eight bananas.

Early in the evening, James decides it's time to prepare dinner. He goes to the key pad and chooses menu planning. He pulls up the list of recipes that the couple chose earlier. He picks one to prepare that night. The list of ingredients is displayed along with the directions. The first part of the directions highlights the time needed for prep and for cooking. It outlines the strategy for preparing the meal so that everything is ready at the appropriate time. As James progresses through the steps, he receives auditory cues so that he stays on the time schedule. When he needs more time to grate the cheese, he simply says pause, and the system waits for his command to resume the time keeping. James notes that he is using up the fresh mozzarella that remained from last weekend's trip to the farmer's market, and he's glad it didn't go to waste. The lasagna goes into the oven, leaving him time to make his salad and cut up fresh fruit for dessert. When he finishes all the cooking, he presses "Done," and the system subtracts the items he has used from the inventory.

The couple enjoys their home-cooked meal and they feel great about keeping their resolutions to eat healthy and watch their budget.

Conceptual Scenario 2

Beth finishes up her last task at work and starts thinking about what she will cook for dinner for herself and the kids when she gets home. She goes to the Web site for her home's smart inventory system. She plugs in her password and is able to access a list of ingredients she has on hand. She then chooses menu planning, and chooses ingredients on hand as the top criteria for choosing a recipe. She chooses total prep and cooking time as her second criteria. She gets a list of recipes to peruse. She decides she'll ask the kids which of two they want when she gets home. Before she logs off, she remembers that her daughter needs a sack lunch tomorrow because she is going on a field trip. Beth's usual sack lunch is a peanut butter and banana sandwich on cinnamon bread, a cut up Granny Smith apple, a chocolate rice cake, Sun Chips and a bottle of water. She has this menu stored in the system, so all she needs to do is go to the "Check Inventory" button, and then "Sack Lunch." The system lets her know that she needs more bananas. She hits "Substitutions" and gets a list of alternatives: jelly, honey, raisins. She decides she better pick up some bananas on the way home – her daughter is PICKY!

Beth stops at Kroger near home. She pulls out her iPod and accesses her smart inventory system. She checks the running list option and sees that her milk is about to expire. She remembers that she didn't pick milk up this weekend because there was a lot left over (with her son away for the weekend, they didn't use as much as usual). She decides to pick up a gallon of milk to be sure they make it to the next big shopping on Saturday. She hopes they can use up the milk they have tonight. She decides to get some extra bananas so she can make banana smoothies for dessert. She also gets some yogurt for the smoothies.

Beth gets home with her few groceries. The system recognizes the yogurt and milk as she unpacks them and puts them away. She gives the auditory cue "10 bananas" and the bananas are checked in to the inventory. She then asks the kids which of two meals they want, and they choose tacos. She takes out her ingredients and begins the preparation. The system scans the RFID tags on the items she uses that have them, and subtracts those items from the inventory. She gives auditory cues for the produce that she uses – for example, "Two tomatoes; half a head of lettuce; one onion." After the tacos are all eaten, Beth makes the smoothies. She is happy that she can use up the milk. And she still has time to help her daughter get ready for her field trip.

Simulation Scenario 3

Emily is a second-year MBA student working as an intern at a local marketing organization. She is constantly on the go between her school projects, class lectures, and her 25-30 hours of internship work. She takes some time for herself to shop for food, but is, admittedly, not very skilled as a cook when cooking from scratch. She went shopping last weekend, but is now getting back to her apartment after her night class.

