DH1622/IC1007-HT19 Human-computer Interaction: Principles and Design

Final Design Project documentation

Inventory system for reducing food waste
Name: FoodBuddie
Potential users: Food sellers

Group: C1
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1. Abstract

FoodBuddie is an inventory management application designed for small-/medium-sized grocery store owners.

Our team gathered data from the whole spectrum of food sellers - restaurant workers, shop owners and grocery shop workers - using a variety of methods - semi-opened questions, online questionnaires. As we kept brainwriting the ideas after each conducted interview, we started to distinguish few common areas that lack proper solutions. So when creating the functions to our tool we tried to address: the heavy reliance on excel sheets, paper or personal memory and experience when managing the inventory, no analytic or forecasting tool of the inventory and sales, no food waste control or status, lack of proper ordering management encompassing all the orders. Each of these issues received a separate module.

Although there are many inventory management apps available, they focus only on one of these areas and are not as user-friendly as our user group would like them to be. As our target group stressed their lack of technological skills, we especially focussed on the intuitiveness and usability of functions, the ease of navigation and clearness of layout.

The current application might serve as a base for further developments to also include solutions to the problems of restaurant owners.

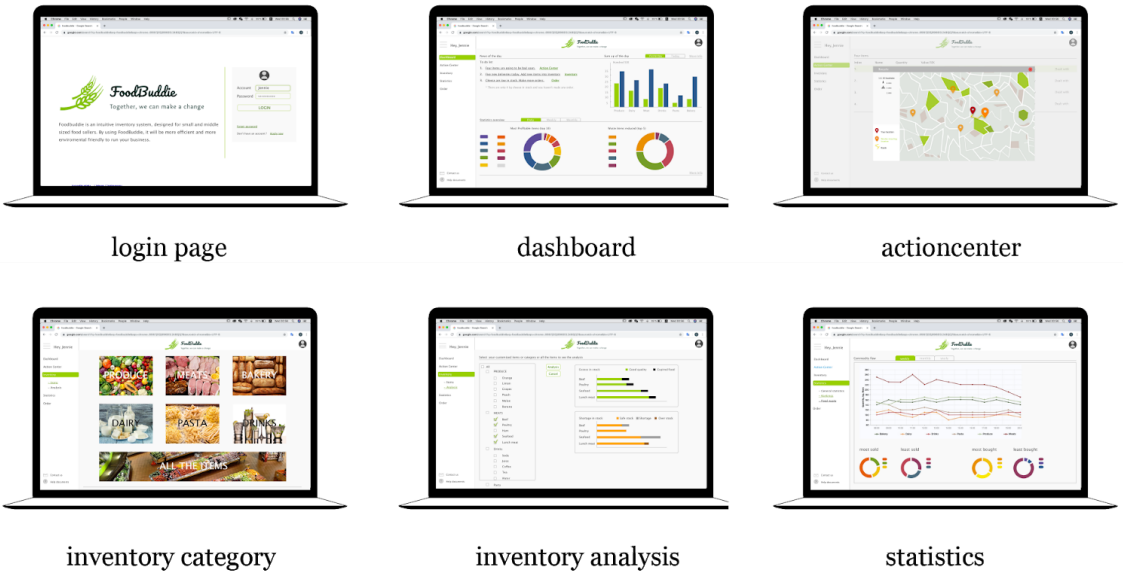


Figure1 a brief overview of FoodBuddie interfaces

2. Data Gathering

Key moves: structured interview question plan->semi structured interview; online questionnaire; Audio Plus photographs;
Failed: Observation in the field (Norman, 2013) (the interviewee was too busy, interested in the talk but couldn't find a suitable time);
Achievement: huge amount of information about food sellers and opinions/problems inside food industry has been collected;

We decided to throw a wide net on who we considered to be food sellers, partially due to our difficulty in finding people in a very limited time willing to schedule a talk with us. We asked for help from some acquaintances who are currently working in Foodtech to find people who are food sellers or who are doing business closely with food sellers.

For our data gathering we first decided to send out a questionnaire (in attachment 1) to the people who operate their business in “Hötorgshallen” in central Stockholm and more than 30 emails of food restaurant owners we found on Google map. We did this to get a feel for what kind of general trends could be found amongst food sellers - which we then based our base interview questions off of.
We found that taking a relaxed, inquisitive route, really asking about what, more specifically the individual person we were interviewing thought about their own business and their take on the industry usually gave us better insight into their situation. We used a semi structured interview, instead of using only hard formulaic questions, as this was a more relaxed and open approach, asking extra questions to get them to elaborate on things that they seemed passionate about and overall just let them go on while they were “on a roll” provided good engagement and gave us greater insight in their individual struggles.

Apart from our initial interviews we also conducted several additional interviews with people in the food tech industry to get a broader overview of the food industry as well as to get some guidance on our own project, such as to get further insight into why similar/related projects to our own have failed. As for the technique for recording the interview, because some people may get nervous in front of cameras, we used photographs and voice recording to make sure the interviewees were relaxed.

We initially interviewed the following individuals to get a good grasp on what issues food sellers may encounter, to see if there were any commonalities in the problems they face.

