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Operationalizing the Springfield Innovation Center

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Written by:

Brian Amado
Alexandra Connor
Cody Lattin
Tianyi Xu
Michael Paquette
Kevin Martin
Eric Larsen
Shanshan Xie
Syed Ali Hussain
Christian Walck

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Sponsored by:

Jay Minkarah, CEO of DevelopSpringfield

Approved by:

Professor Kevin Sweeney, Advisor

Abstract

DevelopSpringfield is establishing the Springfield Innovation Center (SIC) in the downtown Springfield area. After extensive research, including site visits and interviews with professionals and SIC stakeholders, our team has produced a detailed set of recommendations for operationalizing the Innovation Center. Included are plans to make full use of the center's kitchen space, implement a makerspace in a building attached to the center, and market the center. Ultimately, these recommendations will serve to promote entrepreneurial activities at the center.

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Acknowledgements

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Executive Summary

DevelopSpringfield is a non-profit organization that formed in 2008 to advance development projects and stimulate economic growth in the Springfield area. The company's newest and largest project to date is the Springfield Innovation Center (SIC). The SIC is located at 276 Bridge Street in downtown Springfield, MA. It is in the area of some of Springfield's major landmarks, including the Center Square, Stearns Square, Tower Square, and the new Union Station. It will serve as an ecosystem to accommodate startup businesses and entrepreneurs as well as a new home to Valley Venture Mentors (VVM), a business accelerator in the Pioneer Valley area.

One of the major components of the Innovation Center is a kitchen space of roughly 900 square feet (SF) which is located directly behind the Ground Up restaurant. The restaurant will be sharing the space and will have little to no need for the kitchen space. The CEO of DevelopSpringfield, Jay Minkarah, is hoping to use the space to foster the entrepreneurial spirit of aspiring chefs in collaboration with Ground Up. By looking at numerous models, combining and integrating relevant ideas, we built four models outlining kitchen operations and employable managerial tactics.

DevelopSpringfield also owns an approximately 6,000 SF building (including a basement) adjacent to the SIC. It is currently leased to a carpet vendor and is being used as a storage area. It is not, however, generating a sizable revenue. In about 2 years the lease term will be over and the space will be available. Mr. Minkarah would like to put the space to use. The function of the space should generate revenue for the organization as well as align with the vision of DevelopSpringfield. Mr. Minkarah expressed interest in filling the building with a makerspace. This would hopefully help rising businesses and entrepreneurs working with VVM and otherwise gain access to tools and collaborative space that they need. The previous group of students working on this project has determined that a makerspace is a viable option for the building. We have done more in-depth research in this growing market. By looking at several examples and evaluating our available space in comparison, we have created a set of recommendations for management structure, equipment listings, space usage, funding strategies, and economically sustainable services.

For Springfield Innovation Center to grow and expand, it is important to have a marketing strategy that conveys its services and the opportunities it provides to the local population. The marketing strategy has been carefully analyzed in this project. It is imperative for every business to have a website. A mockup website was designed that can be used for future website development or used as it currently stands. On top of the website, we looked into other ways to increase our online presence. The main ways of increasing the Springfield Innovation Center's

online presence was by using the big social media platforms as well as having a guest WiFi network that automatically directs people who connect to the WiFi to the Springfield Innovation Center's website. Another idea that we will be talking about extensively is creating a mural on the outside wall of the building. We have a potential artist for the mural that is very interested in working with us, and shares a similar view about what the Springfield Innovation Center could do for Springfield. Through the methods listed above, we hope to increase the public's awareness of the Springfield Innovation Center, which will generate more foot traffic into the building.

Introduction

The Springfield Innovation Center (SIC) project consisted of a of a large, multi-team effort spanning the course of the 2017 spring semester. Work for the project was divided half way through the semester, following WPI's quarterly term-based schedule (C & D terms). The first group to work on the project (C-term team) performed an analysis on the operations of the SIC and did background research on the community as well as other innovation centers. Their final deliverable was a set of handoff projects for our team (the D-term team). Our group's projects included suggested background research and number of students. During the first week of our IQP we examined these recommendations and broke into three teams: kitchen operations, makerspace implementation, and marketing analysis. We have done research into these areas and produced set of recommendations for each.

Background

Positioned strategically in the heart of downtown Springfield, the new SIC is aptly located to become a common meeting ground for the city's entrepreneurs. Founded and renovated from a historical building on Bridge Street by the non-profit organization DevelopSpringfield directly under its CEO Jay Minkarah, the center was created with the goal of promoting the growth of local start-ups. To create this business incubator environment, the center includes several connected operations. Just past the main entrance lies a large gathering room with a stage for hosting the SIC's networking events. Directly to the left of the entrance is Ground Up, a cafe privately leased. Behind the cafe is a kitchen space shared by the Ground Up and the SIC, which will be available for rent by food entrepreneurs. Upstairs are shared and private office spaces, many of which have already been leased. Below is a large basement space with plans for a daycare, although most of the space will still be unoccupied. Attached to the building is a large carpet warehouse, to be acquired by the SIC within two years. Overall, the building's facilities and the center's programming will be able to grow the startups until they take over their own space in the unoccupied buildings adjacent to the center as full businesses.

Problem Statement

The intent of this project was to utilize the recommendations in the C-term IQP's deliverable and develop implementation strategies for the SIC. The Innovation Center continues to undergo construction which is currently funded by grants negotiated by DevelopSpringfield and Mr. Minkarah. This project serves as a guide onto which the center can begin to ensure long-term sustainability. Our task was to operationalize various spaces and determine a marketing plan for the SIC.

Recommendations

I. Shared Kitchen Space

Key Findings

In this section, we explore various uses for the 900 square foot kitchen space. We looked at different kitchen models including Venture Cafe, Boston Chefs, FareStart, Sur La Table, CommonWealth Kitchen and Wellfleet Commissary Kitchen, to assemble a set of recommendations for the kitchen space. These recommendations include information about:

- Necessary kitchen equipment and pricing
- Staffing and management options
- Expenses and revenue
- Insurance and safety considerations

Careful analysis of similar spaces led to the development of 4 operations-based models that outline some of the viable options available to the Springfield Innovation Center.

Introduction

This section will be dedicated to the 900 SF kitchen located behind the Ground Up restaurant. In presenting this information, we will describe models which have been designed to highlight some of potential options that the Innovation Center has, in terms of using the kitchen space. Essentially, we will be describing different "ingredients" that can be used to operationalize and optimize the space. These ingredients have both pros and cons so they should be treated as pieces that can be pulled together to create a unique model that works at with the SIC. Our team researched different models for both test and prep kitchens across the country. In addition, our team conducted a number of interviews with people who have been tasked with operationalizing test/prep kitchens.

Throughout this section you will read a number of different definitions for the term *test kitchen*. For example, Model 1 uses the test kitchen in reference to a guest chef event, whereas in Model 3, the term is used to describe classes where aspiring chefs can collaborate and express their love for food.

Another key term that we have incorporated into the models is *prep kitchen*. Our team has used this term to describe an area being used for the purpose of preparing meals.
There are a number of barriers affecting the operationalization of the kitchen. One of the obvious barriers is the need to share the space with the Ground Up restaurant. Taking this into

consideration, we have included models that would apply with different levels of collaboration with Ground Up and models that do not utilize the space as frequently in order to avoid hindering the performance of Ground Up.

Management Structure

Deciding upon feasible management applications, before deciding upon the model (or pieces of a model) that best fits the kitchen space, would allow the SIC to highlight some of the most achievable and applicable operations for the kitchen space. There are a number of different management models that have fit well in spaces with similar goals of fostering entrepreneurial aspirations. Space plays a key role in the type of management style that is employed.

Some companies do not have physical kitchen spaces but have managed to bring together some of the same ideas that the SIC is built on. Take Boston Chefs for example. The company is essentially a networking site that promotes and helps organize events, classes, etc. that have to do with cooking.

A large part of their audience and a marketing is toward entrepreneurs. They have taken a very informal approach in terms of how they manage those who directly host events. Their power comes from their ability to market themselves and events sponsored by them. The pros of this approach in connection to the SIC, and in terms of managing a group through sponsorship rather than employment are:

- The ability to set the regulations or terms for ‘sponsorship’.
- Only needing some to oversee compliance and scheduling .
- Presenting entrepreneurs with the opportunity to manage their own space for a given time period.

The cons are:

- Approach does not foster collaboration amongst different entrepreneurs.
- Introduces the need for user friendly information systems which can be expensive.
- Strict schedules will be needed to maintain order.
- Weak accountability on the end of the SIC.

Venture Cafe is much different from Boston Chefs in nature, but similarity, the company has promoted creative ideas through their operations. The company has employed a variety of different management techniques. Initially the company had volunteer staff which, given the

number of functions that the SIC wants to run through the space, may not fit the environment. Today, Venture Cafe is run using paid staff.

In terms of using paid staff to run the kitchen operations here are some of the pros:

- The SIC will be physically involved and have control over the space.
- Ability to work around issues and prevent.
- Easier to recognize flaws in operations and capitalize on opportunities.

Some of the cons are:

- The need to pay salaries/wages throughout the day.
- Entrepreneurs may not be very active because they can not control and manage the space completely.

In regards to managing a physical space, given that different management structures differ with the amount of space available to a company, we suggest a management system in there is at least 2 SIC staffs overseeing the kitchen but janitorial services are outsourced. Those in charge of managing the space should be responsible for ensuring compliance with the SIC health and safety procedures, scheduling, and collaboration with Ground Up.

Kitchen Space Legal/Insurance Considerations

According to Massachusetts General Laws (Issuance of license to be innholders or common victuallers), all commercial restaurants and food prepping facilities in Massachusetts are required to be both licensed and insured to operate. This is to ensure that all the food businesses are accounted for, compliant with health and safety codes, and covered in the case of an accident or emergency. Considering that the SIC will operate with both the Ground Up cafe and use this restaurant's kitchen as a commercial commissary, it will require several types of permits and insurance.

