



Bearcats Pantry Food Recovery Network



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Fall Semester 2019

INTRODUCTION

Class Purpose

Inquiry to Innovation, PD2030, is a class offered by the University of Cincinnati Honors Program in collaboration with UC Forward. This interdisciplinary course is designed to introduce students to the creative process of research and innovation as well as collaborative cross-disciplinary teamwork that is necessary to address specific and real-world problems. This course pairs together students from different disciplines and backgrounds and introduces them to the real-world problem solving and innovation process. This semester, Kroger Zero Hunger | Zero Waste partnered with our section of PD2030 and tasked our class with creating innovative solutions to address food waste and food insecurity on and around the University of Cincinnati's campus.

Project Conjecture

If a reliable collection and distribution system is put in place to divert potential food waste from nearby sources to the Bearcats Pantry and Little Sisters of the Poor, then the quantity of food recovered will increase and the number of hungry UC students should decrease.

Abstract

In collaboration with UC Forward our class was tasked, by the Kroger Zero Hunger Zero Waste organization, to create a system to reduce hunger and food waste in Cincinnati. Before a proposal could be created, research was collected surrounding food waste, food recovery, and food insecurity. The time spent on research provided as the foundation to build our proposal upon. After the initial research phase, the focus to reduce both food waste and food insecurity at the University of Cincinnati was produced. From here our project conjecture was developed and more research was done on food waste and insecurity occurring at UC. It was proposed that if a reliable collection and distribution system is put in place to divert potential food waste from nearby sources to the Bearcats Pantry and Little Sisters of the Poor, then the quantity of food recovered will increase and the number of hungry UC students should decrease. From this, the Bearcats Pantry Food Recovery Network was developed. This network utilizes UC student volunteers to transport recovered food, using backpacks, to the Bearcats Pantry and Little Sisters of the Poor. With the goal of implementations, it is our hope that the work produced through this class will create an impact on both food waste and food insecurity at the University of Cincinnati.

Implementation Plan

Because our proposal is both low cost and has low barriers of entry, it can be implemented rather quickly - ideally by Fall 2020. Steps that must be taken before implementation include purchasing backpacks, designating a space at each food waste source for food storage and

pickup, and coordinating with Bearcats Pantry and Little Sisters of the Poor to ensure that they can accommodate the daily increase in donations. For a more detailed look at our implementation plan, reference Chapter 7.

CHAPTER 1: Meet the Team

Ahmed Ashraf

Ahmed is a second year student studying Medical Sciences. He took this class because he wanted to expand upon his creative problem solving skills. Ahmed's contributions include conducting research on different food supplies, contacting suppliers, and designing the Bearcats Recovery Network.



Seth Reichenbach

Seth is a fifth year Architectural Engineering student. He took this class to further his collaboration skills and to work with an interdisciplinary team focused on a project with community impact. Seth's contributions include conducting research on the Bearcats Pantry and the Center for Community Engagement, designing graphical content for the project proposal, and designing the Bearcats Recovery Network.



Abbi Wells

Abbi is a second year student studying Medical Sciences. She took this class because of her interest in food insecurity, particularly in the Cincinnati area. Abbi's contributions include conducting research on transportation methods, creating recovery and distribution routes, and designing the Bearcats Recovery Network.



Acknowledgements

Francis Russell, Professor, *Niehoff Urban Studio*

Erica Judd, Director of Analytics, *84.51°*

Fran Larkin, Director of Community Engagement, *University of Cincinnati*

Georganne Parker, Perishable Donations Manager, *Kroger*

Jeremy Stover, Corporate Expense Manager, *Kroger*

Daniel Cummins, Assistant Dean of Students, *University of Cincinnati*

Jessie Fix, Assistant to the Assistant Dean of Students, *University of Cincinnati*

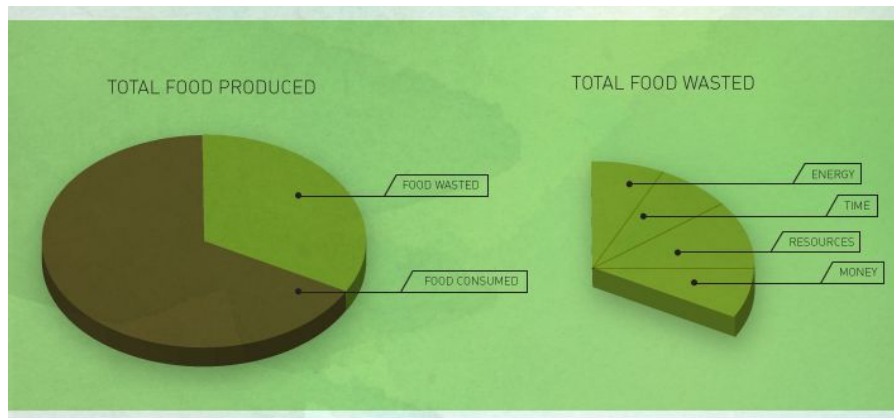
Lauren Byczynski, Public Safety Community Safety Manager, *University of Cincinnati*

Saagar Chokshi, Student and Cincinnati Scholar, *University of Cincinnati*

CHAPTER 2: Research

What is Food Waste?

Food waste refers to the food that does not get consumed by humans. Food waste is an ever growing problem, currently about one third of all food that is produced for human consumption is lost or thrown away, as shown in the figure below (Yee, 2012).



Worldwide, there are about 1.3 billion tons of food waste annually. All this waste has two major issues: needless hunger and a negative environmental impact. Considering there are more than 37 million people in the United States that are hungry, it does not make sense that this country wastes enough food to feed all of its hungry people (Facts About Hunger, 2019). Food waste additionally has a major environmental impact. For instance, the carbon footprint of food produced and not eaten is estimated to be 3.3 billion tons of greenhouse gases, making food wastage the third top GHG emitter after the U.S. and China (Dibenedetto, 2013). Once the food waste ends up in landfills, it produces a large amount of methane gas, a powerful greenhouse gas that contributes to climate change (Dana, 2015).

What is Food Insecurity?

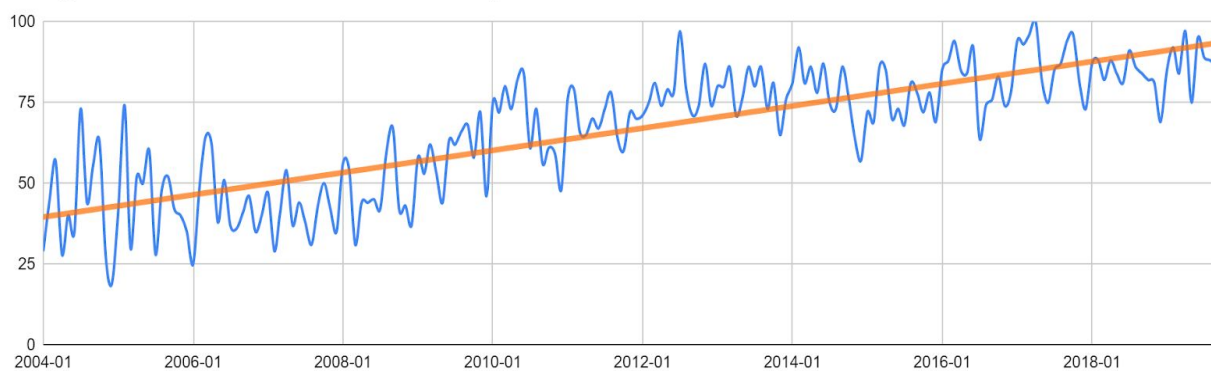
Food insecurity can be described as the lack of consistent, sufficient food necessary to live a healthy lifestyle. In the United States, there are approximately 40 million people struggling with food insecurity, and nearly 50% of college students identify as being food insecure across the US (Laterman, 2019). Food insecurity is a complex problem; it arises because many people do not have the resources to meet their basic needs, challenges which increase a person or family's risk of food insecurity (Understand Food Insecurity, 2019). Food insecurity is particularly prevalent among college students, as tuition rates continue to rise and financial aid is decreasing. The number of non-traditional college students (those who are past college age or have obligations beyond that of a typical college student) is going up, and these students are more likely to experience food insecurity (Lee, 2019)

What is Food Recovery?

Food recovery is an essential outlet that rests between when an individual discards a food item, and when that item is defined as food waste. Food waste is traditionally not consumed by humans, and most often follows routes to either feed animals, or becomes compost (ReFED). It is for this reason that food recovery must exist, and is a critical component to the food cycle. Food recovery is most easily defined in the context of examples. If a canned good is to pass its “sell-by-date” the item is still edible, however, grocery stores must remove it from their shelves (Reference Figure 1.1 in the Appendix for the Bearcats Pantry list of when to remove items from their shelves past the sell-by date). From here the store would have two options, to either discard the canned goods and contribute to waste, or to donate the item to a recovery outlet. The latter option is food recovery. In the context of individuals — rather than large businesses, such as grocers — if a perishable item is not going to be consumed by its original owner, then said owner has the opportunity to once again follow a recovery pathway and donate the food prior to it spoiling. A common example of this would include college students purchasing more food than they are to consume (large bags of potatoes, onions, and other vegetables), not because they are intending to be wasteful, but simply because food items are often sold in large quantities. Before this excess food is allowed to perish, if it is donated to others who may use/consume the item then it can be classified as recovered. To put it simply, food recovery is the area between when food is going to be waste, and when food is actually waste.

Public interest regarding food recovery has increased steadily since 2004, according to Google Trends. This data shows that there is heightened awareness amongst the public about what food recovery is and the benefits it can have in the fight against climate change and carbon emissions (“Food Recovery”).

Google Search Trends for "Food Recovery" from 2004 - Present



Above: Graph of Google Trends search results for “Food Recovery” between 2004 to date show the continual interest in food recovery as time goes on.

Students on college campuses in particular have begun to mobilize efforts on food recovery through the vehicle of The Food Recovery Network nonprofit. The Food Recovery Network is the “largest student movement fighting food waste and hunger in America” according to their website and was founded in 2011 at the University of Maryland. In the first year of operation, over 30,000 meals were donated to the local community, serving as a model for other food recovery chapters around the country. Since then, 230 chapters have been established nationwide with 3.2 million meals donated. In total, it is estimated that all the chapters of the Food Recovery Network have prevented approximately 7.4 million pounds of carbon dioxide emissions (“Our Story”).

What is Zero Hunger | Zero Waste?