Initial Interviewees:

- Corentin de Tregomain - pool.farm - attachment A
  Corentin is an importer and the founder of “pool.farm” , a cooperative buying service. Together people use the site to order food in pools to achieve quantities that enable them to purchase the wares at so called “wholesale prices”.
- Filip Zawadka - Kooperatywa “Dobrze” - attachment B
  Filip is a member of a Polish food cooperative (pol. kooperatywa) "Dobrze" based in Warsaw. It has been over a year since he joined it. He fulfills his duties by monthly help with the inventory and management. "Dobrze" is a food store with ecological products from local producers, based as close as possible to Warsaw. It enables people from the city center to enjoy good quality, seasonal food which origins they know.
- Axel Pettersson - K-märkt - attachment C
  Axel Pettersson is a director of operations in a chain of restaurants based in Stockholm, called “K-MÄRKT”. They are regarded as one of the most sustainable restaurants in Stockholm. The K-MÄRKT's team's strategy is to serve food in a form of a buffet from surplus products that their purveyors did not manage to sell to the other restaurants that day. Besides the restaurants, they also run a cafe and bakery, also conforming to this philosophy.
- Ravi - the south indian - attachment D
  Ravi is the owner of a chain of restaurants called “the south indian”, spread over Sweden and Denmark with a total of 7 locations. We met him for the interview at the restaurant located in Stockholm. He Is very interested in digitising his business, and uses many different digital tools to simplify his management.

We used the 22 questions (in attachment 2) as a starting point of the interviews to guide us through the different aspects that may concern a business.

During data gathering process, we were planning to observe in the wild. So we have contacted several food sellers who own their sustainable farm and running a business with it. However, due to their busy schedule before the end of October, we at first was offered the chance to interview them at 18th October. We offered to volunteer in their farm to help them work and experience the working conditions there. They hesitated for accepting this interview in September after the volunteer offer. However the attemptation to interview them failed after four days contacting.

3. The Problem

Key moves: Six most common requirements; brainwriting & brainstorming;
Achievement: system requirements; more specific target user group; design idea decision;

From our interviews we gathered that none of our interviewees had really any sort of proper digital management systems, and that their inventory was in their head, on a piece of paper, or in a cluttered excel sheet.

Both the south indian as well as k-märkt had issues with things expiring and we got a specific request to look into some sort of inventory system and a general management system, that would deal with booking of tables and integration with already existing systems etc.Since we noticed that all of them were using different tools or software systems to manage different parts of their business, we came up with the idea to combine all of these aspects into one single platform that would make it easier for them to use, as having to manage things via multiple systems was another complaint.

Apart from there issues multiple others were mentioned, and in our brainstorming we came up with 17 ideas which can be found in attachment 3.

Out of those we ended up using ideas 3, 4, 11 and 17 in combination with each other.

Our initial scope was quite large (see paper prototype B), and ended up getting a bit out of hand. From these questions we quickly identified a handful of common themes that are the most relevant, which would include: the sustainability of the food waste management and the control over the benefits, costs, orders and inventory.

We considered the inventory aspect to be the base of the system, and ended up decreasing the scope of our project, eventually settling on it simply being an inventory and order system that would provide our users with statistics and a good overview of their business.

Along with that, since sustainability was a main concern, we included actions related to it, such as donating, composting, recycling or throwing away food. The system also includes statistics on these topics so the user can have an overview of their past management of food waste and maybe take some decisions according to it. Finally, the inventory system puts an emphasis on expiring or already expired products, alerting the user when necessary.

The requirements of our final idea can be found in attachment 4.

4. FoodBuddie

4.1 Introduction

Based on the conclusions from the interviews we decided to create a module-based management system for small/medium grocery store owners. We focused the whole analysis on the inventory system but at the same time we acknowledged that there is space for expanding it to cover more of the problems that the interviewees kept mentioning. Our design would then serve as a base which later could include modules specific for restaurants, like management of the menus based on the current stock, tables booking module etc. We went through six inventory softwares on the market and see what is bad and what is good there.

In order to narrow down the scope of our ideas we drew few core areas that we want to project onto the dashboard - data of the day, expiration date alert, inventory overview, sales overview, orders management.

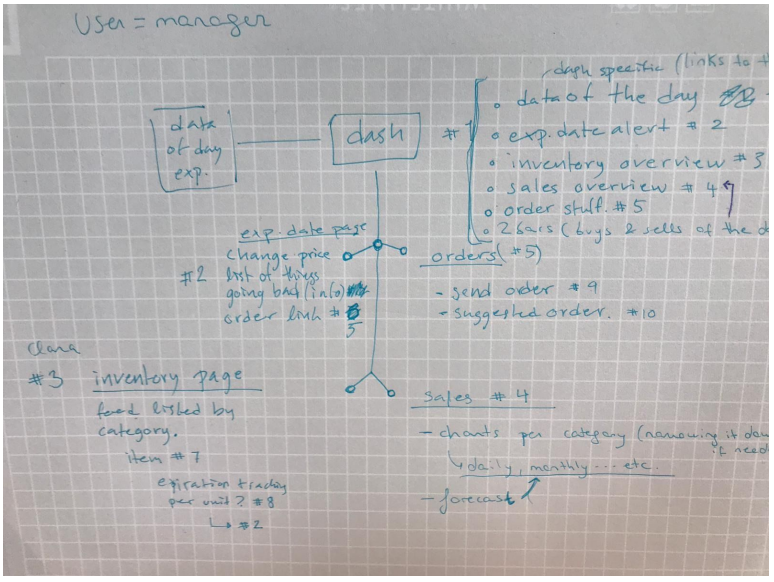


Figure2 the structure of the inventory system

Every module addresses different users problem:

1) Data of the day keeps the owner updated about the most important information about the state of the stock and summarizes the daily flow of the goods
2) Expiration date alert is our contribution to the food waste problem and the lack of a digitized method of checking the expiration dates of the products
3) Inventory overview shall replace unorganized and abundant excel sheets, papers, and replace it with a consistent list of items, including all the necessary information about a given item
4) Sales overview serves as a help for the owner, gathering all the data from the past and current stock so that there is no need to rely on experience or memory of a person
5) Orders management is a collection of recommendations and a place to make an order

Firstly we agreed to use Google Slides to make the prototype: attachment 5.
But then received feedback from Pavel that it would the most suitable to make it on the actual paper.