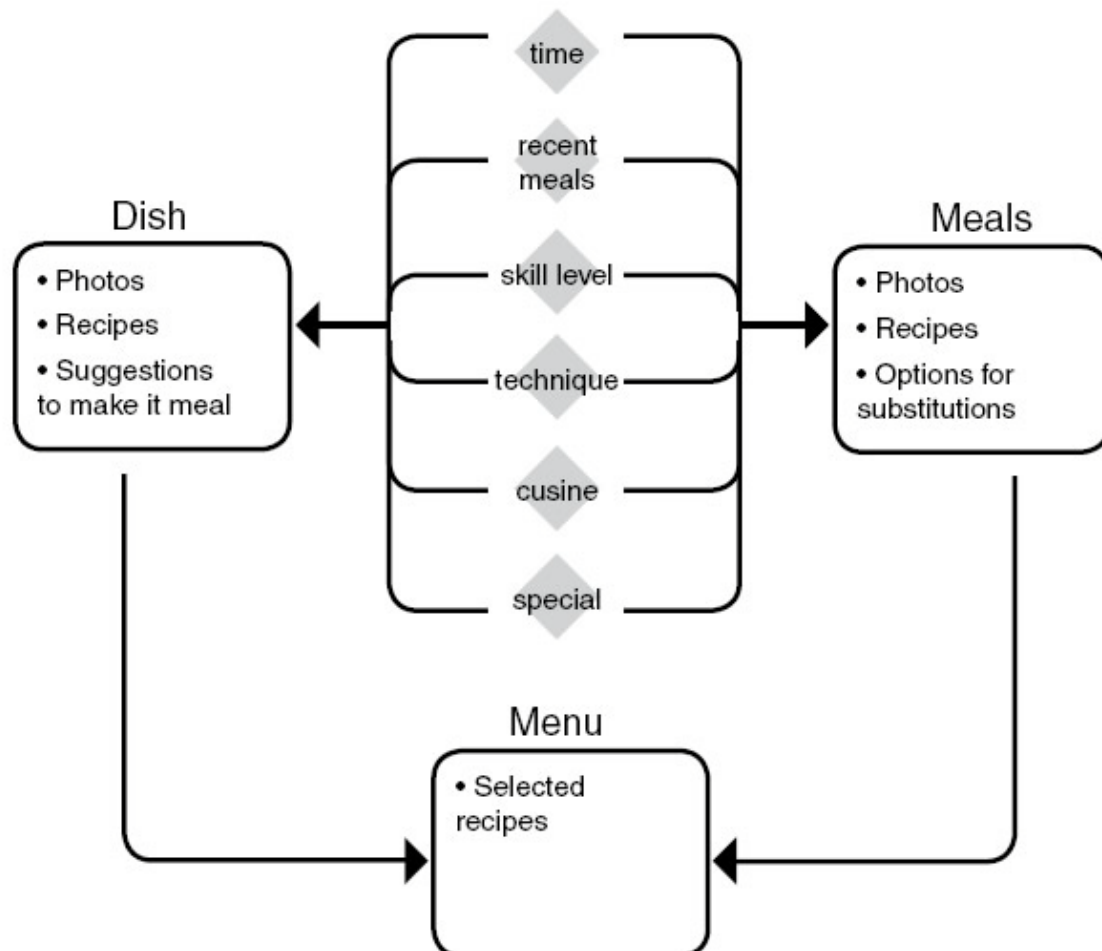
Emily wants to prepare a light evening meal, as she'll be going to bed within the next two hours. She goes to e la Carte to begin her meal plans. Upon opening the application, the system reviews her current inventory, and displays a number of recipes that she can create this evening. She believes a quick sandwich may be best for this evening, so she enters the 'Sandwiches' section. She is shown a list of all sandwiches she can make, with a Turkey & Cheese Panini displayed first (due to the limited amount of time needed). She selects the Panini, and it is shown as selected. She then re-reviews the available categories to her, and eyes the Veggie Burger. She de-selects the Panini, and selects the Veggie Burger. There is only one recipe available for her for the burger, so it is automatically highlighted. She reviews the rest of the categories, determines she is done selecting her main course, and selects the "Done Selecting".

The e la Carte system displays her Veggie Burger selection, and makes recommendations for available side dishes based on her current inventory. While she can review displayed side dishes, she decides she would rather have just a potato, rather than perform a recipe for potatoes. She selects the "See Inventory" button, which displays a familiar USDA Food Pyramid categorizing her current inventory, based on when she purchased her food items and "checked" them into the system via RFID scanning. She selects the Vegetables section of the pyramid and sees a number of different vegetables. She sees she has 5 pounds of potatoes on inventory, selects the icon to choose one potato, and selects "Done Selecting" to return to the side dish recommendations screen. The system shows she has selected the Veggie Burger and a potato, as well as an estimated amount of time to prepare both dishes. She touches the "Done Selecting" button, and a final review of her selections are displayed, along with a visual picture of what her meal will look like. She determines the Veggie Burger / Potato meal is perfect for this evening, and selects "Ready To Cook".

Upon touching "Ready To Cook", the system gathers the recipe instructions from the Veggie Burger recipe, and basic potato preparations instructions, and organizes all instructions into a proper timeline, such that both the burger and potato are ready at the same time. She then begins the e la Carte timer, which begins her instructions on how to prepare both dishes. The timer shows her each instruction step-by-step, including necessary ingredients. Emily has the ability to pause the timer, in case she is running into preparation difficulties.

Once the meal has been prepared, Emily touches the "Meal Completed" button, which ends the e la Carte session, and updates current inventory quantities based on the used food items for this particular meal. Emily has the ability to review what inventory she has and has not used, and can modify the e la Carte database based on any meals she may not have used e la Carte for.

Appendix K: Interactive Dialogue Model



Appendix L: Stakeholder Breakdown

Primary roles

Name	Food purchaser
Brief Description	The person in a household who pays for the food that is brought in to the home for meal preparation
Responsibilities	Keep in mind budgetary constraints for food purchasing; provide the funds for the food
Participation	Would be interested in ways that a system could reduce costs for food. For example, limiting loss of food due to expiration. Would also be interested in how the cost of recipes would be factored in to the system. Could that be a parameter that a user sets before be given recipe options? As someone who is dealing with the household budget, the cost of the system would also be an area of concern for this stakeholder.

Name	Meal planner
Brief Description	Person who plans meals for the household.
Responsibilities	Must plan meals based on a variety of parameters cost, appeal to diners, nutrition requirements, health constraints, time and skill constraints, and what is available in the home in terms of ingredients.
Participation	Would want to have input on the parameters that would focus the recipe search conducted by the system. Parameters would include cost, appeal to diners, nutrition requirements, health constraints, time and skill constraints and availability of ingredients. Would also want input on learnability and memorability of system, portability and how system would fit into the home.