Zero Hunger | Zero Waste is Kroger’s plan to end hunger in their communities and to eliminate waste across the company by 2025. This plan includes accelerating food donations, striving to have zero waste by 2020 and zero food waste by 2025, and creating a \$10 million fund within The Kroger Co. Foundation to provide grants for innovative solutions to help them achieve these goals. This plan was created to bridge this gap between the 1.3 billion tons of food waste and the 40 million hungry Americans (Adelman).

Why College Students?

The average college student throws away about 142 pounds of food each year, creating a total of 22 million pounds of food waste on college campuses nationwide (Poon, 2015). Not only are college students contributing to the growing food waste problem, but we are also in a unique position to help solve this issue. Most college students live close together on or near campus in a community small enough to allow change. If this change is effective, it can then be applied on a larger scale. Students are also in a position to provide a fresh take on many problems. As students we are gaining an array of knowledge and interacting with people from different disciplines, putting us in the perfect position for problem solving. College students are specifically an important group when it comes to the food waste problem because there is a lot of room for improvement. Most students only prepare food for themselves and potentially a roommate, but food is sold in quantities intended for families. Because of this, a large portion of the food purchased by students goes to waste simply because they cannot use it all. Remedying basic problems like this can certainly have a positive impact on the food waste problem.

Why the University of Cincinnati (UC)?

UC is located less than three miles away from the Kroger headquarters, and is additionally just down the street from the Corryville Kroger. This makes the University an ideal partner for Kroger’s Zero Hunger | Zero Waste program. Being located in Cincinnati, UC is also familiar with the challenges of food insecurity both on and off campus. Within Cincinnati, about 33% of

families are food insecure, more than 10% higher than the national average (Curnutte, 2019). Focusing further on the University of Cincinnati, it is estimated that approximately twenty percent of students are food insecure and not receiving the nutrients they need from their food. This equates to roughly 8,000 UC students that are experiencing food insecurity. Because UC is in close proximity to both Kroger and a large food insecure population, we are in a unique position to help. Kroger was the perfect partner with the UC Forward Program, as it is a learning opportunity that pairs students and faculty of diverse majors in trans-disciplinary teams to collaborate with outside experts in solving today's problems (Russell).

CHAPTER 3: Our Problem

Conjecture

If a reliable collection and distribution system is put in place to divert potential food waste from nearby sources to the Bearcats Pantry and Little Sisters of the Poor, then the quantity of food recovered will increase and the number of hungry UC students should decrease.

Our Focus: Diverting Food Waste to Combat Food Insecurity at UC

Food waste across the United States is an immense problem that contributes to global climate change at an unimaginable scale. In the Food Recovery Hierarchy lauded by the U.S. Environmental Protection Agency, food waste source reduction and “feeding hungry people” are listed at the top of the hierarchy, meaning these are the two most critical steps to reduce the negative impacts of food waste (“Food Recovery Hierarchy”). Food waste decomposition in landfills expels enough methane, carbon dioxide, and other greenhouse gases into the atmosphere that, if it were a country, it can be represented as the third-largest greenhouse gas emitter in the world (“Food Waste, Methane, and Climate Change”). Furthermore, methane gas traps twenty-five percent more thermal energy as a greenhouse gas than carbon dioxide (“Food Waste has Environmental...”). For this reason, it is crucial that our system diverted edible food from landfills. This problem is not isolated to restaurants, or single-family homes, as shown by the fact that college students produce a collective 22 million pounds of food waste yearly (Poon, 2015). These key facts propelled our group to focus on food waste recovery from hyper-local sources to food insecure populations on UC’s campus as it is relevant to our peers.

We chose to divert food waste from local grocers near UC’s campus to align with Kroger’s mission of Zero Hunger | Zero Waste in their retail locations. We also selected to accept the challenge of diverting food waste from residence halls and apartments because of statistics regarding food waste by college students. Restaurants were not included in our problem statement because of the short shelf-life of food waste from restaurants that is unable to be stored at the Bearcats Pantry. These challenges allowed us to present solutions that have impacts in the immediate UC community.

At the same time, food insecurity is prevalent in the City of Cincinnati and the University of Cincinnati. For our project, we primarily focused on diverting edible food to those who are food insecure in the UC student community. It is estimated by the Bearcats Pantry that 20%-30% of UC students are food insecure, which equates to around 8,000 students (Figure 1.15 in Appendix). It was crucial that our project focused on engaging existing programs in place at UC that combat food insecurity. Currently, the Bearcats Pantry is the primary organization connecting food insecure students with nutritious food directly on campus. Our project proposal seeks to assist in the solution to both food waste and food insecurity simultaneously to align with

the mission of Zero Hunger | Zero Waste.

Non-Conventional Food Rescue Transportation and Reduced Emissions

In many food recovery networks, motorized vehicles are the prevalent mode of transporting food waste to community distribution locations. While some food rescue networks may utilize electric vehicles in favor of fossil fuel vehicles, the associated negative climate impacts of this energy consumption are detrimental to the overall mission of food recovery networks. Yet, transportation is necessary to enable the food rescue team to divert the edible food waste from landfills to community distribution locations. The challenge to develop a transportation system that is accessible to all students, low-cost, and maintains minimal to zero emissions was embraced by the team in this project.

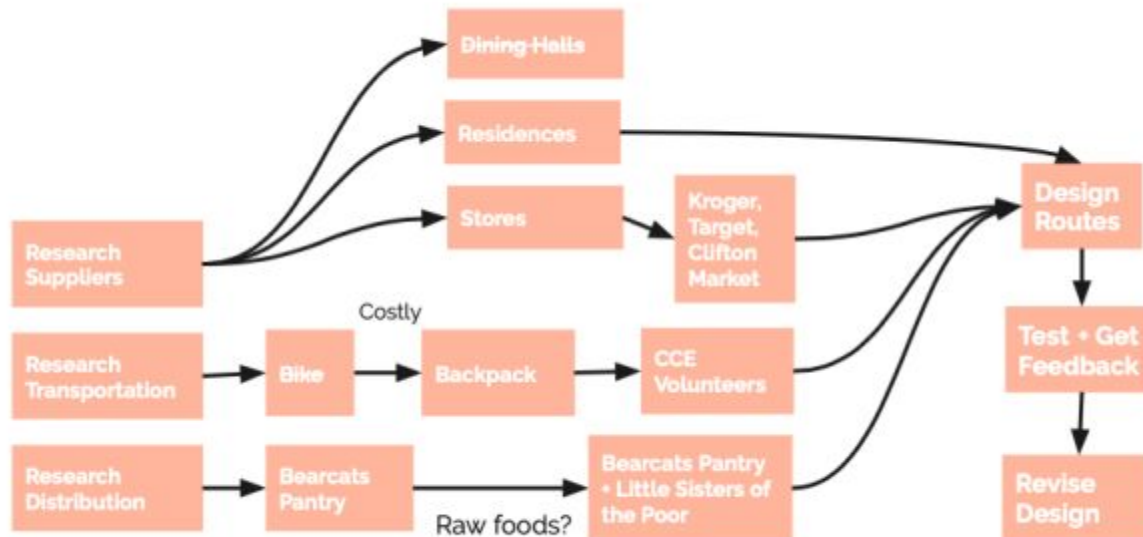
Engaging UC Students in the Bearcats Food Recovery Network

Through our case studies, referenced in Chapter 5, it was apparent that the most successful food recovery networks were those that were spearheaded by a passionate student volunteer coalition. We were challenged with finding where we could find a group of students large enough to facilitate the operations of our system. Community impact through the Bearcats Recovery Network is increased by involving student volunteers that power the system. While students participate as a food waste recovery volunteer in their immediate community, they reap the rewards of combating food insecurity experienced by their fellow Bearcats, but they also receive first-hand education on food insecurity and food waste through service learning. Service learning cultivates empathy for those whom they serve and places a poignant importance on the service work at hand.

For these reasons, it was crucial that our system devised a method to involve a large number of UC student volunteers from various backgrounds and programs of study.

CHAPTER 4: Process & Ideation

Workflow



Initial Ideation:

At the beginning of the semester, students were broken into three primary research teams to investigate three strategies to combat food waste: food waste education, food waste policy, and food waste recovery. The members of our group chose the latter topic. After initial research was collected surrounding food recovery ideation began. Within this food recovery group, two groups eventually formed, one which focused on reducing food waste through the CORQ app, and another which was centered around developing a food recovery network.

Before any process creation began the question of who would be the workforce of this process. The answer came quickly to utilize volunteers, more specifically University of Cincinnati Cincinnati Scholars. Further information surrounding these volunteers is written below.

After this the general idea was posed that food would be recovered from outside of UC and then brought to the Bearcats pantry to help food insecure students. Building off this idea, the mode by which food was to be transported needed to be determined. Our group's initial idea was to use a UC Night Ride van to transport food during the day as these vehicles only operate at night, however, it was discovered that the pantry had already been using Night Ride vans to transport food and they ended up crashing one of the vans. This incident is further analyzed in the "Case studies" section below.

With the use of cars/vans scrapped as a mode of transportation, bikes, more specifically, pedicabs were looked at next. A pedicab (depicted in Figure 1.7) is typically used to transport people through cities. One person pedals the bike while the 2 others sit in the back and do not have to exert any energy. The initial idea was to develop a pedicab in which the rear seating was converted to a cooler for food. Given that the average pedicab driver pulls their own weight and the weight of two other adults, it was reasonable to assume that a student could pull a pedicab cooler full of food. With further research into this idea it was determined to be impractical. Each pedicab was estimated to cost upwards of \$1000, meaning this proposal would become incredibly expensive relatively quickly. Additionally, these pedicab coolers would only be able to be used in the warmer months as ice/snow would make biking dangerous. Furthermore, the traditional biker only pulls the weight of their bike plus their body weight. In this pedicab proposal the biker would need to pull their own weight, the weight of the bike, plus the weight of a cooler full of food. The issue here is not that the weight would be too much to pull in a straight line, but instead that maneuvering a bike with the extra weight may have presented an additional learning curve, thus increasing the barrier of entry for our proposal. It was for the aforementioned reason that the pedicab cooler idea was scrapped.

After both the Night Ride and Pedicab ideas were scrapped, a cost versus conventionality matrix was developed in order to pin down the ideal way to transport food (Figure 2.1). Eventually the idea of using a backpack to carry food was proposed and remained as the main transportation method for this proposal. The backpack was settled on due to its inexpensive nature, and the fact that UC students -- the workforce -- already carry backpack around campus, thus providing for a low barrier to entry transportation method. From here walkable routes were developed based on grocer and apartment style residence locations. In inclement weather, it is proposed that existing university vehicles in partnership with UC Sustainability could be used (Reference Figure 1.3 for ideation process photos.)