The state of Massachusetts and the city of Springfield generally require different permits to operate restaurants and commissary kitchens; Springfield uses the Springfield MA Common Victualler Permit, while the state uses the Federal Food Manufacturing Code. These are described and quoted below:

- **General Restaurant Permit:** This is issued by the city of Springfield; it allows the operation of a restaurant in the city limits. Its estimated cost is about $100/year.
- **Full Restaurant Liquor Licence:** This is essential to the bar activities at the Ground Up cafe, for general service and networking events. It is issued by the city of Springfield at $2,800/year.

- **Wholesale Licence:** This is to use the kitchen space as a commissary, allowing the manufacture, storage, and distribution of food products to "resellers" (A.K.A. kitchen renters). Obtaining this permit requires proof of adherence to CRM 500.000 "Good Manufacturing Practices" (see health and safety section below for more information). This permit is issued by the State of Massachusetts for approximately $300/year.

In addition to these permits, both the SIC kitchen and individuals renting the kitchen space for the purpose of manufacturing food must also carry their own licenses (*"Good...Food"*). These can be specific to the product manufactured, with dairy products, meat products, canned goods, and alcohol products requiring additional licensure. In order to maintain health and safety compliance, the SIC should require proof from businesses of these certifications before allowing chefs to rent out and manufacture products in the kitchen space. While this is out of the scope of the SIC, the SIC could also choose to provide permit and legal counseling to businesses that have purchased a SIC entrepreneur membership, to increase the potential number of entities that can rent the kitchen space.

In addition to permits, insurance is required to operate the kitchen space. There are several types of insurance, described in detail below (*"Coverage Details"*)(*"How Much...Taverns?"*):

- **Business owners policy:** This policy will cover general damage or theft to equipment in the kitchen space. This is estimated to cost 20-40 cents/SF (see the makerspace insurance policy). This would be between $180-360/year to cover the kitchen space, $380-760/year to cover the restaurant space, and additional amounts to cover the basement food storage space and any off-site storage spaces.
- **Liquor Liability:** Because liquor will be served on the premises for both general restaurant operations and during the SIC-sponsored events, having liquor insurance is necessary. This protects the SIC in the event that a patron has a liquor-related car accident, etc, and consumption of the liquor can be traced to the Ground Up's bar. Liquor insurance is estimated to cost between $966-3,660/year.
- **Professional Commercial Kitchen Policy**: This policy (quoted at $424/year from Flip Food Insurance) will cover renting the kitchen space for food product prep and also covers cooking class insurance. It includes the following:
    - Food Product Foodborne Illness ($1,000,000)
    - Food Product Mislabeling/ Allergy Claims ($1,000,000)
    - Worker Injury Claims ($1,000,000)
    - Property Damage ($300,000)
    - Customer Identity Theft ($15,000)
    - Professional Extension (Cooking Class Liabilities) ($100,000/case $200,000 maximum).

Since the kitchen space is shared between the SIC and the Ground Up cafe, which is owned independently from the SIC, the shared purchasing of insurance for general kitchen activities will need to be negotiated between the two parties.

Health and Kitchen Safety Recommendations

With all of the machinery and equipment present in the kitchen, the potential for accidents is huge, so the safety of kitchen equipment is a key feature which must be addressed and detailed. First, a mandatory class should be provided before working in the kitchen to ensure all users are knowledgeable on how to operate the equipment. The class should include training guest chefs and bakers about kitchen equipment, using sharp knives, burn prevention and moving heavy loads, and etc. Second, one of the restaurant staffs should also take the role of kitchen supervisor to make sure all the machines are turned off after each pre/test kitchen shift, and also lock the door of the kitchen during non-operating hours. Third, regular maintenance is an excellent and cost-effective way for restaurant operators to spot potential safety problems and maximize equipment efficiency. In addition, a fire alarm system would also be required for the kitchen because it is essential to keep both the kitchen and restaurant safe as the alarm system is the quickest way to alert users about a fire emergency. Last but not least, we suggest that the SIC establishes regulations for all users and posts them on the wall in the kitchen in order to remind users all the time. Some suggested rules are given below:

- Make sure to turn off burners as soon as you take the pot off.
- Avoid wearing inappropriate clothing and shoes while cooking.
- Clean up spills immediately.
- Keep young children out of the kitchen while cooking.
- Get rid of any appliance that is broken or damaged.
- Make sure all wires, cords and plugs on your appliances are not frayed and that the plugs have 3-prong grounded connections.
- Don't overload electrical outlets.
- Employees must wash hands before returning to work.
- Cleaning chemicals should be stored in a separate area away from food and heat sources.

Besides equipment safety, food hazards is another innegligible problem. One potential danger in the kitchen is cross-contamination, which may lead to foodborne illnesses. For example, using the same cutting board for raw meats and salad ingredients, without disinfecting, can contaminate the salad and cause customers to be ill. Additionally, food allergy, which occurs 4% among adults and 8% among children, is becoming a growing public health concern in the US. Therefore, considering those people who have food allergies, the group of the eight major allergenic foods (milk, eggs, fish, crustacean shellfish, tree nuts, peanuts, wheat and soybean)

should be treated seriously. For example, these eight main food allergens should have a special storage and a special cutting board. Moreover, a training program, which could be an online safety test, is a good way to teach users how to handle food properly.

Since the food allergy safety is such a significant problem in the kitchen, we did some research on how to avoid the food allergy dangers. Below are some good suggestions for SIC:

- Educate all staff regarding allergen concerns by watching video.
- Visit NFCA to view online courses.
- Offer a list of ingredients for guest chefs event's menu selections as a reference for both diners and staff.
- Ask if dinners have any food allergy when they reserve the table online or by phone.
- Chefs must sanitize all cooking surfaces, utensils, cookware and dinnerware before assembling allergen-free meals.
- Employees must wash their hands, change their gloves and use a clean apron when working with meals prepared in an allergen-free manner.
- Coach staff to dial 911 immediately if an adverse reaction occurs.

Model 1: Membership/Integration

Model Analysis

Table 1.1. A time table for Model 1

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5am - 7 am	Prep	Prep	Prep	Prep	Prep	Prep	Prep
7am - 7pm	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation
7pm - 11pm	-	Guest chef	-	Guest chef	-	-	-

Model 1 represents a method in which all operations that Develop Springfield would like to run through the 2800 SF space can be consolidated effectively. Ground Up is set to run, roughly, twelve hours a day, from 7am through 7pm. That being said, the restaurant will provide the three main dining options—breakfast, lunch, and dinner. With a capacity of 50 people, the restaurant can properly serve roughly 100 people per meal. These numbers will likely fluctuate. The restaurant has expressed interest in outsourcing food preparation. This creates an availability of the physical kitchen during most of its hours; however, the kitchen will likely continue to be used by the restaurant to prepare small meals and refrigerate foods.

31 million Americans skip breakfast everyday, and with a major breakfast provider like Dunkin Donuts sitting a few blocks away from the Innovation Center, it is unlikely that the restaurant will experience over-capacity issues (especially in the early stages of its existence). In addition, it would be likely that the majority of the restaurant's early customers will be dining-to-go on weekdays (*Toren*).

This presents the perfect opportunity to provide a fully functional kitchen as a prep-kitchen throughout most of the morning. A prep-kitchen for small time bakers, food trucks, and smaller restaurants could operate everyday from 5am up until 7am on weekdays. Around 10am many breakfast-providing-restaurants begin to shift their products as customers begin to request lunch items. This transitional period, although stressful, would allow the restaurant to clean, and prepare kitchen space for a lunch period that will likely bring in the most customers, thus presenting the perfect time for the prep-kitchen to end for the day.

Ground Up is likely to make the most revenue during its lunch operations. The restaurant's location is in a prime spot for lunch because many nearby stores also serve lunch. For example, Panera Bread and Five Guys, to name a few. Counterintuitive to what many may expect, the competition between surrounding restaurants could bring more opportunities for Ground Up. The competition will draw a larger crowd to the area for lunch and bring customers to the restaurant.

After 3pm the restaurant will begin dinner preparations. We suggest that, 2 days per week, in collaboration with Ground Up, the Innovation Center use the kitchen as a test kitchen for aspiring chefs. The events should not be held on Fridays or weekends because the restaurant sees the most customers during these days. The term 'chefs' will be used loosely to include and encourage participants like desert artists and bartenders. Essentially, a chef will be allowed to use the space to prepare and serve a meal to the customers of Ground Up. Initially, to get chefs to participate, one chef will host an event per night or two chefs per week.

The events should be brainstormed by the chefs; having chefs plan the different events allowing them to bring their specialty to the table directly. Events will be marketed by, both, Group Up and the Innovation Center. The Innovation Center should coordinate the events in a way that chefs are expected to staff the events and order the necessary foods to be prepared beforehand. FareStart, a company based in Seattle has been holding exemplary guest chef night since 1992. Much like FareStart, the events should be held from 5:30pm-8pm. People should be seated every 15 minutes so that people can be grouped. One of the most striking issues with this model is possible chef cancellation.

Promoting the ideas put forth by Develop Springfield, to develop an innovation center that fosters creativity in an all-inclusive space, it would only be fitting that a network of chefs collaborate both inside and outside of the center's walls.

Many fail to look at entrepreneurship as a team sport. "Continuous learning is the minimum requirement for success in any field" (*Waitley*). BostonChefs.com has provided a platform onto which Boston chefs can learn through a sense of community. The company describes themselves as "a digital marketing network that connects chefs, diners, and brands through a shared passion for food and drink." Here is how they do it:

They have built up a website that receives 50,000 views per month by implementing user experience techniques into their marketing strategy. With 70% of their viewers being consumers it is easy for them to attract both accomplished, and aspiring chefs.

Develop Springfield can use a similar model in building a network of entrepreneur chefs. One option would be to establish a membership program. Develop Springfield can display the membership program on the Innovation Center's physical walls and promote the program on the website as well. That platform, much like that of BostonChefs.com, would be the foundation on which the Innovation Center can bring in chefs. The page would outline the membership program, a program that could potentially be free, yet gain traction, through the implementation of a process where membership is contingent upon reasonable expectations.