Name	Food manager
Brief Description	This person gets rid of expired products in the pantry and the refrigerator. He/she watches over food storage and puts products in appropriate places – frozen items versus refrigerated, etc.
Responsibilities	Remove expired food from the home. Be sure food is stored correctly for safety.
Participation	Would want input into how system tracks shelf-life of products. Input on whether information from system could be available to the shopper during grocery trips. Input on how the system would maintain the inventory – when and how would items be scanned, for example. Also, input on how the items would be checked out of the inventory. Input on how to retrieve data on inventory and shelf-life from the system as desired.

Name	Person who puts food away after grocery shopping
Brief Description	This person puts items just purchased away in the pantry, in cabinets and in the refrigerator/freezer.
Responsibilities	Put groceries away according safety considerations (temperature and proximity to other items). Rotates stock so that newer items go to the back and older items are used first.
Participation	Would have input on how items are checked into inventory by system after purchase. Would have input on how system tracks expiration dates, and how that data can be retrieved. Would be someone to give data on the best way to organize items for easy retrieval and for easy recognition.

Name	Shopper
Brief Description	Person who goes to grocery store or other outlets to purchase food for at-home meal preparation
Responsibilities	Responsible for knowing what products are needed in the home at the time of shopping and for the period before the next planned shopping. Responsible for executing plans regarding budget concerns, including satisfying the lists for planned meals and also using coupons and special offers. Responsible for maintaining standards on the quality of the products that are brought into the home. Responsible for the safe transport of the items from the store to the home.
Participation	Input on how lists are compiled for shopping – what input might the system have on that task? If the system has a portable component, this person might take that component to the store during the shopping. Input on how the household maintains an inventory at the present time.

Name	Cook
Brief Description	The person(s) that prepares the food for consumption.
Responsibilities	Locating the food in storage, Preparing food to be cooked based on recipe, taking food out of packaging, cooking based on the recipe
Participation	Direct involvement will come into play when they need to read or locate ingredients. This will be in the later stage of using the product (removing products from the user's system)

Name	Food packaging industry
Brief Description	Responsible for tagging the food with RFID tags and entering tag into system.
Responsibilities	Placing RFID tags on products, entering the tagged information into an accessible system,
Participation	They are one of the first roles to handle products being entered into the system. Without them there is no database of products.

Name	Manufacturer of the product
Brief Description	The company that produces the system that the end users will be using
Responsibilities	Building and maintaining the product that the end users will be using
Participation	Produce the product

Secondary Roles

Name	Grocer
Brief Description	The person(s) that have a place to purchase goods
Responsibilities	Provide a way for end users to purchase goods
Participation	Supply the products to the end user

Name	Diners
Brief Description	The person(s) that consume the food made
Responsibilities	Eat the food
Participation	Consume the goods made

Tertiary roles

Name	Health Care Professionals (HCPs)
Brief Description	HCPs include medical personnel and dietitians, whom recommend proper diets for people with certain conditions (i.e., low-carbohydrate, diabetic, food allergies, etc.).
Responsibilities	Provide insight into possible allergy complications in conjunction with current food on-hand quantities of home
Participation	Would participate for purposes of assistance in adjusting recipes and/or cooking techniques for people with such conditions. Conditions would be provided by consumer and primary stakeholders.

Name	Insurance Companies
Brief Description	Companies that provide health care benefits for company employees whom participate in health care packages.
Responsibilities	Oversee current insurance costs for employees vs. current medical cost trends. Review health packages to be provided to employers based on current trends, and adjust yearly.
Participation	Would desire input regarding provided recipes to employers, such that healthy choices would be rewarded with lower health care costs and deductibles.

Name	Employers
Brief Description	Employers interested in the healthy choices employees make regarding the health of those covered by provided health care benefits.
Responsibilities	Work with product manufacturer to review possible recipes (or provide own recommendations for recipes) to assure employees are acting and maintaining healthy lifestyles.
Participation	Would desire input regarding provided recipes to employers, such that healthy choices would be rewarded with lower health care costs and deductibles.

Name	Cooking Schools
Brief Description	Establishments that provide instruction as to the various techniques for preparation of foods for individuals or groups of people.
Responsibilities	Provide insight into proper recipe preparation instructions for chosen recipes, based on on-hand items as scanned by product.
Participation	Review basic recipe preparation techniques, based on perceived customer experience levels. Work in conjunction with software to provide (free?) how-to's for more efficient food preparation techniques, in exchange for possible business opportunities for training customers.

Name	Restaurants
Brief Description	Any of a variety of eating establishments outside of normal homes. Introduced as a tertiary stakeholder due to "take out" meals
Responsibilities	Responsible for providing means to "take out" or "deliver" food products to consumers for consumption at a current or later date/time. Would be responsible for providing RFID in packaging best representing food contents to be scanned or inventoried within proposed system. Food may or may not be prepared at time of purchase.
Participation	Supply proper RFID identifications for purchased items brought home.