4.2 Paper prototype B Discarded

Key moves: Illustrator:

Achievement: Paper prototype B with platform idea Discarded

Firstly we created a sketch of a platform that would encompass all the modules that we came up with after the data gathering:
Dashboard summary, inventory system, dishes&menu management, table booking management, deliveries overview, activities&community module, sales&waste management, team overview, table arrangement, order management.

The potential functionalities and layout:

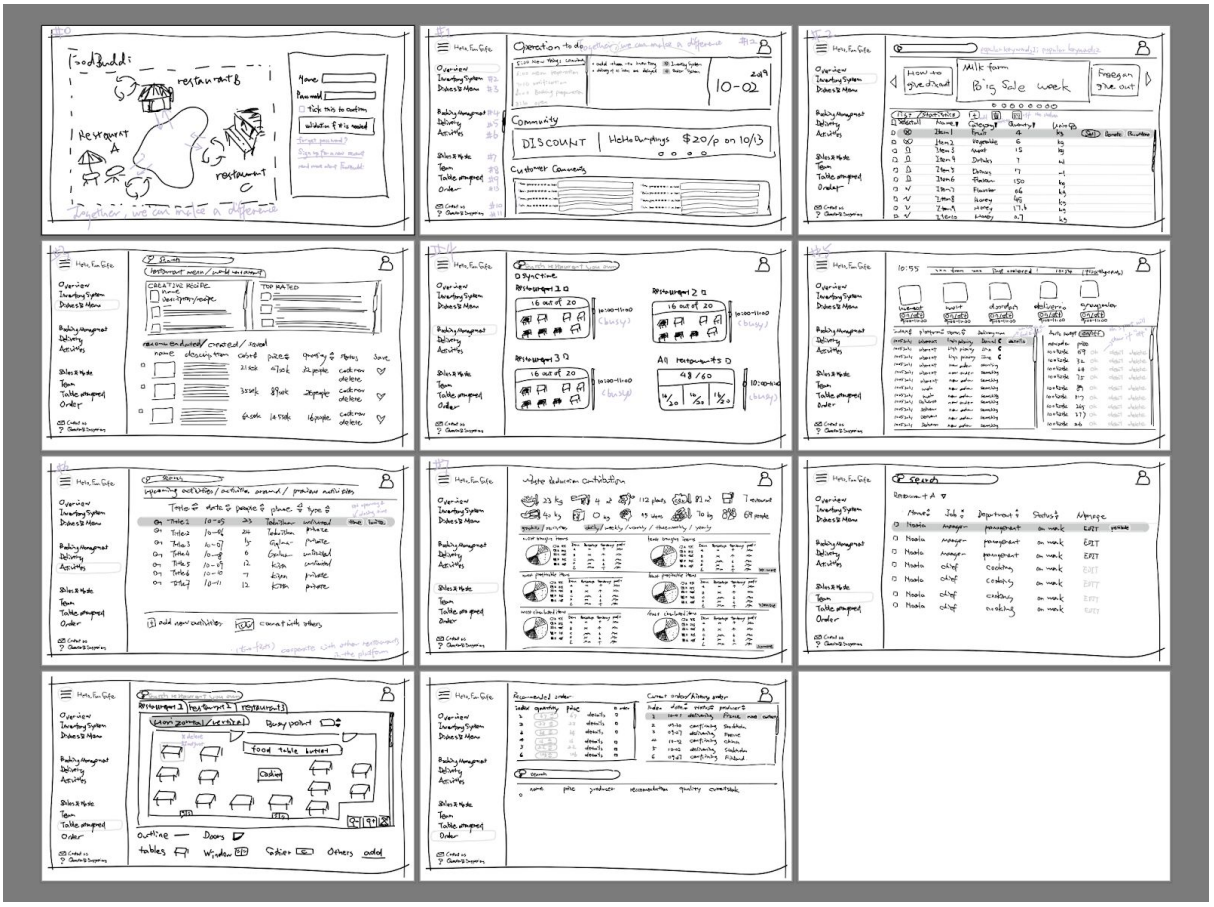


Figure3 paper prototype B of a platform for zero waste value restaurants

However, as mentioned in the Introduction, we needed to decrease the scope of the application, taking into consideration the time and workload that our team experienced. Therefore we decided to make another paper prototype, now only focusing on the inventory, sales, orders and food waste based functionalities.

This proved to be a right decision - not only could we focus and enhance the functions that we decided to keep, but we also got feedback from the pilot testing (paragraph 4.4), that building such a platform would be really hard to do - the food sellers are mainly focused on the selling part of the business, and they are usually not interested in a platform containing all of these functionalities. They also require a lot of trust and involvement on the user side. Inventory based application on the other hand helps them make a bigger profit, caring about the sustainability while remaining a tool.

4.3 Paper prototype usability test method

Key word: Guerrilla testing [1]; Concurrent Think Aloud (CTA) & Concurrent Probing (CP) [2];

Achievement: digital prototype decision; Functionalities redesign;

Figure4 paper prototype A of inventory system for managing food waste

When Guerilla testing the paper prototype, we decided to take Concurrent Think Aloud (CTA) and Concurrent Probing (CP) approaches.

Our participants were past or current workers in the food industry, as well as people who have never worked in the industry:

- Yoji, man, sushi restaurant worker
- Domin, man, noodle maker
- Kris, man, bartender in an American pub
- Dina, woman, no experience in the food industry
- Yuji, woman, chinese restaurant worker.