Food Recovery at Dining Halls

Two representatives from the University of Cincinnati Dining Services met with the class to discuss what food waste reduction elements are being utilized at UC dining halls. Currently, both On The Green, and Market Pointe dining halls are using a complex composting process which dehydrates leftover food and converts it into soil to be used around UC. As for donating food, they do not donate any food due to fear of health code violations (Figure 1.16). In order to have UC dining services donate food policy changes would most likely be necessary. Considering another group within the class is focused on policy change, it was deemed best to leave dining services out of the scope of this project.

Bearcats Pantry Visit

One of the first questions we asked ourselves is “where will we take the food we recover?” Rather than creating an entirely new system to distribute food, we thought it would be most efficient to utilize a system that is already established. The Bearcats Pantry’s goal is to assist students in need by cutting down their grocery bills and connecting them to other resources in an effort to promote independence (Bearcats Pantry). Our team went to the Pantry on October 18 around 11:00 am. It is located inside Stratford Heights Building 16, which itself is not the easiest to find. Once inside the building, there is no signage for the Pantry, and we only discovered that it is in the basement after asking someone who worked in the building. The only signage for the actual Pantry was an 8.5” x 11” paper on the door. The website indicated that the Pantry should be open, but the door was locked, the lights were off, and there was a sign apologizing that they missed us (Figure 1.8). Though we were unable to go inside this pantry at this time, this visit showed us many areas for improvement in the Pantry’s operations.

Our group returned to the Bearcats Pantry in November around 9 am and successfully entered the Pantry. As shown in Figure 1.9, the Pantry consists of three small, connecting rooms lined with shelves for non perishable food. They previously had a refrigerator, but because they could not afford a new part when it broke, they had to get rid of it, and subsequently stop providing perishable goods. When we went, there was one student volunteer working, and he told us that he sits there and makes sure everyone takes the correct amount of food and tracks it. From this visit, we were able to gain insight on the physical limitations of the Pantry and see what the student experience is like when utilizing the Pantry.

Center for Community Engagement (CCE) Visit

Rather early in the research phase, the idea of utilizing UC students as the “workforce” for any future plan was posed. This said, paying students to transport food was predicted to be incredibly costly and would add an additional layer of complication to any future processes. Additionally, Fran Larkin — the director of the UC CCE — states that the Bearcats Pantry was created with essentially no funding, only further proving the difficulty paying students would ensue.

Considering the financial constraints of the Bearcats Pantry and our knowledge from case studies, volunteers were viewed as the best option. Each year, UC awards the Cincinnatus scholarship to the “brightest and most promising prospective freshmen in all academic disciplines,” and promises up to \$22 million over 4 years to each class of Cincinnatus scholars. The scholarship does have some stipulations, as its recipients must maintain a 3.2 GPA and complete 30 hours of volunteering each year. Cincinnatus scholars represent programs of study from all colleges on UC’s campus and vary in age, from first-year students to fifth-year

students. With the sizable number of Cincinnatus scholars across campus, it was clear that these students could potentially make up the workforce for our system.

Before Cincinnatus scholars could be developed as a cornerstone of the project, research needed to be done on their engagement on campus. On October 18, a meeting was set up with Fran Larkin, where several numbers and qualities about volunteering students were obtained. He explained that there were 633 students who volunteered with the Bearcats Pantry during the 2018-2019 school year, and that there were more students that expressed interest in volunteering than the Pantry had capacity for. This made it clear that the volunteer supply is present, and people are interested in helping the Bearcats Pantry (Figure 1.10 and Figure 1.11).

CHAPTER 5: Case Studies

Current System at UC

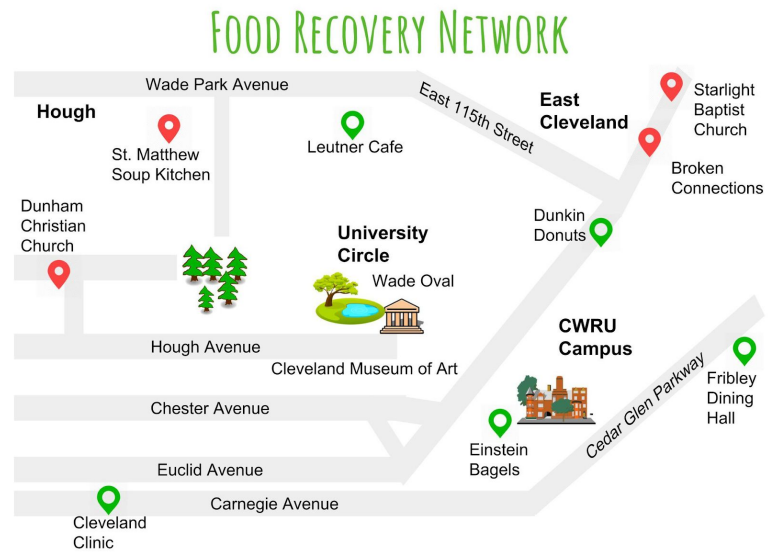
Before any ideation developed, an analysis on current food recovery methods at UC was conducted. For the most part, dry goods donations are taken from UC faculty and students a few times throughout the year. When the UC Sustainability Community Garden is in season, they will donate some produce to the Bearcats Pantry and store it in their mini-fridge after sending an email to food insecure students, according to a phone call with Jessie Fix. Donations are usually brought directly to the Bearcats Pantry, or a certain department on campus will have a food drive and one person will drive the collected dry goods to the Pantry. Additionally, the Bearcats Pantry has been collecting canned goods at UC football games, with the assistance of UC President Neville Pinto, and then using Nightride vehicles to transport these goods to their location at Stratford Heights. Nightride is a service offered by UC Public Safety with the formal purpose of the Nightride vehicles is to transport students to their residences after dark. During the day, however, the Nightride vehicles were not being utilized, which allowed for the Bearcats Pantry's use of the vehicles. Unfortunately, this partnership has recently dissolved since a NightRide vehicle was involved in an accident while being used by a Bearcats Pantry volunteer, according to Lauren Bycynski, UC Public Safety Community Safety Manager (Figure 1.5). Because of this incident, the director of Nightride revoked the Pantry's vehicle privileges.

The Ohio State University

The Ohio State University established the OSU Food Waste Collaborative as a coordinated effort between students and faculty to combat food waste in a variety of ways. As a student-led initiative with faculty support, the program has grown immensely since its conception. On the student side of the OSU Food Waste Collaborative, the students established a local chapter organization of the national Food Recovery Network. The mission of the OSU Food Recovery Network is to “unite OSU students to recover the surplus, unsold food from campus dining halls, local farms, and local businesses to donate to food banks and charities around Columbus” (Student). Outside of the student organization that is involved in food recovery, there are also faculty-led research initiatives regarding anaerobic digestion of food waste, among other projects, and consulting other food waste reduction efforts on best practices. This said, the OSU Food Waste Collaborative utilizes a Nissan Leaf (an electric vehicle) to transport uneaten food waste from dining halls to nearby food pantries. Additionally, students at OSU earned \$200,000 in funding to put towards their food recovery mission. This funding came from Engie, a French energy company, and Transitus, an Ohio based non-profit focused on innovative solutions to common problems. OSU provides as a stellar example for what food recovery at UC has the potential to become, given adequate university and local support (Roe).

Case Western Reserve University

Students at Case Western Reserve University (CWRU) established a local chapter of the Food Recovery Network, a national organization that seeks to establish student task forces to divert edible food waste around university communities from landfills. The CWRU Food Recovery network diverts approximately 250 pounds of edible food waste per week, according to 2017 estimates reported by *The Observer* newspaper at CWRU. Food waste sources in the CWRU Food Recovery Network include retail locations, such as Einstein Bagels and Dunkin Donuts, campus dining halls, and even the Cleveland Clinic. The Network then transports this food waste in a twenty minute shift to community distribution locations at church soup kitchens. Student volunteers facilitate the system by signing up for shifts between 2:30 PM and 9:00 PM after a short training session. The CWRU Food Recovery Network also holds educational events to inform students about the environmental impacts of food waste (Ridge, 2017).



Key Lessons Learned

Through investigation of existing food recovery networks at other Ohio universities, four key critical lessons were gleaned. For one, it is critical that an emission-free vehicle is a component of the food waste recovery network to further reduce the system's impact on climate change. Additionally, an emissions-free vehicle aligns with the mission of community education regarding sustainable environmental practices. Another lesson learned is that funding from external sources can greatly improve the efficacy of food recovery networks by enabling food rescuers with crucial resources that help them store, transfer, and distribute food to the community. Third, food waste sources and distribution locations closer to university campuses motivates students to participate due to ease of access. Students do not have to travel far distances or look up the food waste source locations to engage with the system; instead, students are familiar with the stops in the recovery network because they are embedded within their immediate community. Lastly, mobilizing a task force of responsible student volunteers is critical to the sustained and effective operations of a food recovery network. Reliable volunteers and regular recovery shifts are necessary in a food recovery network so that food waste is regularly rescued throughout the week and food insecure populations can expect regular

donations. Student volunteers must also be intrinsically motivated to participate in the food recovery network. From investigation of UC's current system, we discovered that there are too many barriers to access for volunteers to use UC vehicles: required defensive driver training, the dissolution of the partnership between the Bearcats Pantry and UC Public Safety, and parking difficulties in the urban environment near UC's campus.

CHAPTER 6: Proposal

We have designed a collection and distribution system to rescue food from sources close to campus for use in the Bearcat Pantry and Little Sisters of the Poor. Enhancements and complementary services for the Bearcat Pantry will be recommended and designed to create more capacity and more access opportunities for food insecure students. Nonperishable goods will be taken to the Bearcats Pantry so they can be redistributed to students, and perishable items will be taken to the Little Sisters of the Poor so it can be cooked and served to elderly people in need. This food will be recovered from local grocery stores and student apartments and residence halls. We will utilize the high number of UC volunteers to transport the recovered food to the Bearcats Pantry and Little Sisters of the Poor. Volunteers will be equipped with branded, insulated backpacks to move the food; these will serve the dual purpose of transportation and increasing awareness regarding the Bearcats Pantry and Kroger's Zero Hunger | Zero Waste initiative.