To break it down, an aspiring chef would apply to join the Innovation Center's team. The Innovation Center could present some examples of previous events to chefs. The chef would then need to successfully plan an event to finalize his/her membership. In order to ensure relative success, the chef would be expected to reserve seating for a certain number of individuals—say 5. Successfully coordinating an event would solidify this chef in the group and allow the chef to continue hosting events at the Innovation Center.

Having a free membership option acts as a marketing tool to draw in and recruit chefs early on. In addition, if a chef cancels an event that has been marketed, other members can negate the potential risk by shifting the responsibility. This membership option allows the number of events to increase exponentially given that there would be no limit on the the amount of events a chef can hold. On the flip side, as more chefs join there will be less opportunities for the chefs to hold events because space will be limited.

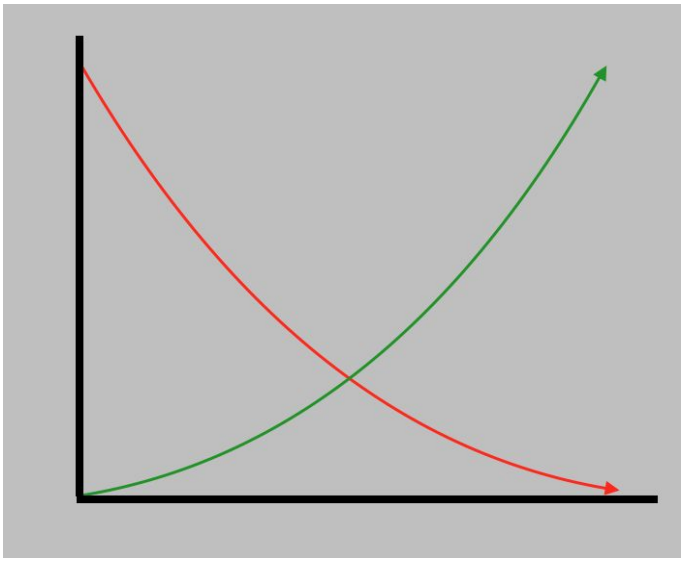

Figure 1.1. Illustrates the effect of more chefs on the Innovation Center. The green line represents the exponential growth in the number of chefs drawn to the Innovation Center. The red line represents the exponential decrease in the number of events guest chefs would be allowed to host.

Cost Analysis

We suggest that the Innovation Center charge $20/hour to use its kitchen for the purpose of preparing meals. This small charge would allow the center to invest in the equipment necessary to provide an environment in which most of the main food-prep materials are available. For example, in addition to providing a stove, dishwasher, and freezer, the center can provide prepkitchen users basic kitchen utensils like knives, spatulas, plastic wrap, essentially all of the generic kitchen materials aside from the actual food.

The Innovation Center and Ground Up should provide the necessary materials and give the chef a $500 stipend to be used (strictly) for the event. The events should be charged at a flat rate of $15. Event attendees will be charged a flat rate of 15$ per entry. 75% of the revenue should be given to the restaurant and 25% should belong to the Innovation Center.The cost of building the membership program would be minimal given the connection to the Innovation Center's main website.

Model 2: Workshop/Collaboration Focus

Model Analysis

Table 1.2. A time table for Model 2

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5am - 7am	Rental baker-prep	Rental baker-prep	Rental baker-prep	Rental baker-prep	Rental baker-prep	Rental baker-prep	Rental baker-prep
7am - 2pm	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation
2pm - 4pm	Prep-kitchen	Prep-kitchen	Guest chef	Prep-kitchen	Prep-kitchen	Guest chef	Cooking class (2pm - 5pm)
4pm - 10pm	-	-		-	-		

This model focuses on engaging chefs and locals in activities at the SIC by bringing exciting cooking classes to the Innovation Center. Overall, the schedule for this model includes having the cafe's kitchen space rented to bakers and food trucks daily from 5-7am and 2-4pm, respectively. Between 7am and 2pm daily, the kitchen space will be set aside so that the Ground Up cafe can serve its diners efficiently. On Wednesdays and Saturdays after 2pm, the kitchen will be rented out as a test kitchen for guest entrepreneur chefs prototyping their recipes and serving their fare to interested diners in the cafe. In addition to these activities, a cooking class will be held every Sunday afternoon. Drawing from four existing kitchen models (namely Tasting Table, Sur La Table, Boston Chefs and CommonWealth Kitchen), this model ultimately combines their key elements for success at the SIC.

One of the most efficient ways to find entrepreneur chefs is by putting a guest chef application form on our own website. Once the SIC receives the chefs' profiles, they can contact chefs directly and schedule them for events that reflect their talents.

Holding the test kitchen twice per week, with one event on Wednesday night, and the other on Saturday night, would be effective because the nights would have different amounts of diner traffic. Wednesday, being a weekday, would have lower restaurant traffic, allowing new chefs leeway in serving their customers quickly. By contrast, on Saturday the crowds at the cafe will be significantly larger (as more are available on weekend days), allowing more experienced chefs to command a greater culinary audience from the event. Additionally, on Saturday night this model suggests offering a fixed-price menu, such as $29 for a 3-course themed-dinner (authentic Mexican, vegetarian gourmet, ultra-healthy, ect.), to let people enjoy a fantastic Saturday night out. the price for Wednesday night events, however, should be a little lower to

attract more people. For example, a guest chef offering a two entree option without a theme should charge a $10 to $15 flat rate per entree.

Moreover, collaboration between chefs, restaurant staff, and the SIC is very important to this event's success. For example, for Saturday's 3-course dinner there may need to be two chefs collaborating together in order to serve 50-100 guests; as a sole entrepreneur chef, it may be difficult to prepare quality food for this many people in the given time frame. Moreover, since all the guest chefs are unfamiliar with the equipment in the kitchen, the restaurant staff should introduce them to the environment and show every new chef how to use the equipment at the beginning of the guest chef's shift. Also, before each event, staff and chefs should hold meetings to discuss how to serve customers and the special requirements from chefs. Last but not least, the collaboration between chefs and the SIC is important for the event's success. Guest chefs will be required to propose menus and budgets to the SIC at least 2 weeks before the event. They also have to buy ingredients by themselves and keep all the receipts. With this structure, the SIC and chefs can then decide a reasonable price together to break even for each event.

To market the events, several methods should be used. First, the full menu for Ground Up and a detailed profile of each guest chef, including their signature dishes, should be posted on the SIC's website before each event. This will allow prospective diners to check the Ground Up's menu and guest chef's meal for taste preferences and allergy information. One good website model to follow is that used by Tasting Table, a website and newsletter for culinary enthusiasts. On Tasting Table's website, numerous guest chefs event in different cities all over the US are simultaneously posted. Their website style has played a key role in generating interest and making people aware of culinary events. The SIC should adopt a similar website user experience when designing its website format.

Besides the collaboration with entrepreneur chefs for the test kitchen, the SIC could also provide hands-on cooking classes every Sunday afternoon for interested chefs and Springfield locals. The person who teaches the cooking class could be an entrepreneur chef, already familiar with the test kitchen, or other interested parties. Because it is likely that they would be eager to share their own unique recipe with their students, the SIC could have 4 teachers each teaching one class a month to keep the recipes varied.

To introduce this variety, the SIC should consider hosting Chinese, Japanese, and Thai food cooking classes. For example, Sur La Table, a national store that sells premium-quality goods for the kitchen, also hosts Thai food classes and Macaron workshops. Both these classes are very popular and are always booked months in advance. Moreover, Boston Chefs, a chef networking website, promotes a variety of interesting cooking classes across the city; the successful marketing of events through the website advertising has also led to numerous sold out classes. To

attract more customers to the cooking class, we should also post a detailed profile of each teacher and their own cooking stories on our website in advance (similar to guest chef profiles). Included in the profiles should be images of dishes from past classes to entice potential students to attend classes.

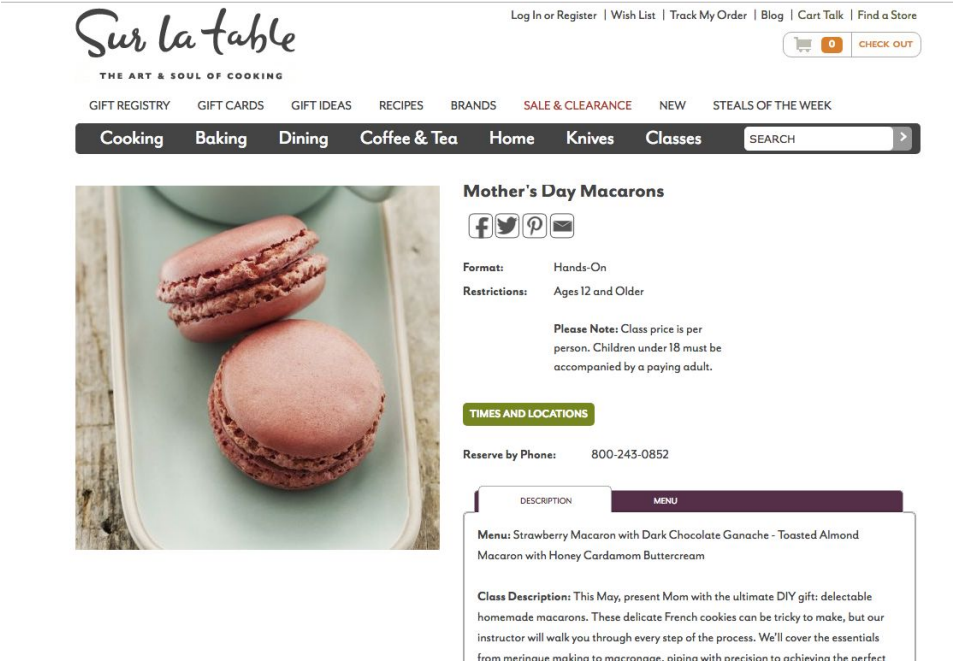

Figure 1.2. Macarons workshop. （Sur La Table）

Moreover, the style of the class should be hands-on, where students stand for the duration of the class cooking and working in the 900 SF kitchen during most of the class time so that they can participate in the demonstration themselves and get the most out of each experience. To prepare for each class, the teacher should prepare handouts that include recipe information and reminders of important concepts. The class size should be capped around 12 students with each person working in a group of four students rotating into the kitchen to best make use of the limited amount of space and equipment in kitchen.