We assigned them four tasks, trying to cover different functionalities and modules of the system. The tasks and our motivations were following:

1) Evaluate the global navigation, give your opinion on the general design and the dashboard - get the response on the overall layout and aesthetical aspects as well as ease in navigation throughout the system
2) Delete an item from the system - test the basic functionality of the Inventory module
3) Explain how you would order an item based on the previous statistics - give the user different ways to approach the problem - either use the recommendations of the Orders module, which is a preferable solution, or use the statistics in the Sales module - and test the intuitiveness of the solutions that the platform provides for such a common task
4) Check if there is too much of an item in stock - test the usability of the statistics of the past in the Sales module

The feedback from the tasks were as follows:

1) Expiration date alert and “what is going bad today” part of the Data of the day module deliver the same information, the Inventory page is too cluttered, Sales module has unintuitive naming as to what it includes.
2) Deleting function in itself was ambiguous - does it mean that the item will be put off the shelves, deleted from the system permanently or it will still appear in the item list, should it be included in the statistics or not.
3) Users took different approaches in completing their tasks - many searched for the functionalities in the Inventory module, not in the Sales or Orders modules.
4) Most of the users wanted to check it in the Inventory module as opposed to our intention that they shall find this information in the Sales module, moreover they lacked more information in the form of eg. Excel sheets

Conclusions:

- Our approach to the feedback was to reconstruct the problematic modules and assign their parts differently across the modules we had.
- The inventory module would have two subpages - list of items and analysis based on the current stock (this is the part from the sales overview; when users wanted to order something they went to the inventory module, not the sales overview, so that would force them to base their orders on the forecast that we would provide).
- The sales overview would be the remaining part, more historical data concerning how the sales went throughout the existence of the business, the overall profit, most bought items etc. with additional excel sheets.
- The order module shall be also divided into parts where there would be the list of current, previous and recommended orders.
- We would keep the expiration alert on the dashboard since it was one of our core ideas and it is bonded with the food waste philosophy that we want to focus on. But then we would change the data of the day content and put there the bars with the sum of daily income and outcome and remove the items that will go bad today part.
- The problem with deleting an item would be solved by a pop-up with a list of what the user meant when clicking on the bin icon - put off the shelves, throw out all what's in stock, delete permanently etc.
- Lastly, we would put a little analysis of sells of each item into the item page, like a chart of how it sold in a specific time, so that when one checks out why it is recommended to eg. buy more of Item 1, you can check the Item 1 page and the specific data justifying it will be provided there.

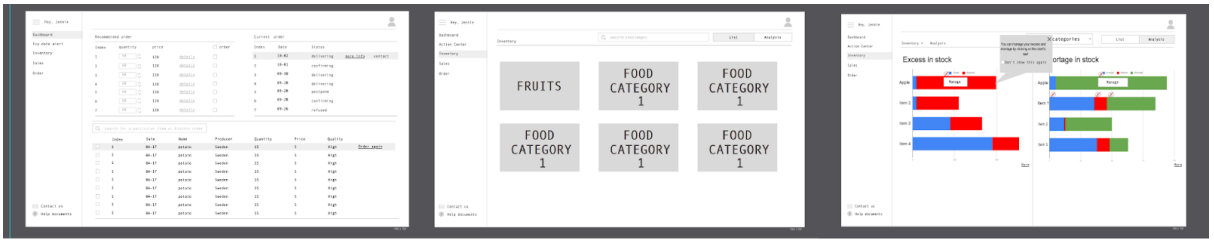
4.4 Digital prototype 1.0 & Pilot user test

Key word: Justinmind; Pilot test；Concurrent Probing (CP) ,CTA & Retrospective Think Aloud (RTA);

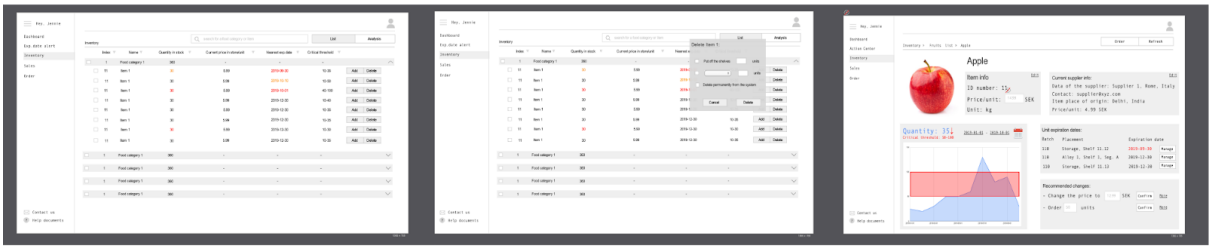
Achievement: key functionalities redesign;

On the first digital prototype we decided to use Justinmind prototyping tool since it provides the ability to share the prototypes and work collaboratively. We applied the conclusions from the paper prototype user testing.

The overview of the first digital prototype:



dashboard | inventory first page | inventory analysis



inventory item list | inventory item-delete | inventory item-details

profit statistics | food waste statistics | order page

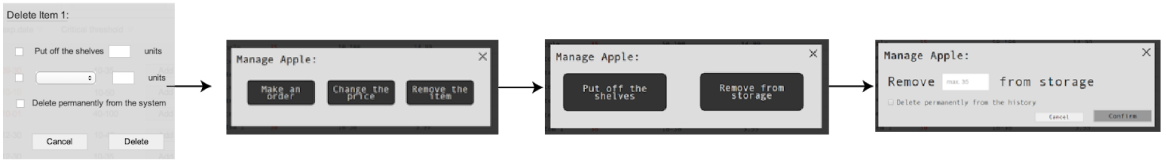
Figure5 our first digital prototype made by using Justinmind

During the presentation of the prototype to the tutor we received the feedback that we partially included in this version of the prototype.
The problematic parts were:

1) overall 1995 look of the system,
2) cluttered list of items in the Inventory page,
3) not user-friendly enhanced deleting option (too many tick boxes)

We solved the 2) point by introducing a new main Inventory page with just the food categories listed in the form of big, user-friendly buttons. Number 3) was also addressed in a series of steps guiding the user through the deleting process.