Step 1: Sources

Large-Scale Sources: The largest quantities of food will come from grocers that are close to UC's campus, all of them within walking distance. Corryville Kroger, located at 1 W Corry St in Cincinnati, will be one of the largest sources, contributing an estimated 100 pounds of food per week. This estimate is based on the amount of food waste capable of being transported weekly by two volunteers in the Bearcats Pantry Food Recovery Network. Metrics from Kroger's Jeremy Stover show that at the Corryville Kroger alone, 10.07 tons (20,140 pounds) of food waste are generated per year (reference Figure 1.12 in Appendix). At baseline operations of 100 pounds of food waste diverted per week from this location, 2.6 tons (5,200 pounds) of food waste would be diverted. From this data, we know that the amount of food waste diverted from the Corryville Kroger could be increased as the Bearcats Pantry Recovery Network continues to grow past baseline operation.

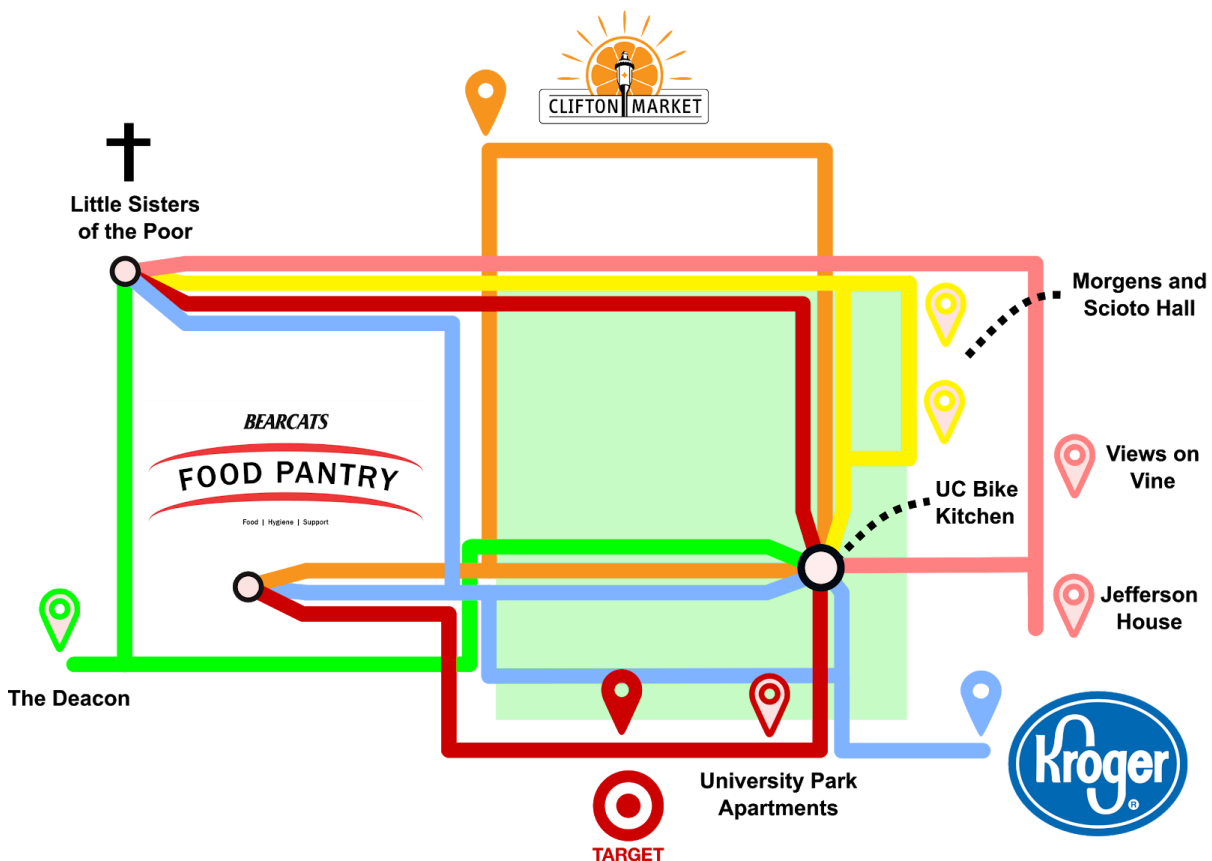
Other large scale sources include Clifton Market, a locally-owned grocery located at 319 Ludlow Avenue in Cincinnati, and the UC Calhoun Target. Management at the Clifton Market estimated that regular food waste from the Market consists of fifty-percent dry goods food waste and fifty-percent produce food waste. It is estimated our initial systems operation can divert 100 pounds of food waste from Clifton Market per week as well. Target is estimated to provide 50 pounds of food waste in the Bearcats Recovery Network as the final large-scale source.

Small-Scale Sources: Small scale sources in the Bearcats Recovery Network consists of apartment-style UC residence halls and other apartment complexes in the contiguous area surrounding UC's Uptown West Campus. Apartment-style residences were chosen as small-scale sources for the system to divert produce food waste that is unable to be consumed during its peak

freshness by college students, and the research illustrates that there is excess food waste created on college campuses by these students. Small-scale sources are expected to contribute five pounds of food waste each, per week. Residences included as small-scale sources may be seen in the route map below.

Step 2: Transportation

Routes: We have designed six different routes for rescuing food in and around the UC Uptown campus. These routes are referred to as the blue, green, yellow, red, orange, and pink routes, respectively. Each route begins at the UC Bike Kitchen where volunteers will pick up the Bearcats Pantry Recovery Pack, an insulated backpack that they will use to transport the food. Next, the volunteer will walk to various large- and small-scale sources based on their chosen route and pick up the diverted food waste. Finally, they will walk the food to the Bearcats Pantry if it is non-perishable food or Little Sisters of the Poor if the food is perishable. The routes vary in distance from 2.0 to 2.9 miles, but they are all designed to take approximately two hours to complete to allow for equal volunteer opportunity. We anticipate running each route once a day five times a week, totaling thirty routes per week. Please reference Table 1.1 for the route distances.



Blue: this route is approximately 2.0 miles starting at the UC Bike Kitchen and ending at the Bearcats Pantry and Little Sisters of the Poor. The only pickup location for this route is Kroger, as they are the largest supplier of recovered food. The dry goods recovered from Kroger, estimated to be about 50 pounds, will be taken directly to the Bearcats Pantry. Any perishable items, also estimated to be approximately 50 pounds, will be walked to Little Sisters of the Poor. After dropping the food off, the volunteer will walk back to the Bike Kitchen and return the Recovery Pack.

Green: this route is approximately 2.5 miles starting at the UC Bike Kitchen and ending at Little Sisters of the Poor. After the volunteer picks up the Recovery Pack from the Bike Kitchen, they walk to the Deacon, an apartment complex located on the southwest end of campus. Because most food recovered here is expected to be perishable, it will be taken directly to Little Sisters of the Poor. After dropping the food off, the volunteer will walk back to the Bike Kitchen and return the Recovery Pack.

Yellow: this route is approximately 2.0 miles starting at the UC Bike Kitchen and ending at Little Sisters of the Poor. After the volunteer picks up the Recovery Pack from the Bike Kitchen, they will walk to Morgens and Scioto Hall, two apartment style residence halls on the east side of campus. Because most food recovered here is expected to be perishable, it will be taken directly to Little Sisters of the Poor. After dropping the food off, the volunteer will walk back to the Bike Kitchen and return the Recovery Pack.

Red: this route is approximately 2.5 miles starting at the UC Bike Kitchen and ending at the Bearcats Pantry and Little Sisters of the Poor. After the volunteer picks up the Recovery Pack from the Bike Kitchen, they will walk to University Park Apartments, an apartment complex located on the southern end of campus, and rescue about 2.5 pounds of perishable food. They will then proceed to Target, where they will rescue an estimated 10 pounds of dry goods. The volunteer will then take the dry goods to the Bearcats Pantry before taking the perishable food to Little Sisters of the Poor. After dropping the food off, the volunteer will walk back to the Bike Kitchen and return the Recovery Pack.

Orange: this route is approximately 2.9 miles starting at the UC Bike Kitchen and ending at the Bearcats Pantry. After the volunteer picks up the Recovery Pack from the Bike Kitchen, they will walk to Clifton Market, a grocer located just north of campus.

Bearcats Pantry Recovery Pack

As mentioned before, the final proposal utilizes backpacks as its main mode for transporting recovered food. Several designs of this backpack were created and are depicted in Figure 1.13

The reason this backpack was selected was due to its waterproof interior and exterior in addition to its insulative properties. Interior waterproofing was essential as it prevents any spills from exiting the bag, while exterior waterproofing was not essential, but still a positive as it prevents the food from being ruined in the case of rain or splashes. The insulating properties of this bag were also necessary. The reasoning behind this is that perishable food must be kept at 40°F per federal regulations regarding food safety. With the backpacks insulation, perishable food is able to be transported without being compromised.

Aside from the practical aspects of this bag, it also features branding for all of the collaborators involved in the implementation of this proposal. Most notably the Bearcats pantry is present. The reasoning behind this is to not only credit the pantry, but also raises awareness about its presence on campus. With more students aware of the pantry it is likely that this will translate into more food insecure students using the pantry, thus reducing both food waste and hunger.

UC Bike Kitchen - What is it and how does it fit into our system?

The backpacks will be stored at the UC Bike Kitchen. The UC Bike Kitchen is a free service that is offered to UC students that promotes bicycle culture, offers bike repairs, and hosts workshops regarding biking (“UC Bike Kitchen”). Reasoning behind this stems from a variety of sources. First, as pulled from the volunteer data, the majority of students who volunteer through the Center for community engagement are first year students. The UC Bike Kitchen is located directly below a residence hall typically occupied by first year students, and is centrally located on campus, providing easy access to the majority of UC students during the day. Additionally, The Bike Kitchen is run by UC Sustainability. The idea of assisting with the implementation of a food waste reduction proposal aligns with their mission and thus is an optimal location to store the backpacks.

CCE Volunteers + volunteer.uc.edu

As mentioned before, 633 students volunteered for the Bearcats Pantry during the 2018-2019 school year, and many more students wanted to volunteer, however, the pantry simply did not have the capacity to manage any more volunteers. With this said it is clear that there are people who want to volunteer with the pantry, but have simply not been able to find spots. Considering this, it would be ideal to utilize the student population coming through the Center for Community Engagement (typically Cincinnati Scholars). The role of volunteers will be to pick up the backpacks from the UC Bike Kitchen, walk the route to their food recovery location and pick up the food, then deposit the food to the Bearcats pantry.