Figure 1.3. Cooking class. （Dabble）

Furthermore, the SIC could also serve as a commissary kitchen, renting out the kitchen space to bakeries and food trucks in the early mornings and afternoons. This would allow the small businesses to prepare their food in the SIC's commercially licensed kitchen, then transfer their foods to their store fronts. Currently, there are numerous food trucks in Boston, which provide thousands of mid-day meals and snacks to workers on their lunch breaks. Similarly, in Springfield food trucks could provide meals to workers on their lunch breaks.

Moreover, the rental fee charged for the SIC's prep kitchen space is a good source of revenue for the Innovation Center; it allow the center to achieve sustainable development to eventually provide other services, such as food packaging, financial analysis and additional private kitchen space for tenants who wants to start their own food businesses. One example kitchen where this is in place is the CommonWealth Kitchen, which is a commercial shared prep kitchen space with locations in Boston. Many people choose CommonWealth Kitchen not only because it provides space, but also because of its other valuable services; renters also receive business assistance to help aspiring chef entrepreneurs build great food companies, networking and collaboration opportunities with other chefs working at the kitchen, and have options for storage of their ingredients and products on site. Overall, the services that CommonWealth Kitchen provide serve to create jobs for entrepreneurial chefs, improve healthy food access to local consumers, and strengthen Boston's food economy.

To support commissary activities, the SIC would benefit greatly from purchasing more general equipment, such as an industrial blender and mixer. In addition to this, not many prep kitchens provide baking utensils. These kinds of equipment are inexpensive compared to dishwashers and fridges, but they may be a great addition that would allow the SIC to market their commissary space directly to bakers. A membership plan can also encourage tenants to rent over a longer

time period. For example, we could use the same type of membership plan as the Wealth Kitchen, which has a $75 application fee at first and tenants pay $20 per hour renting fee.

The bakers could also collaborate with the cafe to sell their products through the restaurant. This store front access for bakers could be a great marketing tool for the SIC to attract start-up business partners. Moreover, if their products are really good, more local people will come to restaurant for food, increasing the Ground Up's total revenue.

Overall, there are many pros to this model. First, the cooking class can attract more people and increase foot traffic. Second, cooking classes provide a bridge between chefs and customers to talk with each other directly, helping chefs get some feedback on their recipes and students get tutored first-hand experience. For the test kitchen, letting two chefs collaborate together can provide higher quality dishes and faster service for the event while also providing a bridge for chefs to talk with each other, share new recipes or plan future collaborations. Last but not least, having the SIC rent kitchen commissary and storage space to food entrepreneurs provides a financial supplement that ensures that the SIC's kitchen and cafe operations break even or generate revenue to grow the center.

Disadvantages of this model include costly initial capital investment, guest chef unfamiliarity with the kitchen, and the possibility of hosting bad chefs. If there are too many shifts in a day, how can the SIC make sure everyone leaves on time and cleans the kitchen after their shifts? If the SIC chooses to provide other prep-kitchen services, such as storage freezers and food packaging machines, the initial capital investment requires additional analysis. In addition, if we change guest chefs frequently, chefs may not be familiar with kitchen equipment. Moreover, if one guest chef's food is not good, the customers may be disappointed with restaurant rather than the chef, and may refuse to return. The recommendations to solve these drawbacks are at the end of kitchen section.

Cost Analysis

For the $29 3-course dinner on Saturday night, after ingredients and staff salaries, we would suggest that SIC and Ground Up both earn $5/person, and Guest chefs earn $3/person. For Wednesday's low price menu, we would suggest that SIC and Ground Up both earn $2/person, and Guest chefs earn $1.5/person. Therefore, if there are 100 guests come for dinner both on Wednesday and Saturday night, then the SIC and Ground Up both can earn 5*100+2*100= $700 per week and $36,400 per year.

For prep-kitchen, we suggest that the Innovation Center charges $20/hour along with a $75 membership fee per year to use its kitchen for the purpose of preparing meals. If we have two

tenants, then the SIC could earn $75 membership fee plus $20 renting fee per hour. Therefore, the annual renting fee from prep-kitchen could be (75+365*40)*2= $29,350.

For the cooking class, we suggest each student pays $60 for 3 hours. After eliminating the money for chefs, ingredients and other costs, the SIC, Ground Up and teachers can earn 15 dollars per person.

Model 3: Networking Events Focus

Model Analysis

Table 1.3. A time table for Model 3

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5am - 7 am	Prep	Prep	Prep	Prep	Prep	Prep	Prep
7am - 7pm	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation	Restaurant operation
7pm - 10pm	-	-	-	-	Guest chef(s) + networking event	Guest chef(s) + networking event	-

The focus of this model was to create a relaxed atmosphere in the Ground Up cafe where entrepreneurs can both work and network with each other, promoting their ideas and products while also reaching out to professionals in their field. To accomplish this task of "building a community of businesses that are growing", emphasis has been placed on promoting the concept of hosting guest chef dinner nights and networking events at Ground Up. (*J. K.*) This model also includes opportunities for start-ups to use the cafe's kitchen space to prepare food for their business, furthering the center's entrepreneurial cause.

The inspiration for this model was Venture Cafe, a non-profit entrepreneurial organization based in Cambridge which serves start-ups, investors, and enterprise innovators. One of the numerous activities of this organization is its weekly meetings for entrepreneurs to discuss their ideas and share their innovations with others. Since its inception, it has grown from a relatively small gathering to the point where roughly 500 people attend their weekly cafe night meetings. These events typically include 2 office hours for startups to receive advice from professional entrepreneurs, information booths, clinics, and seminars. In addition to the weekly meetings, Venture Cafe also hosts larger monthly and quarterly meetings. Though their locations tend to be much larger in area compared to the restaurant/dining space of the SIC and their events are not paired with food entrepreneurship, Venture Cafe's ideals and programs serve as a fantastic model for future networking events at the SIC. (*Venture Cafe*)

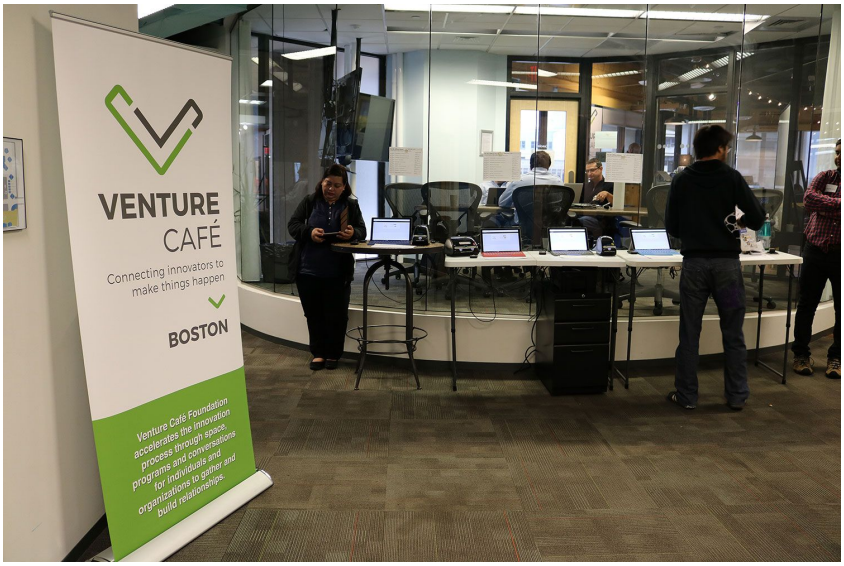

Figure 1.4. A registration area for events held at Venture Cafe. Courtesy of: (*Venture Café*)

The schedule for this model consists of three major elements: prep, operation of the Ground Up restaurant, and guest chef/networking events. The plan is to have entrepreneurial chefs rent the Ground Up Kitchen facility from 5am to 7am (while the cafe is closed) to prepare food that they will sell independently. As it is difficult for chefs to have access to a certified commercial kitchen stocked with equipment when they are starting out, this rental prep period would give them the opportunity to easily prepare commercial products in a licensed environment.

From 7am to 7pm, the restaurant is open; neither the front of the cafe nor the kitchen can be used for any other activities during this time period to allow for dedicated restaurant use. During these hours, the restaurant will serve primarily light fare for breakfast and lunch, but will also offer dinner for those getting out of work and wanting to enjoy a sit-down meal. (*J. K.*) From 7pm to 10pm on Friday and Saturday nights, there will be a networking and guest chef event. During this time, guest or celebrity chefs are invited to cook and serve meals for attendees of the networking events. They are encouraged to test out recipes so they can receive direct feedback through a survey or rating system distributed to diners.

As for the networking side of these events, anyone is welcome to attend, but there will be a focus on entrepreneurs and innovation. One possibility for increasing professional entrepreneur attendance is to reach out to professionals and allow them to give lectures to those starting out about how they started and rose to success. Having a variety of events and themes will encourage a wide array of people to attend while also ensuring that the events are enticing over an extended period of time. Starting out, it will be necessary to reach out to people to attract them to these

events, but the goal is that eventually the word will spread and more people will attend without the need for extra advertisement.