Number 2)



Number 3)

Figure6 some of the major changes on the inventory category

After the reflections and improvements we have made in digital prototype version 1.0, we arranged a pilot user test with Lady E who is currently working in the food industry. She has a developing background on the platform (foodloopz) for reducing food waste. Now she is focusing on how to build bridges among different sized food sellers.

She performed the tasks we designed for the paper prototype and gave us valuable feedback on the redesign on “expiration date alert” module and rearrange our statistic structure. Furthermore, she shared with us her opinions on the relationship of the quality of the food and food waste which also influenced our second round iteration on the digital prototype. For more information, please go to 4.5 The Action Center.

However when faced with 1) we discovered another tools - Principle and Sketch - which, although do not support collaborative work, make it much easier to design a more user-friendly and aesthetically pleasing prototype. Therefore we switched the tools and implemented the solutions that implemented in Justinmind.

4.6 Digital prototype 2.0 & usability test

Key word: Sketch & Principle (tools); Pilot test [5] ; Concurrent Probing (CP) ,CTA & Retrospective Think Aloud (RTA);
Achievement: Functionalities redesign;

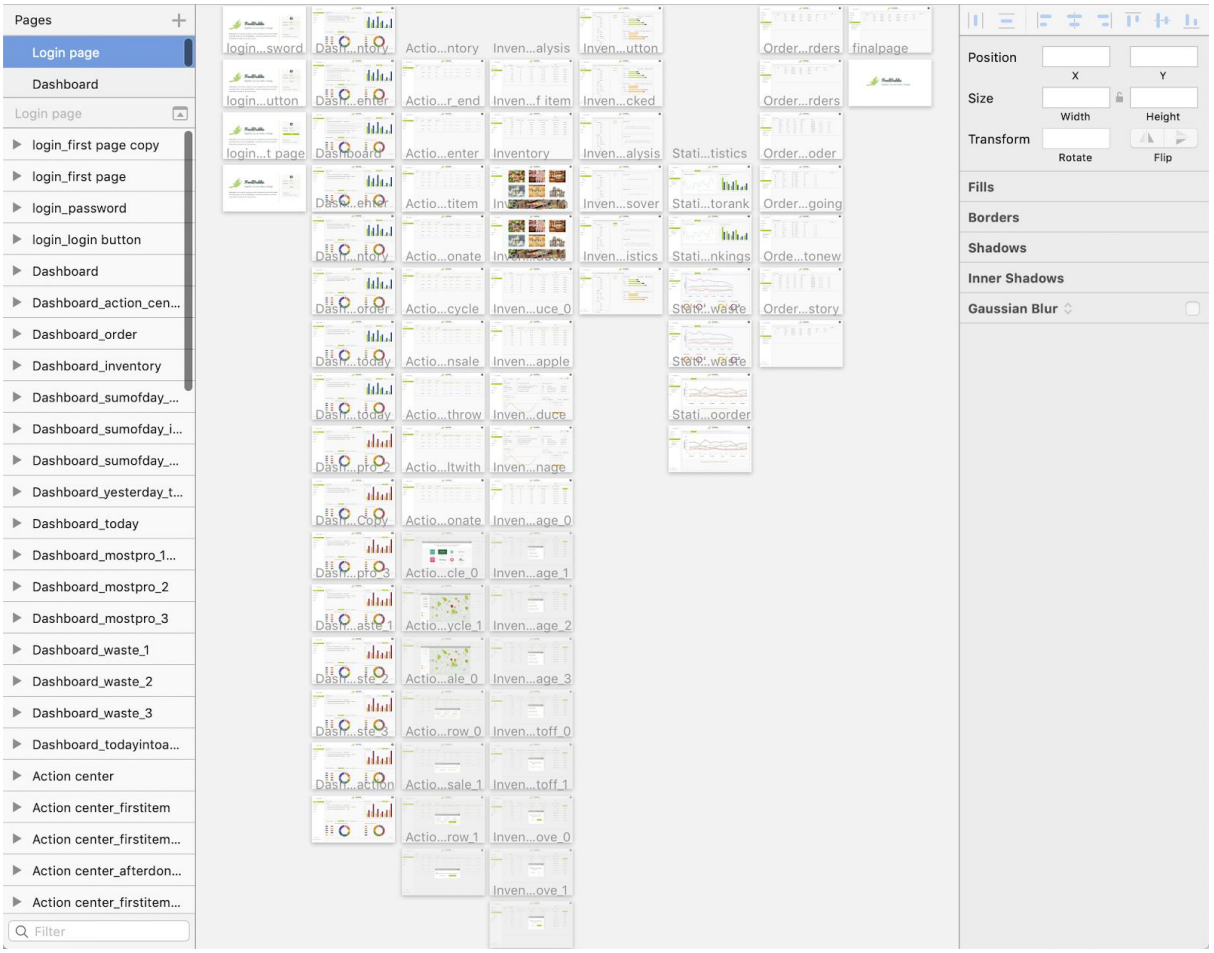


Figure7 our second digital prototype made by using Sketch and Principle

3/5 of usability test participants for digital prototype 2.0 were current workers in the food industry. 2/5 of them are our friends.