Additionally, the CCE already has a web page dedicated to signing up to volunteer for the Bearcats Pantry, called *volunteer.uc.edu*, which students can log into using their UC account. This means that there is minimal computer work to be done, and instead the pantry is simply able

to post a need (in this case transporting food via the backpacks) and a student can sign up and fulfill the need. Put simply, the modifications needed to be done to the website are minimal, if at all present, in order to implement this proposal. An example of a webpage a volunteer would see has been depicted in Figure 1.4.

Step 3: Distribution

The final step of this process is distribution after the food has been recovered, and is by far the simplest stride in completing the proposed food recovery network. Currently the Bearcats pantry is unable to take perishable goods due to their lack of refrigeration. This then limits the pantry to only being able to accept canned/dry goods. When picking up food grocers, volunteers will only be accepting canned/dry goods. These goods will then be deposited to the pantry. From here students who are perhaps unable to secure a meal, or even fully food insecure students, can go to the pantry and pick out the goods they wish to eat at no cost to them. It should be mentioned that the pantry limits how much a student can take a once to prevent manipulation of the system. This limit is well above what a student would need for 2 meals. At this point food will be entering the pantry via volunteers and leave the pantry to feed food insecure students thus reducing both food waste and hunger.

As for food which is perishable, in a future step the pantry may be able to secure funding for a refrigerator, however, in the meantime a separate outlet has been created for these goods. Perishable goods will be donated to the Little Sisters of the Poor, where they are able to both refrigerate and cook these items. From here the donated goods will be used to feed food insecure people outside of the university, hence still reducing waste and hunger.

Volunteer Narrative

To provide a concise example of exactly how a volunteer would proceed through the Bearcats Recovery Network and narrative will be given.

A student will receive an email that there is a need to be fulfilled at the Bearcats Pantry. Considering this student needs the volunteer hours to maintain scholarship eligibility, they will click the link to take them to the Bearcats Pantries webpage, hosted by the CCE. Here the student will read a description of the route to be walked, backpack pickup location, starting time, and estimated total time. Next this student will sign up for the need thus notifying the pantry that the given route will be converted.

On the day of the route this student will most likely, wake up, walk to the UC Bike Kitchen, pick up a backpack and then begin their route, a grocer in this case. Once at the grocer this student will notify an employee that they are there to pick up food and will be directed to the back of house. From here this student will fill up their bag and walk it over the Bearcats Pantry. At the

pantry the student unloads the bag onto the pantry shelves and then writes down how many, and what type of items they picked up in the Bearcats Panty's log book. After this the student will walk back to the Bike Kitchen drop off the backpack and then continue on with their day having received volunteer hours. An example of a student going into the pantry with a backpack can be seen in Figure 1.7.

CHAPTER 7: Testing, Implementation, & Impact

Testing/Feedback

Once we developed our proposal, it was crucial to receive feedback from various perspectives in the UC and Cincinnati communities.

Fran Larkin, Director of Community Engagement, University of Cincinnati: We talked with Fran throughout our ideation to make sure that he thought volunteers would be both available and interested in engaging in our proposal.

Erica Judd, Director of Analytics, 84.51°: Erica was very optimistic about how implementable the backpack would be due to both its low barrier to entry and low cost nature. Additionally, she appreciated the idea of using a backpack due to its simplicity and the fact that nearly all students already carry a backpack, and thus are familiar with the concept.

Saagar Chokshi, Student and Cincinnati Scholar, University of Cincinnati: When speaking with Saagar, he noted that he would absolutely want to volunteer to carry food via the backpacks. He also noted that during the warmer months he would potentially utilize his bike to transport food as well. This idea of students using their own means of transportation in addition to the backpack is agreeable with this proposal and could potentially provide as a region for future development.

Feedback from Final Class Presentation: During our final presentation to representatives from Kroger's Zero Hunger | Zero Waste division, we received some feedback that will assist in our next steps toward proposal implementation. The discussion of how to divert more produce from our food waste sources to the Bearcats Pantry was prompted. We had initially strayed away from diverting produce to the Bearcats Pantry since the Pantry no longer had a large refrigerator to maintain food safety. However, it was noted that purchasing a refrigerator for the Pantry would not be out of reach for funding, and it would not make our system less cost-effective.

This was a helpful piece of criticism because diverting more fresh produce to the Bearcats Pantry will increase the amount of nutritious food available at the Pantry. More available nutrients to students will in turn aid in combating nutritional deficiencies leading to food insecurity.

Implementation

We have designed our proposal so that it may be implemented with relative ease and cost efficiently. With continuous work, the implementation goal is a Fall 2020 kickoff. A helpful tool toward the implementation and credibility of our system would be to establish a Food Recovery Network student chapter at UC. A Food Recovery Network chapter at UC would offer additional

resources and expertise on how to execute an effective food recovery network in our community.

A coordinated effort with the Bearcats Pantry staff, including Assistant Dean of Students Daniel Cummins and Jessie Fix, Assistant to the Assistant Dean of Students, is imperative to ensure an ethical and sustainable implementation plan for the proposed system. Ample study of the daily operations of the Bearcats Pantry and the needs of the students is crucial to develop an empathetic understanding of the issue of food insecurity amongst University of Cincinnati students. Furthermore, this understanding allows for thoughtful implementation of the system that allows for sustained operations as the system expands, partnerships change, and students' needs evolve.

An important aspect of our proposal is data collection and analytics of the recovery network's operations, which will allow us to alter routes and pick up routines to maximize food recovery once the system is enacted. To begin this process, a more detailed discussion must be opened with each of the food waste sources to determine the type of food waste that will typically be donated beyond the initial estimates we received to craft our recovery network proposal.

Partnerships with organizations on UC's campus that have similar missions to the project proposal will maintain accountability in the system and provide additional resources for the founding of the system. Partnerships must be forged with UC Sustainability to access the UC Bike Kitchen, the UC Center for Community Engagement to use *volunteer.uc.edu*, and Little Sisters of the Poor to use as a distribution location.

Impact

Meals Provided to Bearcats Pantry (Dry Goods) Only

Sources	Quantity of Food / Day
Kroger	50 lbs
Clifton Market	25 lbs
Target	10 lbs
Residences	2.5 lbs (conservative)
Total:	87.5 lbs

1 meal = approx. 1.2 pound according to Feeding America (Understand Food Insecurity)

$87.5 \text{ lbs/day} \times 365 \text{ days/year} = 31,938 \text{ meals} \approx \mathbf{31,900 \text{ meals / year}}$ to students

Meals Provided to Community Overall (Dry Goods and Produce)

$31,900 \text{ meals/year at Bearcats Pantry} \times 2 \approx \mathbf{64,000 \text{ meals / year}}$ to community

Bearcats Pantry Users Per Year

The yearly number of students who use the Bearcats Pantry was extrapolated from the current year-to-date metrics of Bearcats Pantry usage.

$$\frac{250 \text{ students this year}}{4 \text{ months}} = 62.5 \frac{\text{students}}{\text{month}} \times 12 \frac{\text{months}}{\text{year}} = \mathbf{750 \frac{\text{students}}{\text{year}}}$$

Volunteer Hours Required to Operate System

Using the basis of the current number of students that have responded to needs posted by the Bearcats Pantry on volunteer.uc.edu as a baseline, we have estimated that students could provide 360 hours to the system per week maximum. Only 60 hours are necessary to operate the recovery network. This is assuming no increase in the number of students that would like to volunteer with the Bearcats Pantry Recovery Network.

$$\frac{633 \text{ students}}{52 \text{ weeks}} = 12 \text{ students/week}$$

$$30 \text{ required volunteer hours} \times 12 \frac{\text{students}}{\text{week}} = \mathbf{360 \frac{\text{hours}}{\text{week}} \text{ max}}$$

$$6 \text{ routes} \times 2 \text{ hours} = 12 \frac{\text{hrs}}{\text{day}} \times 5 \text{ weekdays} = \mathbf{60 \frac{\text{hours}}{\text{week}} \text{ required}}$$

Percent Increase in Volunteer Hours Offered through Bearcats Pantry and Bearcats Pantry Recovery Network

Currently, two hour volunteer shifts are offered through the Center for Community Engagement's volunteer.uc.edu for the Bearcats Pantry. This number was used to compare the number of additional volunteer hours that would be offered by the implementation of the Bearcats Pantry Recovery Network.

$$60 \frac{\text{hrs}}{\text{week}} \times 52 \frac{\text{weeks}}{\text{year}} = 3120 \frac{\text{hrs}}{\text{year}}$$

633 students × 2 hours = 1266 hours currently offered

$$\frac{(3120 - 1266)}{1266} \times 100 = \mathbf{146\% \text{ increase}}$$

APPENDIX

Photos

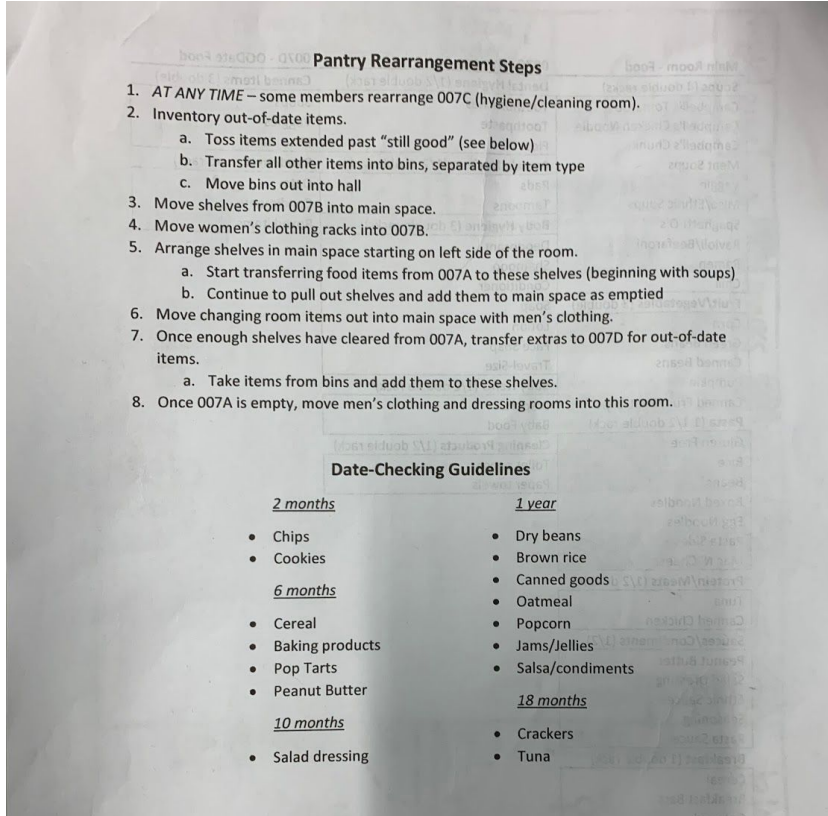


Figure 1.1: Pantry rearrangement steps and when to throw away items past their sell-by dates.