In order to support this SIC entrepreneurial kitchen model, this space (including the Ground Up cafe) must financially break even. To make this possible, is necessary to implement fees for renting the prep kitchen to guest chef(s) and networking events. For the prep period, any chef, baker, or other food-related small business is welcome to use the commercial kitchen of the SIC to prepare food to sell. According to Devra Gartenstein's article "The Estimated Cost for a Commercial Kitchen in a Small Business", the cost of renting a commercial kitchen varies from $10 to $25 per hour as of 2013. The article also states "Renting a commercial kitchen allows you to avoid the large capital outlay of outfitting your own space." Taking this into account, the two hour prep period should go for a flat rate of $50. This amount is reasonable for someone starting out and will afford them access to equipment that they wouldn't necessarily be able to purchase on their own. It is expected that anyone using this prep period will bring their own food supplies to make their food products. Since it is only a two hour period, it is expected that the chefs recognize this so the Ground Up restaurant can begin its operations promptly at 7 am. (*Gartenstein*)

For the guest chef/networking events that run on Friday and Saturday nights, there must also be some money generated. Guest chefs will bring their own ingredients to prepare meals, but they should also pay $100 to use the kitchen and promote their recipe(s). Networking event attendees will pay $10 to attend the event and sample any food served by the guest chef. It would make sense for alcohol to be served at these events, but it would be easier if it was not served as this would create a problem in terms of where money comes from and goes. Guest chefs could not just use the bar in the space as this alcohol belongs to the Ground Up restaurant, but perhaps they could bring their own alcohol to serve. A recent law passed in Massachusetts allows for people to bring their own alcohol to restaurants, but it varies from town to town whether this is allowed or not. If Springfield is one of these towns that does allow people to bring their own alcohol to restaurants, this would be a great option. However, alcohol is usually a great source of income for restaurants since it is often the main reason people go out, especially on weekends. (*"THE STATUS OF "BYOB" IN MASSACHUSETTS."*)

Overall, this model for the restaurant space is centered around networking and collaborating with entrepreneurs. The space will serve as a hub for ideas and innovation and there are some positive elements of this focus. The first of these elements is that attracting entrepreneurs will help achieve the goal of a startup/ entrepreneurial/ innovation environment and follow the theme of the Innovation Center. Valley Venture Mentors (VVM) is the main tenant of the SIC and their mission is "building, supporting, and maintaining a community to launch an entrepreneurial renaissance." With this mission in mind, members of VVM could take part in the networking

events which would help create a tightly-knit community both inside and outside the SIC. Another benefit of this model is the networking events, which would allow people to spread ideas and perhaps collaborate on those ideas. This collaboration and sharing ideas may even lead some people to start a business, potentially with others at these events. At these networking events, guest chefs may promote their recipes and determine their success via feedback from those at the events. This feedback system will ensure that chefs can improve or at least know they are on the right track with what they are doing. (*Valley Venture Mentors*)

Another option for the guest chef/networking events portion of the schedule is to create a membership plan. Members will pay a monthly fee of $25 and be invited to any networking event throughout the month to enjoy food prepared by guest chefs and also connect with entrepreneurs and innovators. This membership plan could later be merged with another membership plan for the makerspace, but will be a standalone plan for the time being.

These prices are all subject to change, but this is a rough plan of action with associated costs to hold events in this space. As for percentages, for now it is easiest to assume that all proceeds will go back into the SIC, but it is hard to tell whether or not guest chefs expect to make money at these events or just promote themselves and their food. Percentages can be easily changed later on, but this model assumes 100% of the revenue generated by these events will be put back into the SIC to expand and improve their programs.

As great as this model may seem, there are always some pitfalls that need to be addressed. One of these is that the events would be focused on entrepreneurs, so the events would be rather exclusive in terms of the crowd they would attract. This limitation could restrict the potential of the space, but based on the success of this model it could be overlooked. Another drawback of the model is that confusion may arise regarding the focus or theme of the event since there would be both a food aspect and an entrepreneurial aspect to the events. However, this issue can be alleviated through proper advertisement for the events. The only other substantial problem with this model, and any other model, is the possibility of chef cancellations before events occur. To remedy this worry, there are a couple of solutions: 1) have a backup chef for each event, or 2) allow two or more chefs to come in and prepare food for each event and work collaboratively. This way, if one cancels, there will still be someone there to prepare and serve food at the events rather than having no one present to serve food.

Cost Analysis

For the guest chef/networking events that run on Friday and Saturday nights, there must also be some money generated. Guest chefs will bring their own ingredients to prepare meals, but they should also pay $100 to use the kitchen and promote their recipe(s). Networking event attendees will pay $10 to attend the event and sample any food served by the guest chef. It would make

sense for alcohol to be served at these events, but it would be easier if it was not served as this would create a problem in terms of where money comes from and goes. Guest chefs could not just use the bar in the space as this alcohol belongs to the Ground Up restaurant, but perhaps they could bring their own alcohol to serve. A recent law passed in Massachusetts allows for people to bring their own alcohol to restaurants, but it varies from town to town whether this is allowed or not. If Springfield is one of these towns that does allow people to bring their own alcohol to restaurants, this would be a great option. However, alcohol is usually a great source of income for restaurants since it is often the main reason people go out, especially on weekends.

Model 4: Food Prep Focus

Model Analysis

Table 1.4. A time table for Model 4

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5am - 10am	Prep 1	Prep 1	Prep 1	Prep 1	Prep 1	Prep 1	Prep 1
7am	Cafe Opens	Cafe Opens	Cafe Opens	Cafe Opens	Cafe Opens	Cafe Opens	Cafe Opens
10am - 2pm	Restaurant Use; Lunch	Restaurant Use; Lunch	Restaurant Use; Lunch	Restaurant Use; Lunch	Restaurant Use; Lunch	Restaurant Use; Lunch	Restaurant Use; Lunch
2pm - 4pm	Prep 3	Prep 3	Prep 2	Prep 3	Prep 2	Prep 2	Prep 3
4pm - 7pm	*Event Hosting		*Event		Guest Chef 1	Guest Chef 2	
7pm	Cafe Closes	Cafe Closes	Cafe Closes	Cafe Closes	Cafe Closes	Cafe Closes	Cafe Closes
7pm- 11pm			*Event		Guest Chef 1	Guest Chef 2	

This model focuses on attracting and retaining food business entrepreneurs through rental of the center's prep kitchen. Along with the Ground Up cafe's usual light fare service, the occasional hosting of entrepreneurial networking events in the restaurant, and facilitation of guest chef nights, this plan also explores renting out the kitchen for food prep during light restaurant hours to food product entrepreneurs and food trucks staff.

Figure 1.5. Food entrepreneur at work (*E. Peterson*)

According to our sponsor (*J.K.*), the SIC's permanent restaurant, Ground Up, is set to have operating hours between 7am and 7pm. This would allow for two 6-hour shift positions available for the regular Ground Up staff.This schedule, however, is restrictive for the guest chef and hosted event nights at the SIC and limits the prep kitchen rental opportunities, all of which would benefit from extended operation hours in the restaurant space.

To compensate, the center should consider hiring bar staff to maintain the restaurant after the normal scheduled closing time (7pm) for networking events, and extending food prep hours to include 5-7 am. These changes would keep the restaurant space open longer for events and guest chefs, and allow for longer morning kitchen prep time slots with few to no restaurant customers present.

Because the restaurant intends to serve light fare (baked goods, coffee, wraps, etc.), most of which is to be made at another location and delivered fresh to Ground Up daily, this frees up the restaurant's kitchen space for prep kitchen rental. Renting opportunities have been partitioned into three time blocks based on movement restrictions through the restaurant and kitchen space availability.

To maximize kitchen usage, ideally different types of food entrepreneurs should be scheduled in the different rental time slots. For the morning availability, Prep 1, there is a 5 hour window (5am through 10am). During this time, the kitchen would be best suited for use by either food truck staff for prep work, or for large food product manufacturing jobs by entrepreneurs. This is ideal because during the morning, the restaurant is likely to have a low volume of customers, with no customers present between 5am and 7am. Because the kitchen exit and storage basement are accessible the restaurant, this timeframe is ideal for moving crates of food and other supplies necessary for large scale food prep operations.

After the restaurant transitions through the lunch period (which is when the restaurant occupies the kitchen), there is a renting window of opportunity (Prep 2) between 2pm and 4pm during days when Ground Up hosts guest chefs and the SIC hosts evening events. Because this is a smaller amount of time and during restaurant operating hours, smaller scale entrepreneurs such as bakers, caterers, and small scale food-processors would optimally fit during this time period.

During days when no special events are planned, Prep 2 may be extended from 2 to 5 hours (2pm-7pm), becoming Prep 3 in the schedule. This period gives a similar timeframe to that of Prep 1, while being potentially more restrictive on access to the parking lot and to the basement storage room due to a predicted higher restaurant traffic volume. Accordingly, this renting time slot could potentially accommodate mid to large scale operations.

Figures 1.6 & 1.7. SIC's Current Restaurant/Kitchen Space (left), Example of a Completed Kitchen Space (right) (*"Home Decorating"*)

The addition of food entrepreneurs working in the SIC kitchen space is a crucial element in both creating an entrepreneurial environment and fostering the start-up culture at the center. Specifically, bringing food trucks and food product businesses into the SIC's incubation kitchen would directly develop the local community as the enterprises expanded to occupy either the currently under-visited park adjacent to the SIC, or their own kitchens in the unoccupied buildings surrounding the SIC. Drawing in these types of entrepreneurs would require renting out the kitchen as a commissary, or commercially licensed food preparation space, that provides them both spaces certified for commercial food preparation and storage space for their equipment and products.

An example of this type of setup, where a commissary kitchen creates business opportunities for their renters, can be seen in the Wellfleet Commissary Kitchen (*Felix, C.*). The Wellfleet

Commissary is a commercial kitchen renting food preparation and storage space to food trucks and food product entrepreneurs in Wellfleet, Cape Cod. In an interview, the owner and operator, Curt Felix, stated that his kitchen facility rented space to 5 food trucks and numerous food product start-ups during last year's summer season. Using a 225 SF kitchen equipped with standard amenities (stove, grill, oven, etc.) he was able to support an outdoor food truck "village" on his commercial property. When asked what his facility provided to make his clients' businesses more successful, he answered, "working on an individual level to tend to each business's needs" (*Felix, C.*). These needs for the Wellfleet Commissary Kitchen came in the form of amenities for each tenant business, including free parking, and a large storage space (400 SF) featuring free storage locks and individual freezer units in each client's partition.