- Zaira, woman, manager in Mexico restaurant (have the experience of using .exel sheets to manage inventory system)
- Cai, woman, student
- Tingying, woman, student
- Fredrik, man, experience with inventory system in a hardware store
- Shujian, man, experience with inventory system in ads management field

We have formulated our usability test plan in attachment 6 with eight tasks and asked about the overview opinion on FoodBuddie.

The feedback from the tasks were as follows:

- Each participant who used to work in the food industry think this system is quite simple and clear, very intuitive to use.
- Some students who haven't used inventory systems before have different opinions for they think the inventory system is a complex system.
- All of the participants like the tutorial video and the graphics.
- All of the participants can finish the tasks without questions.

4.5 The action center

In this part, we want to emphasize and share our design process on the most important modules in the inventory system.

Instead of putting effort to improve the functions and summarize the information of “Expiration date alert” module, we cut out this module from the digital prototype version 1.0 for two reasons:

- almost every user treat it as a redundant part appearing on the dashboard and in the left sidebar.
- some of the expiring information can also be found in the food details page under the inventory category.

At the same time, we came up with an idea of instead of using “alert” to softly attract users awareness but trying to encourage users to take action. In the digital prototype version 2.0, we added:

- “news of the day” into the dashboard which contains all the operations needed to be made today for the real grocery store manager
- “The action center” which is designed to provide all the options FoodBuddie inventory system has for dealing with the expiring food today.

The question “How many possible options to deal with food waste can we provide in the action center” came after the redesign solution. We got help from the user (lady E) in pilot test. Lady E pointed out the difficulties she had encountered when she was trying to convince people to donate. At first, we thought “Donation” procedure as a simple and easy move for food sellers to take when they have opportunities and ways to handle their food waste. However, due to two reasons:

- The donation or reduction on the prices of the products will influence the image of the food seller himself and may raise an uncomfortable psychology unbalanced feeling in their common customers;
- Some regulations and laws forbids people to pick up food from dustbins. These activities are mostly non-well known;

Lady E commented that there are currently two possible ways to encourage more food sellers to change their throwing away food waste behaviors. The first way is to educate people, which will take a long time and great effort for raising business men’s interest in reducing food waste. The second way is to make the donation procedure anonymous.

Based on all these user test feedback and reliable information, we designed four ways in our platform to help users take action on food waste and highlighted this module in the same hierarchy with inventory system management. After reading the information about something will be bad today on the dashboard, the users can go to the action center and choose four of the actions to take:

- Donate: In the beginning, this is also a question that whether FoodBuddie can make users feel trustful enough to donate via this system. FoodBuddie will not connect the food sellers directly to the customers. Instead, we put eight companies/platforms who have experience of dealing with food waste. Some of the platforms are buying in and resell. Some of the platforms are providing artificial intelligent tools. In this way, even though the user will not donate via our system, they will find easy ways to contact other platforms.

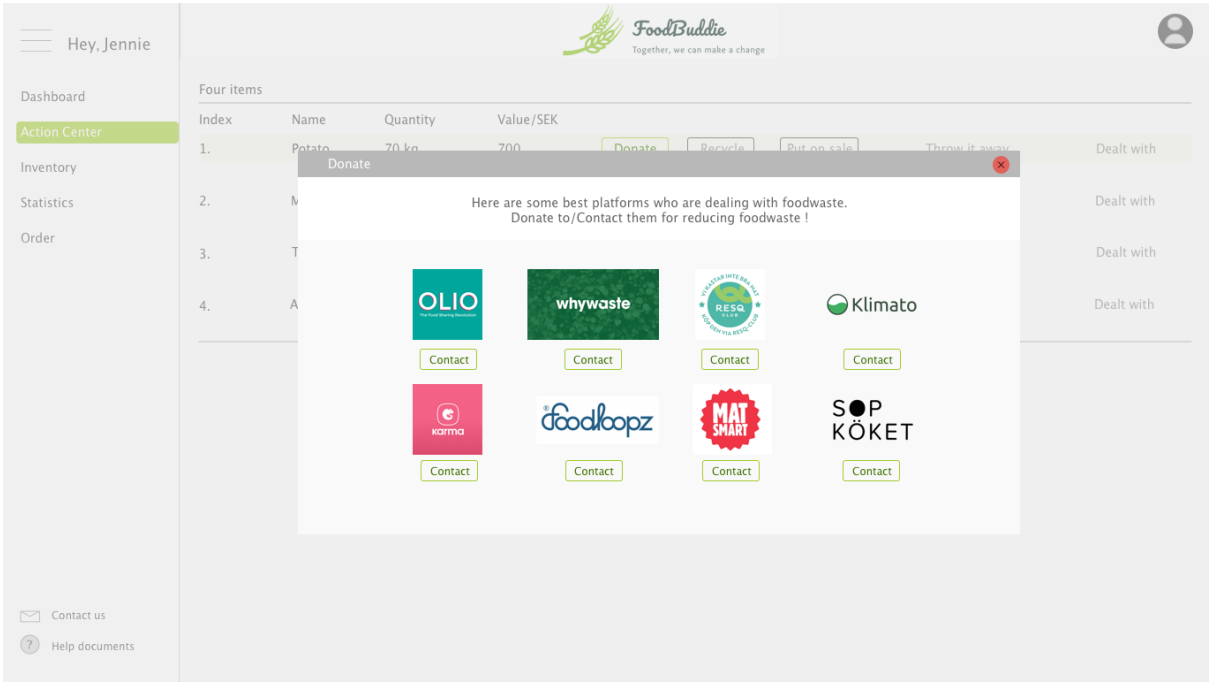


Figure8 eight platforms of helping people to donate food waste

- Recycle: The general idea of recycling option is to show more information about the recycling locations. Some of our classmates are working on maps for Freegans to publish dustbins locations and call for an activity. So we think it might be a good idea to provide route and location information for people to recycle their food waste more easily.