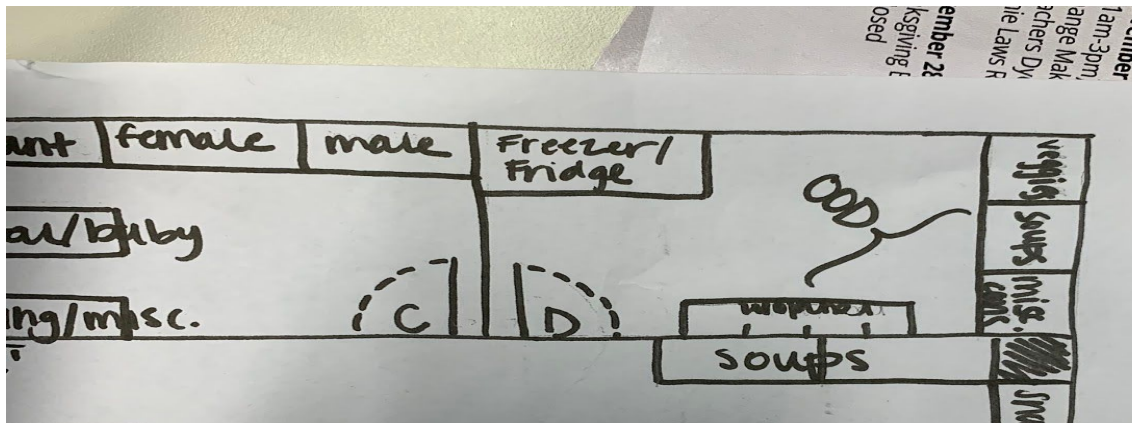
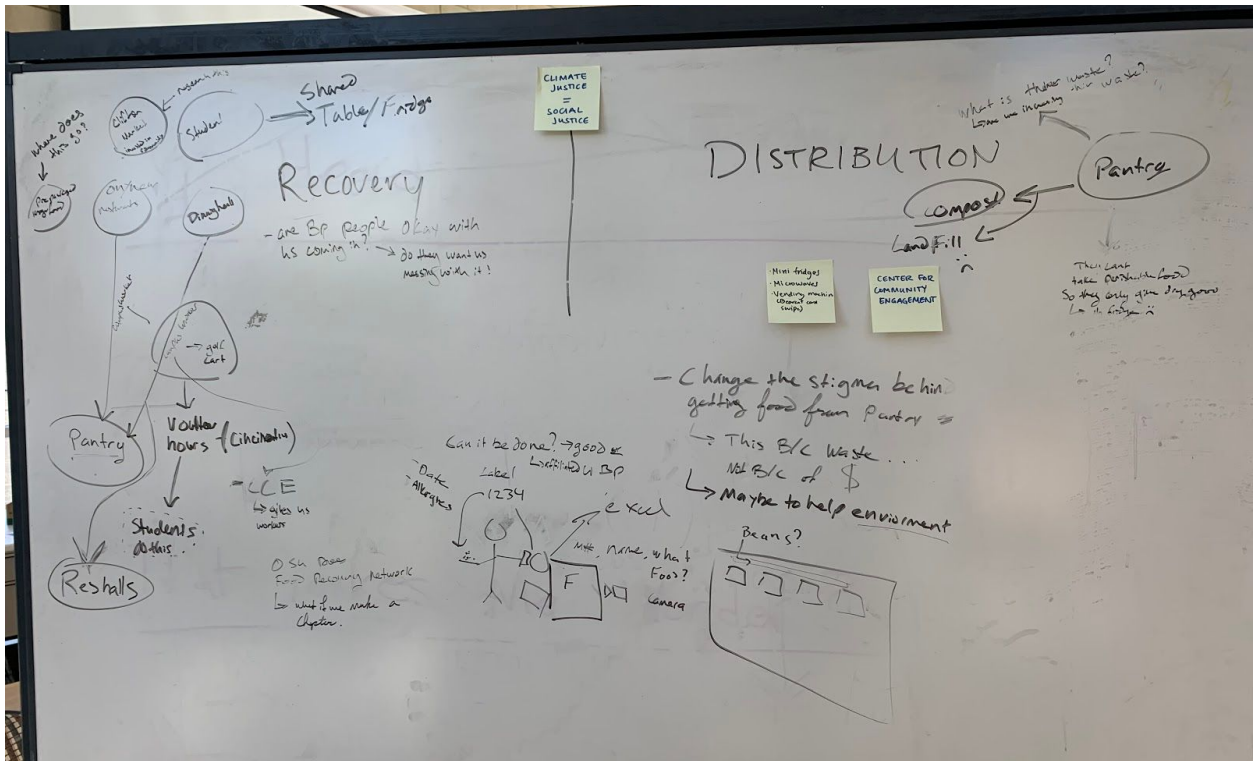


Figure 1.2: Layout of the Bearcats Pantry, showing that a freezer/fridge used to be available.



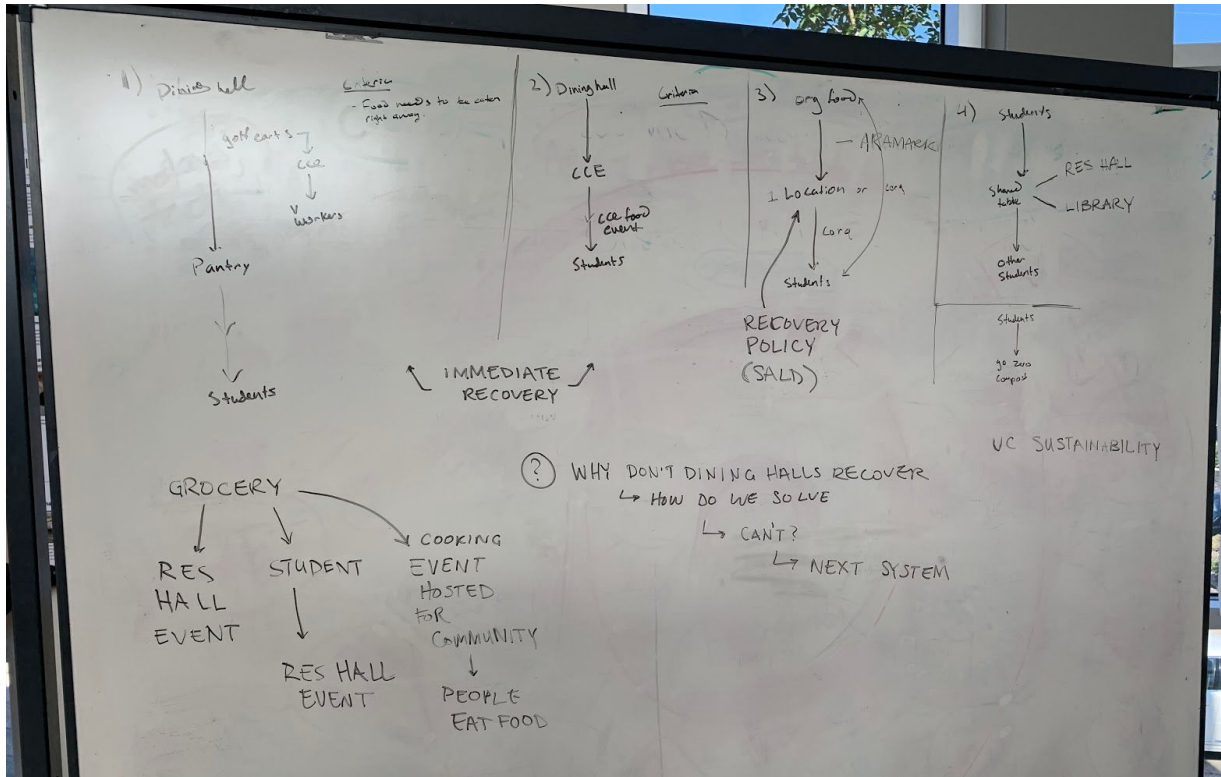


Figure 1.3a: All three images depict initial ideation within the realm of food recovery.