Taking from Mr. Felix's example, the suggested practices above were adapted to fit the prep kitchen's model for the SIC. Changes include adding individual storage spaces in the SIC's unoccupied sections of the basement, each equipped with a freezing unit, and electricity hookups for placing individual businesses' specialized equipment in the kitchen.

Figures 1.8 & 1.9. Dry storage (left), Freezer storage (right) (*"Closest...Downtown"*)

Cost Analysis

An important factor of evaluating this model, adapted for use at the SIC, is determining its operational costs. This model's capital cost analysis includes determining the flow of money from the general restaurant operations, the guest chef and SIC hosted events, and rental of prep kitchen and storage space.

The general restaurant is to have 2 working shifts from 7am-7pm (6 hours each), with 2 employees each shift (bar/barista and wait staff). Given Massachusetts minimum wage is $11.00/hr (*"Mass Minimum Wage"*), the baseline employee cost is about $264/day or $1,848/week. If a bar employee is added between 4pm and 12pm (8hr shifts) for planned event/guest chef days, an additional $88/day ($264/3-event week) is added into operational costs.

On top of this, renting the prep kitchen space and basement storage space to clients will generate revenue for the center. Based on rates posted for a commercial commissary kitchen, The Hood Commissary, rental rates in Orange county, CA are $30/hr for kitchen space, $16/hr for prep space, and $10/cubic ft./month for dry or freezer storage space (*"Rental Rates"*). Equipment storage on site will be charged similarly to that of dry storage, at $10/cubic ft., but will be capped at $30/month/piece of equipment. Freezer units may be purchased from webrestaurantstore.com at $200/5.3 cubic ft., making the rate about $53/month for a locked individual storage freezer ("*Avantco...Freezer"*). Because the SIC's kitchen is both kitchen and prep space, the cost for the kitchen should be an average of the corresponding prices listed above. Additionally, property rates are lower in Springfield than in Orange County (23% less according to Payscale.com), making the actual, adjusted average rent about $18/hr for kitchen prep space in the SIC (*"Payscale"*).

Moreover, chef hosting nights offer chefs the opportunity to network with the SIC's entrepreneurs and promote their food. As such, a base networking facilities fee of $50 will be charged to the chef-entrepreneurs for each event. On top of this will be a flat fee for use of the kitchen; this fee is reduced to help promote entrepreneurial activities at the Innovation Center. Each guest chef time block will be 6 hours long (4pm-10pm), costing chefs a reduced bulk rate of $100 for kitchen use for the night. A flat fee of $12/vegetarian and $15/meat entree will be set for patrons dining on the chef-hosted entree. Chefs will receive half the revenue generated from selling their entrees. Alcoholic beverages, taxes, and tips will be added to this base price. Alcoholic beverage revenue will be collected solely by the host restaurant, Ground Up. Furthermore, if chefs desire to continually host events and extend their networks to include fellow entrepreneurs, they may opt to purchase a SIC entrepreneurs membership at $100/month. This would negate the $50 networking fee for each hosted event, entitle them to one free coffee every week at Ground Up, and allow the chefs to attend all other entrepreneur and networking events at the SIC for free, including other chefs' hosting nights.

Similarly, a SIC membership will be available to the general public for $50/month. As part of this plan, members are entitled to one guest-chef hosted meal every month, one free coffee each week, and may attend all networking events at the SIC.

Based on the proposed model, with 3 events/week (2 guest chefs and 1 networking), and renting 50% of all the available kitchen prep time slots and 4 storage units (1 freezer, 4 cubic ft. dry storage each, 2 equipment pieces at $30/each), the basic net cost to the restaurant facility is approximately $2112/week (employees). The net revenue generated from this plan is $2472/week (without considering revenue generated from alcohol sales or net revenues from serving standard Ground Up fare), leaving a comfortable baseline income of about $360/week. For the guest chefs, considering the kitchen use fee and about $500 for ingredients, would bring

in about $820/night from serving about 100 diners in 2 shifts (there are 50 seats in the restaurant).

Overall, the merits of this plan include both the small amount of revenue, which will be used to improve the facilities (purchase additional freezer/storage units, etc.), and the opportunity granted to food entrepreneurs (potential for guest chefs to make $800/night without needing to worry about managing the restaurant supports the eventual growth of chefs' own restaurants). Additionally, the plan fosters the growth of food product businesses and potentially food trucks by giving them a slightly lower than average market rate rent for kitchen and storage space, and positions them in an entrepreneurial environment, so that they can network and gain business skills to also form their own enterprises.

Potential drawbacks of this plan include the need to initially invest in equipment (individual freezers, locks, dry storage containers), trouble finding kitchen renters/ guest chefs, and trouble establishing food trucks (there is an unfriendly environment currently inside of Springfield; the kitchen would serve only as a registered prep site for food trucks; it cannot currently provide parking for the trucks during event) (*Kinney, J*).

Cost Analysis Comparison and Equipment Suggestions

Table 1.5. Cost analysis highlights of each model

	Cost Analysis Main Points	Additional Considerations
Model 1	● $20/hour to use kitchen for prep ● $15 fee to attend event ● $75 membership fee per year.	● 75% revenue to Ground Up, 25% to Innovation Center ● Give chef a $500 stipend to use for events
Model 2	● $29 for 3-course dinner on Saturday night and $10-15 for flat rate per entree on Wednesday night. ● $20/hour to use kitchen for prep. ● $75 membership fee per year. ● $60 for 3-hour cooking class	● SIC and Ground Up both earn $5/person for 3-course menu and $2/person for low price menu ● Guest chefs earn $3/person for 3-course menu and $1.5/person for low price menu ● For cooking class, after eliminating the money for chefs, ingredients and other cost, SIC, Ground Up and teachers all can earn 15 dollars per person.
Model 3	● $100 to use kitchen for 2 hours of prep ● $10 fee to attend events ● $25/month membership fee to attend any event held at the SIC ○ Can later be merged with another membership plan (makerspace) if necessary/feasible	● 100% revenue to the SIC (can be adjusted if needed)
Model 4	● $18/hour to use kitchen for prep ● Networking facilities fee of $50 charged to chef-entrepreneurs ● $12/vegetarian dish, $15/meat dish ● $100/month membership plan for chefs allowing them to attend all events and to receive one free coffee per week ● $50/month membership plan for the public in which members can receive one guest-chef meal every month, one free coffee per week, and can attend all the SIC events	● $100 for kitchen use for 4pm-10pm block ● Chefs receive half the revenue ● Alcohol revenue will be collected by the Ground Up cafe and the SIC at events

Besides costs of general operations associated with the kitchen, the costs of equipment to utilize these ideas must be considered. In particular, kitchen storage, whether it is shelves, freezers, or refrigerators, are essential to making use of a kitchen space. The basement of the Innovation Center would serve as an ideal location for food storage as it is not currently owned by a tenant. As the kitchen is relatively small, having a dedicated storage space would ensure there is no interference with kitchen operations. Any storage within the kitchen itself should be for immediate use by any guest or prep chefs that need storage while paying to use the kitchen

space. The basement storage would be for outside chefs looking for commercial kitchen storage space.

In terms of storage equipment costs, it varies significantly based on type. Two-door refrigerators tend to be anywhere from $2,000 to over $16,000 depending on the size. They all have around 40-50 cubic feet of storage space. Another refrigeration option is a portable refrigerated holding cabinet. These are on wheels and have shelves to store food items on. They are rather expensive, ranging from $6,000 to $12,000 and offering a great option for the light fare that Ground Up plans to serve for breakfast and lunch. Things like yogurt, fruit, milk and sandwiches can be conveniently stored on shelves within these units.

Figure 1.10. A portable refrigerated cabinet.
(*Central Restaurant*)

Similarly, a warming cabinet, which goes for $1,500 to $13,000, would be useful for any sandwiches that require being kept warm. This cabinet could also be used if soup is served at lunch. Another essential piece of equipment is a freezer or freezers. These run anywhere from $2,000 all the way up to $18,000. It would be best to have multiple smaller freezers so that more than one chef can rent storage space and have their own designated place to store food products.

There are a few other pieces of equipment that might be useful for both Ground Up's operations and the operations of guest/prep chefs. One of these is beer dispensers. This dispenser would

mainly be used by Ground Up and will be necessary as they plan to have a liquor license and serve alcohol. They range from a few hundred dollars for a countertop dispenser to as much as $5,000 for a refrigerated dispensing unit. Another piece of equipment that should be considered is a cooler or coolers for bottles and cans of alcohol. These are anywhere from $1,000 to over $4,000. A food-related piece of equipment that may be useful is a prep table for either sandwiches or pizza. Depending how much prep space is needed, these can run from a few hundred dollars to over $12,000. Finally, a commercial mixer would be very good to have if any bakers are using the kitchen for prep cooking. Mixers can cost anywhere between $450 and $25,000 depending on the size (quarts) needed. It is likely not feasible or necessary for the SIC to obtain all these pieces of equipment, but some will be necessary to attract more chefs to rent the space (*Central Restaurant*).