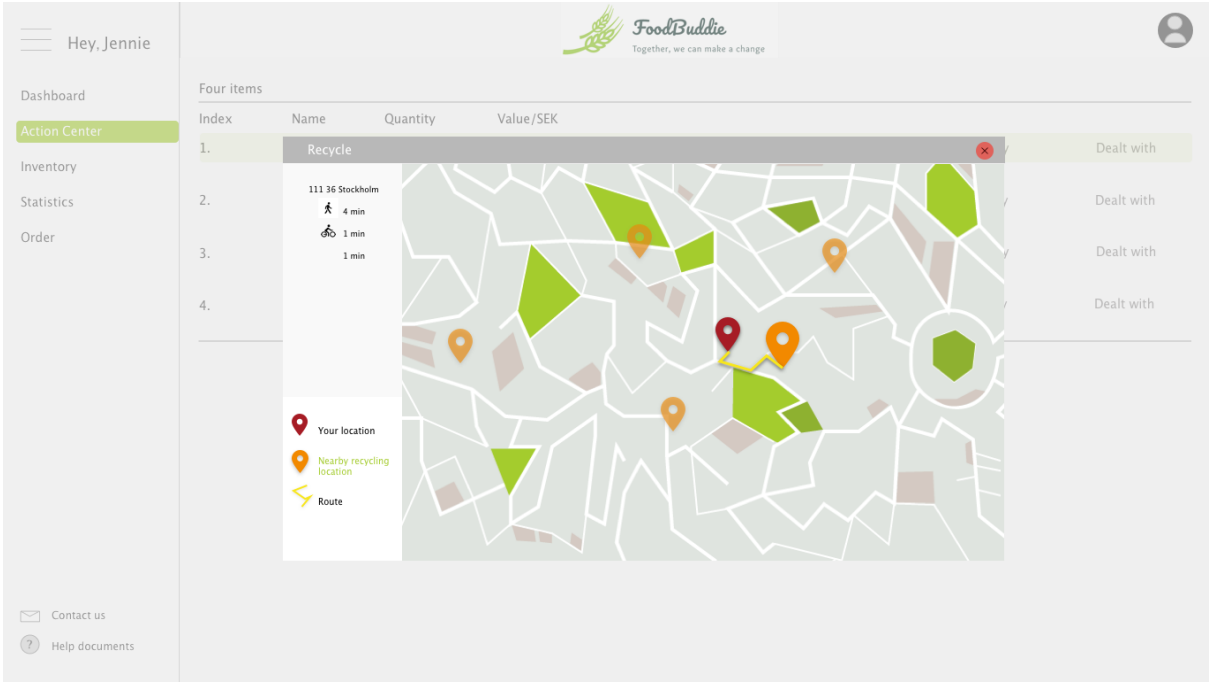


Figure9 Recycling locations and the route

- Put on sale: some food sellers are fine with put some items on sale. (We have observed this actions in Lidl/COOP, etc.)
- Interaction design: We want to influence people's mindset of how they see food waste is and how they will react to it.
    - Grouped "donate" "recycle" and "put it on sale" button together and seperate "throw it away" button;
    - Different style of the buttons;

- Reconfirmation box when the user clicked “throw it away”;

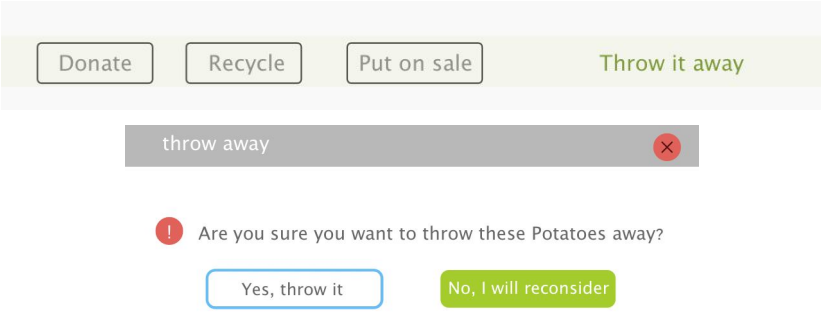


Figure10 interaction design

4.6 The value

Achievement: intuitive; helpful; easy to use

After the digital prototype version 2.0 and the usability test on it was done, very positive feedback were collected from our users. Besides, we send tutorial video we have made of FoodBuddie system to the interviewees we have interviewed at the beginning. Here we included some of their comments on the system.

“ This is a very intuitive system. I like how you designed the donation part.”

- Fredrik

“I will use this instead of the excel sheet. This is a really nice work. I love the graphs and statistics.”

- Zaira

“Thanks for the mention of our work and great first MVP.”

- Filip Lundin, CEO of Sopköket

5. Reflections & Limitations

We need to thank everyone who is currently working in food waste industry and especially the one who were willing to share their opinions and ideas with us. We have iterated FoodBuddie 3 times, each time we transformed the form of representing it. Even though the feedback on the users who are currently working as food sellers or with food sellers are good, we still think some of the parts have space to be improved if we have more time on doing this.