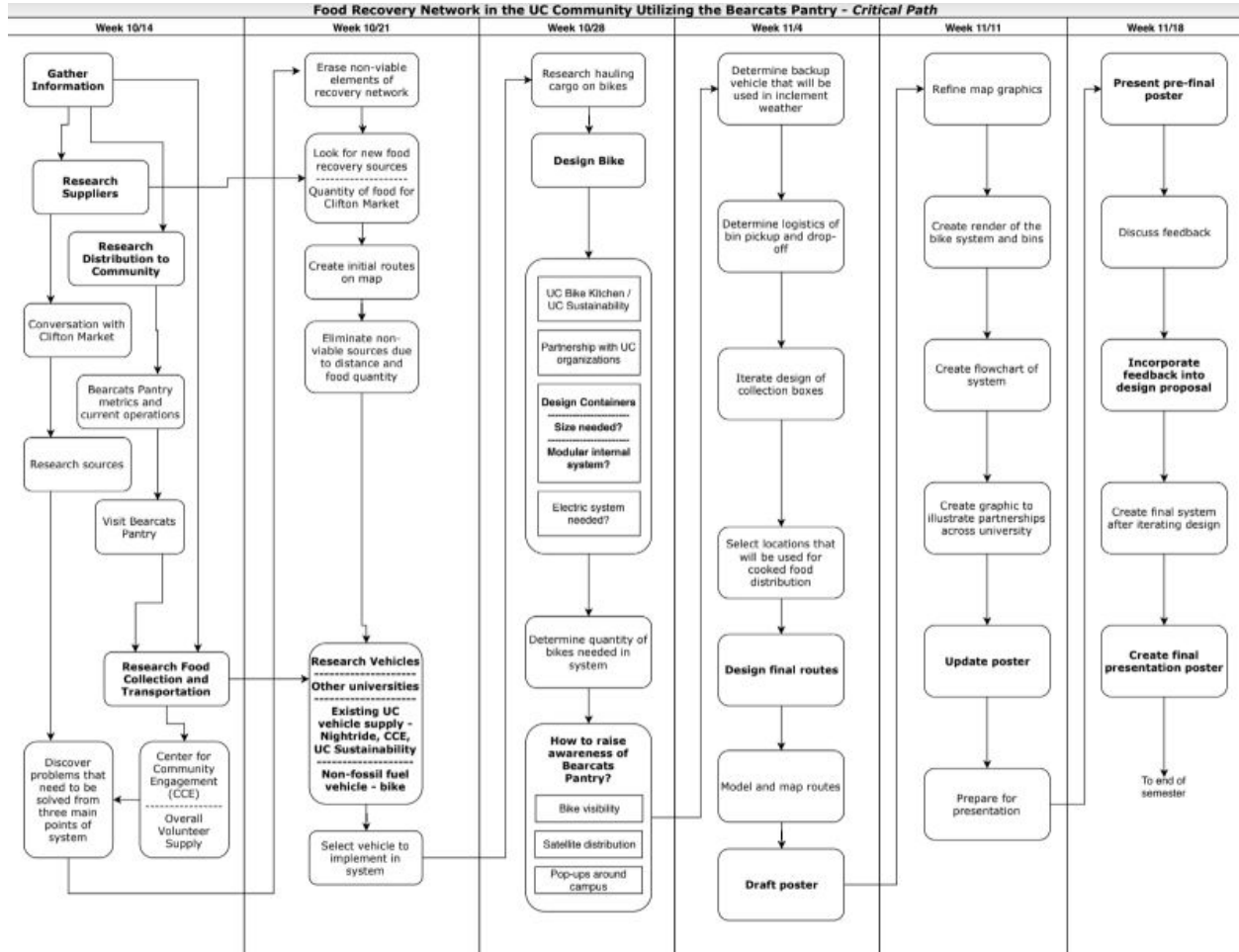


Figure 1.3b: The initial critical path for project development, still containing the bike courier concept.

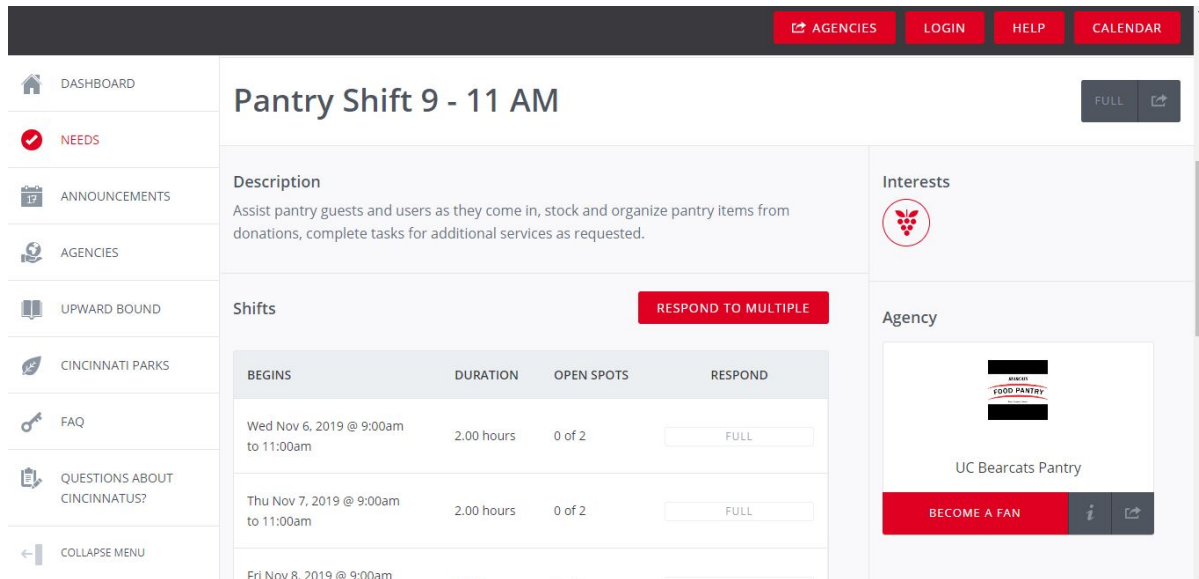


Figure 1.4: An image of what a volunteer would see when signing up through the CCE website.

Abbi,

Thank you for reaching out!

Interestingly enough, we had been working with the Bearcats Food Pantry to transport donations, however, last week, they wrecked one of our vans. Accidents happen, we definitely understand that, but it also takes away from being able to serve the students at night when one of our vans goes out, plus the money it costs to have it repaired. With that being said, I am little uneasy allowing another group to utilize our vans during the day with UC volunteers. I absolutely do not like giving that answer, but I have attempted to lend out our vans and ended up shorting the service that they are meant for, I hope you can understand that!

There are a couple of other options if you are interested:

1. UC Moving Services have trucks available to use for moving a variety of items from department to department. They can be reached at 513-556-4147
2. If moving the food is a once in a while type of request, I could potentially have one of my students come in and drive the vans back and forth. Unfortunately, due to class and work schedules, it would difficult to bring them in several times a week at various times.

Again, I apologize, it's kind of been a disaster lately due to lending our vans out to other departments, so I hope you can understand, but hopefully one of the other options can be of some assistance to your project.

If you have any questions, or anything, please let me know!

Lauren Bycynski
UC Public Safety Community Safety Manager
NightRide Program

Figure 1.5: The email response from Lauren Bycynski, Head of the Night Ride program.



Figure 1.6: A student walking into the Bearcats Pantry, located in Stratford Pavilion, to drop off recovered food.



Figure 1.7: An example of a pedicab

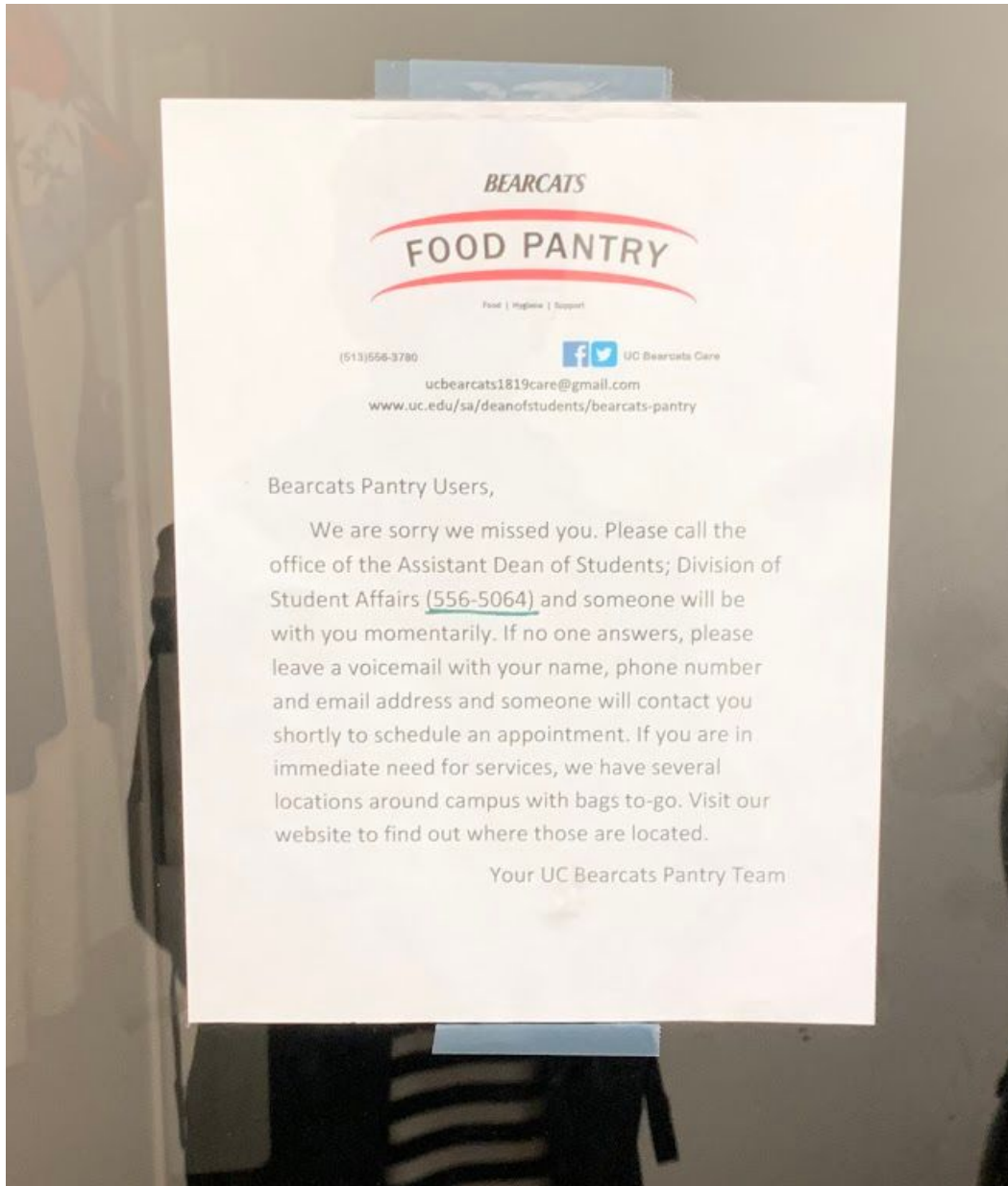


Figure 1.8: The sign posted on the door of the Bearcats Pantry during our first visit.



Figure 1.9: An image of inside the Bearcats Pantry.

Volunteer Data

Larkin, Fran (larkinfp)

Wed 10/23/2019 2:24 PM

To: Reichenbach, Seth (reichesh) <reichesh@mail.uc.edu>

Seth,

Great meeting with you and your team last week. Here are some pieces of information I've found that may be helpful:

- This academic year from August 1, 2019 to present the Bearcats Pantry has had 357 volunteer responses to Needs they've posted on volunteer.uc.edu
- From August 1, 2018 through April 30, 2019 (the 2018-19 academic year), the Bearcats Pantry had 633 volunteer responses to Needs they posted on volunteer.uc.edu
- This academic year, from August 1, 2019 to present 2,090 volunteers have reported 17,469.93 hours of service in general through volunteer.uc.edu
- From August 1, 2018 through April 30, 2019 (the 2018-19 academic year) 4,076 volunteers reported 94,666.78 volunteer hours through volunteer.uc.edu

I didn't find an easy way to run monthly data, but on second look I think these data points get at what you're may be trying to illustrate: there are a lot of students looking for volunteer opportunities, and a lot of students specifically interested in working with the Bearcats Pantry.