Comparison of four models

Table 1.6. Pros and cons of each kitchen model

	Pros	Cons
Model 1	● Including all SIC interests: test kitchen, prep kitchen, network of chefs. ● Little interference with Ground Up operations. ● The guest chefs nights are not at weekends in order to avoid hindering the performance of Ground Up.	● Less opportunities for chefs to host events as more chefs join. ● Challenge of building an engaging network. ● Hosting event at weekdays may not have enough customers.
Model 2	● Collaboration amongst chefs. ● Cooking classes can increase foot traffic and also provide a bridge between chefs and customers to talk with each other directly. ● Providing other service such as packaging and counseling can ensure that SIC breaks even.	● If one guest chef's food is not good, the customers may be disappointed with restaurant rather than the chef. ● There are too many shifts in a day. How can we make sure each group only uses the kitchen within their time and shift efficiently.
Model 3	● Attracting entrepreneurs would achieve the goal of a startup/innovation environment and follow the Innovation Center's theme. ● Networking events would allow people to collaborate and spread ideas. ● Guest chefs will have the opportunity to promote their recipes through feedback at the events on Fridays and Saturdays.	● Because the events are focused on entrepreneurs, the crowd attracted would limit the potential of the space. ● There could be confusion as to what the focus of the event is; there will be a guest chef and networking event going on simultaneously, so some sort of theme would have to be decided.
Model 4	● Making use of the kitchen almost all day ● Multiple prep periods allows more than just one chef to come in and use the space. ● Having a large individual storage space in basement	● Schedule is almost too detailed; will be difficult to incorporate into final model. ● The restaurant has very limited access to the kitchen.

Main problems in these four models

Although each of these models has advantages, there are always some pitfalls that need to be addressed. First three main drawbacks for the guest chefs events are: 1) If one guest chef's food is not good, the customers may be disappointed with restaurant rather than the chef. 2) Less opportunities for chefs to host events as more chefs join the group. 3) The possibility of chef cancellations before events occur. To remedy these worries, one solution is allowing two or more chefs to come in and prepare food for each event and work collaboratively. For example, we can let one old guest chef collaborate with one new joined guest chef to host an event so that the quality of the event can be guaranteed. In addition, if one chef gets sick or wants to cancel the

event, a backup chef will still be available. Moreover, if the guest chefs event becomes successful in the future, we could potentially have a large and outstanding chefs team with more than 20 team members. A “1+1” model, which involves having an old chef present with a new chef at the same time, could create more job opportunities for new members as well as old members so that every member can have a chance to try their new recipes and get feedback. Besides this, another solution to ensure event quality is to have guest chefs cook the food that will be served in the event at least one week before, and let SIC try the food in advance. The menu won’t be approved until the SIC tries it and agrees to it. Last but not least, introducing a ranking of chefs based on customer surveys would also be a helpful way to ensure relative success. A survey after each event not only provides feedback for chefs, but also a feedback for SIC. After seeing the survey results, SIC can decide whether or not to collaborate with some of the chefs that customers are not satisfied with. This ranking system will also bring competition among the chefs, which would further motivate them to create the best recipes.

The second problem is that some of our models need to use both the kitchen and the dining space during the restaurant's normal operation hours. For example, model 3 suggests a bar operation hours in the afternoon, and model 2 suggests to host guest chefs event starting from 6pm instead of 7pm, which is a more suitable time for people to have dinners. However, since 7am to 7pm is the hours of operation for restaurant, the front of the cafe can not be used for any other activities during this time period to allow for dedicated restaurant use.Therefore, the collaboration with Ground Up to host events together would be an essential aspect to be considered. After doing some research on the busy hours for similar restaurants such as subway and Bean Counter Bakery in Worcester, we find most people would not choose a sandwich or wrap for their dinner, especially a dinner on Saturday night. Instead, most people want a delicious plentiful dinner to celebrate their weekends. Therefore, SIC can definitely discuss the use of Ground Up and also provide some revenue from guest chefs night to Ground Up for compensation.

Another foreseeable difficulty will be renting the kitchen space for food truck meal preparation. Nowadays, many people love the creative, diversified, innovative, affordable food that is coming out of these trucks quickly. Looking at Figure 1.11, more developed tourism cities tend to have a large food truck population. Thus, implementing food trucks in springfield may enhance the food orientation of the community, helping local restaurants by increasing culinary interest in the innovation district.

TOP 15 CITIES WITH MOST FOOD TRUCKS BY POPULATION

	# OF FOOD TRUCKS	POPULATION	FOOD TRUCKS PER 100,00 PPL.
Orlando, FL	94	249,562	37.67
Miami, FL	140	413,892	33.83
Washington, DC	172	646,449	26.61
Minneapolis, MN	87	392,880	22.14
Austin, TX	156	842,592	18.51
Denver, CO	113	634,265	17.82
Atlanta, GA	78	443,775	17.58
San Francisco, CA	127	837,442	15.17
Tampa, FL	51	347,645	14.67
Honolulu, HI	44	374,658	11.74
Seattle, WA	71	634,535	11.19
Nashville, TN	66	624,496	10.57
Cleveland, OH	39	390,928	9.98
Boston, MA	59	636,479	9.27
Las Vegas, NV	52	596,424	8.72

Figure 1.11. Top 15 cities in US with most food trucks by population. Courtesy of http://3rxg9qea18zhtl6s2u8jammft-wpengine.netdna-ssl.com/wp-content/uploads/2015/03/Screen-Shot-2015-03-15-at-5.17.02-PM.png

Figure 1.12. An example of a food truck. Courtesy of http://prestigefoodtrucks.com/

The last main problem that these kitchen models may face is the challenge of building an engaging network for chefs. Building a network for chefs could become an essential platform for entrepreneurs to discuss their ideas and share their innovations with others. In order to build such a great network, the initial promotion for chefs cannot be ignored. For example, we can have a free membership option that acts as a marketing tool to draw in and recruit chefs early on. Additionally, with the growing available resources through apps, creating a Facebook or What's App group for chefs is also necessary for chefs to discuss about event plan or share new recipes online.

Conclusion

In summary, after thorough research on other successful models for both test and prep kitchens across the country and conducting a number of interviews with people who have been tasked with operationalizing test/prep kitchens, we suggest four kitchen models that have different focuses for the SIC. However, each of these four models still have both pros and cons, so they should be treated as pieces that can be pulled together to create a unique model. In addition, we also discuss management, cost analysis and health and safety since they are three main problems that need to be focused on.

II. Makerspace Implementation

Key Findings

We found that the soon-to-be unoccupied Bridge Street building is of proper size and location for a makerspace. By examining other spaces, including TechShops, Fab Labs, Artisan's Asylum, Technocopia, Makerworks, and Industry Labs, we assembled a set of recommendations for growing a makerspace. These recommendations include information about:

- Equipment listing and pricing
- Staffing and management plans
- Valuable services such as classes, prototyping services, memberships, and rentals
- Annual expenses and income
- Insurance and safety considerations
- Building layout

After observing the layout of other spaces, we constructed a design that could work for the Springfield makerspace. Lastly, we built a 3D representation including furniture and equipment in Google Sketchup.

Introduction

A makerspace is a place where individuals and groups can come together to share knowledge and invent in the digital or physical realm. Since 2007, when the term makerspace was coined in Make magazine, makerspaces and hackerspaces have sprung up all around the country. Many libraries and universities have begun adding makerspaces to attract local creatives. There are also privately owned makerspaces all over the country (*Educause*). Specific examples of makerspaces used as a model and information collected from them for use in the project are found in the research section.

While each individual makerspace offers a unique set of tools to its members, the general work done in within them can be broken down by function. Makerspaces generally contain an assortment of four functions; fabrication and prototyping, metalwork, woodwork, and electronics (*Kroski*). While other functions are included these four are nearly universal in successful makerspace.

Management Structure

There are no real rules for choosing an administrative model for your makerspace. The manner in which decisions and policies are made should align with the goal of your makerspace. Some makerspaces put more trust and responsibilities in its members while others have more hands-on administrative models. Commercial spaces usually take on the later model because management is held accountable by founders and investors to show a return on investment. MakeIt Labs and TechShops demonstrate these sorts of structures.

MakeIt Labs

MakeIt Labs used to be owned and operated mostly by a single person. Joseph Schlesinger has a background in business management and information technology. He has a degree in electrical and computer engineering (*Barr*).

The pros of a single decision maker are:

- Clear strategy
- No debate
- Faster decisions

The cons are:

- Less availability for owner
- Less variation in views and experience
- Owner may be overwhelmed trying to manage day to day operations and business strategy

TechShops

TechShops' corporate structure is different. Each location is locally owned. There is a CEO, COO, and president of TechShop, but individual locations are run internally. Each location has a general manager to oversee all necessary staff, supplies, and hiring (*"TechShop Executive Management Team"*).

The pros of this model are:

- Decisions can be made purely based on corporate goals

- Individual locations are held accountable by investors and the corporate office
- Able to attract larger investors because of more broad outreach

The cons are:

- Salaries are usually higher
- Corporate goals may triumph over collaborative ideals
- Feels more commercial than creative

Technocopia/Flat Structure

Another structure usually reserved for non-profits with 2-4 founding members is a flat structure. In this case, daily tasks (such as equipment purchasing/maintenance, accounting, education of members, and marketing) are split evenly between each of the members according to individual backgrounds and strengths. This model works for new makerspaces with a few founding members. This is similar to the structure of Technocopia in Worcester, MA. It seems that each residing member of the organization is responsible for management and new member education (*Barr*).

The pros of this model are:

- More varied views on business strategy
- Can split up duties according to expertise
- Always more than one person available for meetings/situations

The cons are:

- Different views may lead to delayed decision making
- Members may be confused on who to ask for specific requests
- Less revenue

Staffing depends on the administration type and size of a makerspace. Generally, the larger the space, the more staff will be required. Bolt in Boston is a 10,000 SF space with 8 full time employees (*Bolt*). MakerWorks is a 30,000 SF space with 2 full time staff, 8 part time staff, and an executive management team (*Barr*). Some common staff member roles are summarized below (*Artisan's Asylum*):

- **CEO/Director:** responsible for big picture decisions, strategy, and community outreach
- **Financial Manager:** responsible for bookkeeping and taxes
- **Facilities Manager:** responsible for tool maintenance and repairs
- **Development:** responsible for bringing in new business and growing the space; may be in charge of marketing as well

- **Services Coordinator:** acts as a receptionist, keeps track of volunteers, and updates social media
- **Marketing Coordinator:** responsible for website, social media, and promotional events
- **Program Developer:** designs educational curriculum
- **Instructors:** teaches classes

Smaller organizations will combine roles or make all roles shared between founding members. One staff member that all makerspaces need is an instructor. This may be a shared position, like at Technocopia, or a full time position. An instructor should be paid between $30 and $150 per session (*Barr*). Other methods of compensations include free memberships or a percentage of class income.