About FoodBuddie:

- Some of the participants in the usability test who are students think the inventory system could be more simple and easier for beginners to use. The tutorial video now is very helpful. They want more help like hint system.
- More statistic types and calculating tools can be included.
- For now, not the whole prototype is interactivable. We only added necessary interactions for users to perform usability test.

About business proposal based on food sustainability value:

- The identity of students is a good thing for it makes it much easier to conduct and recruit volunteers. In the meantime, it is a bad thing because most people will show their kindness and won’t hurt the feelings of students. The comments from food sellers on FoodBuddie could be very kind words out of this reason.

- It is very difficult to change people's mindset, not to mention food waste is usually a non-profitable thing. In FoodBuddie, we designed very soft guidance to lead users to act. However, when it comes to the real world, how many users in the food industry will embrace it. We are not sure.

Appendix A Schedule table

It is very helpful with the tentative schedule on Canvas which helped us to arrange all the process during this design project. However, we have our own schedule not exactly the same as the one on the Canvas because:

- For data gathering part: four of our interviews are more than one hour long, where we have devoted much effort and time to transcribe and have derived many ideas from and we have added the online questionnaire to collect more information.
- We were not certain at the beginning which paper prototype to get into until we did the pilot user test and the paper user tests(the user tests provided so much information to us).
- We have used different digital tools for collaborating easily inside the group.
- We write the particular methods we have used in our project in dark green.

Index	Schedule	Content	Details	Attachments interviews
1	Data gathering Date 09-17 to 09-23	Five face to face Interviews	1. Correntin de Tregomain from Poolfarm; 2. Ravi from SouthIndian restaurant; 3. Axel Pettersson from K-märk restaurant; 4. Filip Zawadka - Koooperatywa; 5. Tolgo from Köttkompaniet;	1.1 Interview voice recording & interview pictures
		Online questionnaire	1. Questionnaire for food sellers in English and Swedish; 2. Our group has sent out more than 50 emails and got 5 responses.	1.2 Questionnaire
		Interview transcribed	Four of the five interviews lasts more than one hour. Each of the group member did one of the transcriptions.	1.3 interview transcription files
2	Usability requirement Date 09-23 to 09-24	Discussed and wrote down the usability requirements on the design product	1. Our group did research on what should be included in usability requirements for different systems; 2. Group members worked together to build the usability requirement	2 Usability requirements
3	Build design ideas Date 09-24 to 09-26	Came up with five different design ideas	1. Brainwriting, group members write down them own ideas after they have read through all the interview transcriptions and requirements; 2. Brainstorming, group members get together to discuss and create more ideas; 3. Put all the ideas in an arranged order.	3. Design ideas
4	Paper prototype Date 09-26 to 09-30	Completed the paper prototype	1. We went through six inventory softwares on the market and see what is bad and what is good there; 2. Discuss on more detailed functionalities we want our inventory system to have; 3. Draw the paper prototype down;	4.1 Inventory system paper prototype 4.2 Platform for reducing food waste paper prototype
5	Paper prototype user tests Date 09-30 to 10-03	Did five user tests	1. Designed four user tasks on key features of our inventory system for testing; 2. Found target users who match our target user profile; 3. Performed the test and collected the feedback; 4. Discussed and summarized the results from user tests.	5. Paper prototype user test records
6	Digital	Drew the digital	1. Redesigned some modules in the digital prototype;	6. Digital prototype

	prototype version 1.0 Date 10-03 to 10-08	prototype by using Justinmind	2. Reread and went through the results from user interviews and usability requirements; 2. Learnt to use Justinmind; 3. Finished the digital prototype version 1.0 collaboratively.	version 1.0
7	Digital prototype usability test plan Date 10-08	Wrote the digital prototype usability test plan		7. Digital prototype usability test plan
8	Pilot user test Date 10-09	Did one pilot user test on Digital prototype version 1.0	1.We found one user who used to design platforms for food sellers and now currently are still working for food sellers; 2. Collected her opinions on current prototype;	8. Pilot user test records
9	Digital prototype version 2.0 Date 10-09 to 10-13	Drew the digital prototype by using Sketch and Principle	1. Redesigned “the action center” and “statistics” interfaces and functionalities; 2. Add more interactive functions in the prototype; 3. Changed some user tasks for digital prototype usability test;	9. Digital prototype version 2.0
10	Usability test on digital prototype version 2.0 Date 10-13 to 10-14	Did five usability test on digital prototype 2.0	1. Found five users who have experience on using inventory system; 2. Collected their opinions on the prototype 2.0;	10. Digital prototype 2.0 usability test records
11	Document ation Date 10-15 to 10-16	Write down the documentation for the project		

Appendix B Reference

[1] Adiseshiah, E. (2019). *Guerrilla Usability Testing: How To Introduce It In Your Next UX Project - Usability Geek*. [online] Usability Geek. Available at: https://usabilitygeek.com/guerrilla-usability-testing-how-to/ [Accessed 26 Sept. 2019].

[2] Affairs, A. (2019). *Running a Usability Test | Usability.gov*. [online] Usability.gov. Available at: https://www.usability.gov/how-to-and-tools/methods/running-usability-tests.html [Accessed 26 Sept. 2019].

[3] Kurniawan, S., 2004. *Interaction design: Beyond human–computer interaction by Preece, Sharp and Rogers (2001)*, ISBN 0471492787.

[4] Norman, D. (2013). *The design of everyday things*. New York: Basic Books.

[5] Thabane, L., Ma, J., Chu, R., Cheng, J., Ismaila, A., Rios, L., Robson, R., Thabane, M., Giangregorio, L. and Goldsmith, C. (2010). A tutorial on pilot studies: the what, why and how. *BMC Medical Research Methodology*, 10(1).