Thanks,

Fran Larkin

[Center for Community Engagement](#)

University of Cincinnati

2639 Clifton Avenue, Stratford Heights | [Map](#)

PO Box 210138

513-556-1503

@UC_CCE

Figure 1.10: An email from Fran Larkin describing the number of students who have volunteered for the pantry through the Center for Community Engagement.













NEED/AGENCY	DATE/TIME	SPOTS OPEN	ACTIONS
 Pantry Shift 9 - 11 AM UC Bearcats Pantry	Multiple Shifts Available	0	VIEW DETAILS  
 Pantry Shift 3-5 PM UC Bearcats Pantry	Multiple Shifts Available	0	VIEW DETAILS  
 Pantry Shift 1-3 PM UC Bearcats Pantry	Multiple Shifts Available	2	VIEW DETAILS  
 Pantry Shift 11 AM - 1 PM UC Bearcats Pantry	Multiple Shifts Available	0	VIEW DETAILS  

Figure 1.11: An example of the majority of Bearcats Pantry slots being filled.

RE: UC Innovation Inquiry - Food Waste Recovery

Stover, Jeremy <jeremy.stover@kroger.com>

Thu 11/7/2019 4:49 PM

To: Reichenbach, Seth (reichesh) <reichesh@mail.uc.edu>; Parker, Georgann <georgann.parker@kroger.com>
 Cc: Wells, Abbigail (wells2ag) <wells2ag@mail.uc.edu>; Ashraf, Ahmed (ashrafah) <ashrafah@mail.uc.edu>; Erika Judd <Erika.Judd@8451.com>

Hi Seth – My role is on the recycling portion that goes from the store to recycling and landfill. Georgann’s role is focused on store to food bank. Are you looking at what percent of material / amount of material is generated out of Corryville (store 929) and where it is ending up at (Food Bank, Food Waste recycling, trash, etc.)?

The information below is 2019 (Jan – Aug) in tonnage.

Store	MSW	OCC	Food Waste	Fat/Bone	PDP	Used Cooking Oil	Plastic Film
014-00929	242.01	316.57	10.07	1.8	0.91	4.89	11.78

Jeremy

Figure 1.12: An email from Jerney Stover describing the amount of food waste which comes from the Corryville Kroger.

Volunteer Data

Larkin, Fran (larkinfp)

Wed 10/23/2019 2:24 PM

To: Reichenbach, Seth (reichesh) <reichesh@mail.uc.edu>

Seth,

Great meeting with you and your team last week. Here are some pieces of information I've found that may be helpful:

- This academic year from August 1, 2019 to present the Bearcats Pantry has had 357 volunteer responses to Needs they've posted on volunteer.uc.edu
- From August 1, 2018 through April 30, 2019 (the 2018-19 academic year), the Bearcats Pantry had 633 volunteer responses to Needs they posted on volunteer.uc.edu
- This academic year, from August 1, 2019 to present 2,090 volunteers have reported 17,469.93 hours of service in general through volunteer.uc.edu
- From August 1, 2018 through April 30, 2019 (the 2018-19 academic year) 4,076 volunteers reported 94,666.78 volunteer hours through volunteer.uc.edu

I didn't find an easy way to run monthly data, but on second look I think these data points get at what you're may be trying to illustrate: there are a lot of students looking for volunteer opportunities, and a lot of students specifically interested in working with the Bearcats Pantry.

Thanks,

Fran Larkin

[Center for Community Engagement](#)

University of Cincinnati

Figure 1.13: An email from Fran Larkin regarding volunteer metrics at the Center for Community Engagement



Figure 1.14: An example of a backpack that could be used to conduct food recovery

RE: Information Regarding Pantry Donations

Bearcats Pantry (BearcatsPantry)

Wed 11/13/2019 8:37 AM

To: Reichenbach, Seth (reichesh) <reichesh@mail.uc.edu>

Hi Seth,

We do not have a specific number of UC students who are food insecure. However, the [College & University Food Bank Alliance](#) suggests that the national average is about 20-30% of students. That would mean about 8,000 students on UC's campus have some form of food insecurity.

Since the beginning of this semester, we have served over 250 students. Of the students we have served this year, about 70% live off campus. We do not distinguish between academic years, but we do serve a wide variety of undergraduate and graduate students from all colleges across campus.

This clearly is nowhere near the number of students with a need, so it is my task this year to increase awareness and decrease stigma. I'm glad you and your classmates are researching this issue! Please let me know if there's anything else I can do to help.

At this time, our most-needed items are granola bars, fruit cups/applesauce, and snacks (popcorn, crackers, nuts/trail mix, etc.).

Best,
Jessie

Bearcats Pantry | University of Cincinnati

Graduate Assistant for the Assistant Dean of Students

Stratford Heights Bldg 16, Suite 007

(513) 556-5064



Figure 1.15: Metrics about food insecurity at UC from the Bearcats Pantry.

From: Reichenbach, Seth (reichesh)
Sent: Thursday, October 10, 2019 2:18 PM
To: Cummins, Daniel (cummins) <CUMMINDS@UCMAIL.UC.EDU>
Subject: Questions Regarding Bearcat Pantry

Hello Asst. Dean Cummins,

I am a fifth year student in the University Honors Program at UC. I am currently in a class focusing on innovative strategies to **reduce food waste** with Professor Frank Russell. My research group's focus is on food recovery, which is the strategy of diverting uneaten, edible food to hungry populations.

During our research, we became aware of the great work taking place with the **Bearcat Pantry**. If you have a moment in your busy schedule, could you please respond to the few questions we have below?

1. How many students on average use the Bearcat Pantry?

Each year more and more students are using one of the three options of the pantry (Pantry main location, Pantry to go bags, Pantry Dining Hall Vouchers) We have had 142 uses so far this year.

2. Have avenues been explored to have fresh perishable food available at the Pantry beyond dry goods?

We currently do not have refrigeration.

3. Do you believe it would be possible to divert uneaten food from Dining Services or Aramark catered events on campus to the Bearcat Pantry? Any possible partnership with local grocers?

This is a liability issue and we are unable to pursue this option.

4. Are there efforts in place to raise awareness about the Bearcat Pantry and to reduce potential stigma around utilizing the services offered?

Yes there is, and I am open to innovative ideas. This is one of the biggest road blocks preventing student use. We mainly use social media and the pantry itself is located in someone of a undisclosed location.

Figure 1.16: Information from Assistant Dean Cummins about the Bearcats Pantry, potential partnership with Aramark Dining Services, and stigma around the Bearcats Pantry.

Figures

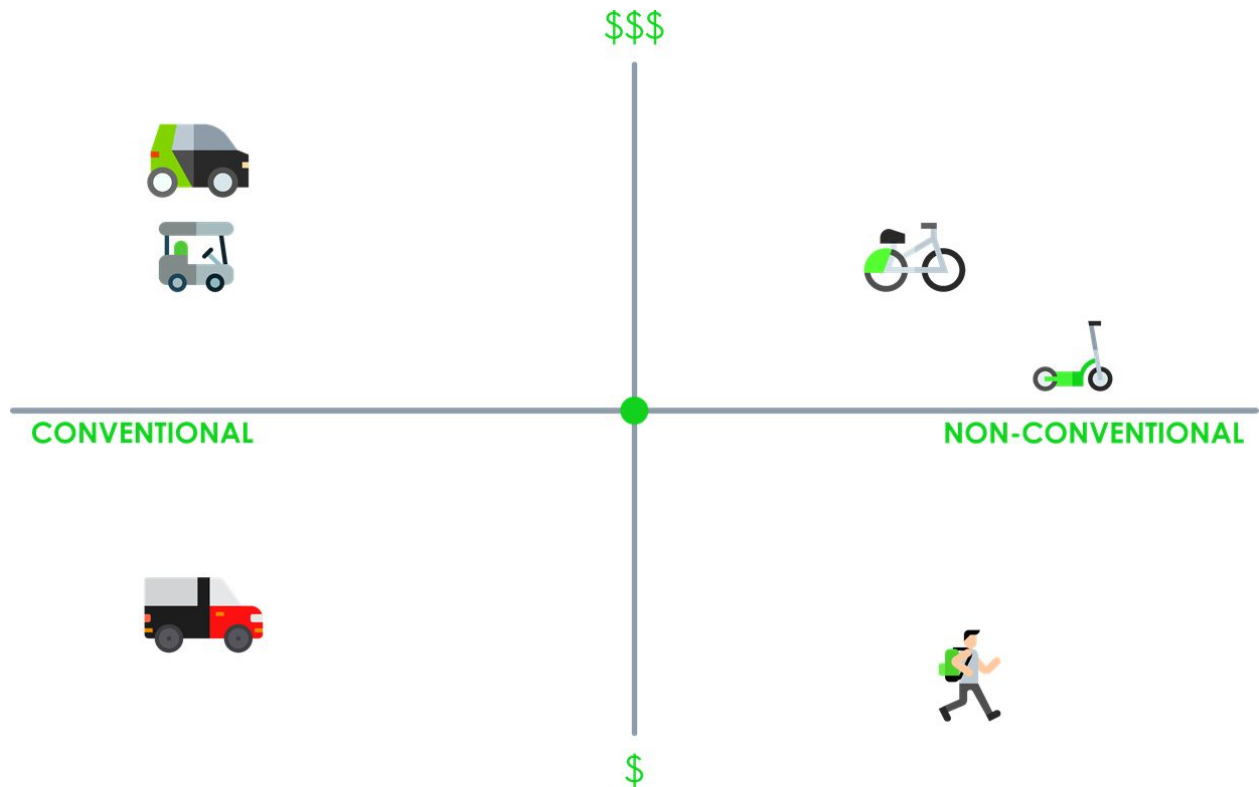


Figure 2.1: Cost versus conventionality matrix for transportation options to utilize in the Bearcats Pantry Recovery Network.

Tables

Route	Dist. (mi)
Blue	2.0
Green	2.5
Yellow	2.0
Red	2.5
Orange	2.9
Pink	2.3

Table 1.1: Distances of the six routes that comprise the Bearcats Pantry Recovery Network. All routes were designed to give volunteers approximately two service hours.

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