For the Springfield makerspace, we believe that three full time and two part time positions are sufficient in the long term. At first, one or two people may take on multiple roles to make the start-up phase more feasible. A **CEO/director** would be needed for big picture decisions, business strategy, and company vision. This person would also absorb the development roll. A second employee would be a **facilities manager**. This person would oversee equipment usage and perform general maintenance. A **services coordinator** would act as a receptionist and sales manager for the retail space and supplies. He/she would also keep track of expenses and income. **Instructors** would prepare and teach courses. As the makerspace grows a **program developer** position can also be made available for educational organization and structuring to define and reach the makerspace target demographic. This can also include tasks like creating events for locals universities or schools, such the open house nights Technocopia hosts for WPI (*Technocopia*). The position itself can also be opened up to local college graduates in the area who are looking for experience in the management or even engineering fields. Also, an outside legal consultant will be required to write legal documents. A bookkeeper/tax accountant will be required quarterly or yearly. Cleaning staff may also be required.

Design of a Makerspace

As the internal community matures, a makerspace will grow and change. Even though the layout of the 6,000 SF will likely shift throughout the years, many features will stay constant. Each piece of the makerspace should planned as modular as possible to facilitate growth (*"Making Makerspaces: Creating a Business Model"*). It is important to note that these are only general features of a makerspace; later sections of the paper will highlight our recommended design.

Core Modules:

1. *Entrance and Reception*

   Functions:

   - Reception: Welcome guests and provide member assistance.
   - Social and eating space: For work breaks or informal meetings. Space should be more sanitary than workshops and provide seating and clean surface.
   - Gallery/Display space: To show off finished work or take photos. If near an entrance or window, this space serves as an advertisement for the makerspace.
   - Retail space: Used to sell products. Could charge a commission on all sales. This space requires storage, display, and check-out space. This space could also be combined with the gallery space.

   Location:

   - As a given this section will be located along the area at the entrance of the building and will made to encourage the public to enter the makerspace.

2. *Conference and Learning*

   Functions:

   - Classroom/ presentation: computers and desks would be located facing a presentation board much like common classroom design.
   - When not in use as a classroom it can be used as a conference and meeting room.

   Location:

   - The area designated for use as a conference and learning space is very important to the credibility of the makerspace. This space would ideally be located in close proximity to the entrance and reception area. This allows it to be visible and easy to locate from the entrance for those who have enrolled in classes at the makerspace.

3. *Common workspace*

   Functions:

   - This module functions as both a common area for work and for a collaboration are between the other modules by allowing conversation among the community
   - It can also function as a storage space for projects for those who need temporary storage while they work on other aspects of a project

   Location:

   - This space is meant to be a hub for conversation and group collaboration for the makerspace it would be placed in the center of the makerspace.

4. *Rental Space*

   Functions:

   - Rental workshops: By allowing rental of a section of the makerspace for members to design their own workstations it allows the makerspace to both connect with

community members and receive income. Rental space is the only way for some makerspaces to sustain their business.

- Project storage: By incorporating areas for rent where members can store their projects it allows the makerspace to receive income which would otherwise be lost. These can come in the form of simple wooden pallets or even large shelving areas.

Location:

- Rental space would be located towards the back of the main floor such that the foot traffic of the building would not disturb their work, yet they also have the access to a majority of the major workspaces while being located in an attractive area of the building. Some members more interested in woodworking or metalworking may desire a work station closer to these shops in the basement area.

5. *Equipment and Material Storage*

Functions:

- Private storage space: This could be shelves, lockers, or small locked or unlocked boxes for long-term member project storage.
- Common storage space: Shelves for equipment materials and smaller tools.
- Equipment shelving: Throughout the makerspace equipment will be present, but for the majority of unused tools and equipment storage will be needed to avoid cluttering or misplacement.

Location:

- The basement will be the most efficient area for storage. It can be secured during times when the makerspace is closed and can be given restricted access to ensure the safety of items stored within.

Possible Workspace Modules:

1. *Prototyping*

Functions:

- 3D printing: This space would have a 3D printer(s) within it to allow for rapid prototyping of parts for projects from around the makerspace
- Prototyping workspace: Includes necessary equipment for operating and maintaining 3D printer(s). (filaments, computer, memory cards)
- Assembly workspace: Table space for assembling prototype parts for all projects within the makerspace

Pros:

- Eye catching and attractive equipment and work
- Can be used for many projects of various kinds of work
- Very helpful for project construction

- Quiet and compact

Cons:

- Expenses of materials for printing
- Higher end printers are needed if you want them to last
- Having few 3D printers will be an issue as some print jobs can take a long time to finish

Location:

- With the work done within the fabrication and prototyping section, it can be said that it would be very visually interesting and the work done within it will relate to most other sections of the makerspace it is best to place this module on the main floor of the makerspace, towards the front of the workspace area.

2. *Electronics*

Functions:

- Electronic hardware testing
- Access to oscilloscope, function generator, digital multimeters, power supply, and soldering stations
- Component repair
- Debugging and prototyping of circuitry

Pros:

- Virtually a necessity in any makerspace
- Equipment and tools are commonly used for other projects
- Compact and useful for makerspace equipment repair

Cons:

- Unnecessary material collection can build up
- Equipment can be found at other locations

Location:

- Tools, materials, and equipment present within the electronics module are often used for wide variety of work. Combined with the fact that electronics work requires smaller space usage this workspace module is best placed on the main floor towards the back or sides of the space.

3. *Metalwork*

Functions:

- Automated metal cutting and milling
- Precision metal tooling
- Structural component construction

Pros:

- Presents a workspace which is hard to find in an urban location
- Can be used by construction companies

Cons:

- Sparks produced introduce a fire hazard
- Floor will need to lined with metal sheets
- Necessary equipment has a higher risk of serious injury

Location:

- Metalworking in general requires larger equipment and has high riskier of serious injury, therefore it would be best to place this module in the basement of the makerspace. This both reduces the risk to the people within the space and give the people using the metalworking area the room they need to do their work comfortably. It also will move work which can be loud and distracting to a space where this will not interfere with others work.

4. *Woodwork*

Functions:

- Furniture and appliance construction
- Artistic woodcarving
- Woodturning

Pros:

- Furniture produced can be displayed and used in the makerspace
- Woodworkers often have to look for shops to do their work in
- Equipment can be used by for fabrication of larger products

Cons:

- Dust and Sawdust are produced on mass
- Fire hazard introduction is evident
- Wood must be brought into the makerspace from external sources
- Necessary equipment has a higher risk of serious injury

Location:

- Woodworking by its nature requires equipment which can be harmful to untrained hands and requires a lot of additional work to maintain in a multipurpose area. Woodwork tends to produce a lot of waste material like dust and debris which must be dealt with on a regular basis. Due to these factors it is generally best to place woodworking stations basement of the makerspaces where they can be isolated to prevent accidental injury and contain the work to aid with cleanup.

5. *Glasswork*

Functions:

- Glass cutting and processing
- Glass furnace
- Glass artwork

Pros:

- Attractive to those who need it
- Hard to find other locations with glass workstations

- Art can be produced which can be displayed

Cons:

- Very specialized type of work
- Costly equipment is not normally used for other kinds of work
- Dangers of working with liquid hot glass
- Ventilation is a requirement

Location:

- If implemented a glassworking module would require heat resistant equipment and enough space where accidents are not detrimental to the entirety of the makerspace. Therefore it would be best to place a glass-working station to in the basement of the building where the floors and equipment and be customized.

6. *Sewing and Crafting*

Functions:

- Costume design and construction
- General clothing design and repair
- Fabric material construction for other projects

Pros:

- More family friendly
- Very little space requirement
- Quiet while contributing to a sense of community
- The makerspace can design and customize its own wallart

Cons:

- Materials requirements and expenses are constant
- It is not always the first thing that comes to mind when you think of a makerspace

Location:

- Sewing and craftwork tend to be comparatively more child friendly and social than other possible functions to incorporate into a makerspace. If implemented this module would be best placed towards the front of the workspace area to allow families to use the space with their children, it can even be made for children to make their own projects.

7. *Computer Design and Programming*

Functions:

- General computer programing
- Digital art and computer aided design
- Program debugging and testing
- Can become a hackerspace if you apply later on

Pros:

- The only large requirement is computer availability
- Works in tandem with the fabrication workstation

- Can be open for general member use
- Comparatively less expensive
- Allows for consideration as a Hackerspace

Cons:

- Work of this kind can be done anywhere generally
- Computer and software are a very personal in terms of preferences

Location:

- This area given its work should be placed along a wall of the makerspace on the main floor where all members could use the computers as needed. Also, given its potential input into the prototyping and electronics workspaces it should also be placed in proximity to those to stations.

Other necessities in your space are plentiful and accessible electrical outlets, space for electrical equipment, wall or ceiling ventilation, fire lanes and handicap accessible paths, space for emergency equipment such as fire extinguishers and first aid supplies, restrooms, plumbing and HVAC.

Equipment Selection

When deciding the types of equipment to bring into the makerspace it is important to start at the basics and bring in higher end equipment gradually. Much like how a tree grows from a humble seed, a makerspace needs to start small to develop and grow with its community. For a makerspace to thrive it must be focused on the local community, all the high end equipment in the world would mean nothing if the community does not utilize it (*Technocopia*). To this end a list of equipment which may be needed to fulfill a specific function; such as woodwork, metalwork, fabrication, or electronics has been compiled and can be seen in Table 2.1 below. Costs were estimated from pricing of equipment lists found on other makerspace websites like, fabfoundation.org, technocopia.org, and techshop.ws, while general online shopping sites being used for average prince ranging (*Technocopia, TechShops, Fab Foundation, "Making Makerspaces: Creating a Business Model", Makerworks, Rochester Makerspace, "High School Makerspace Tools & Materials", & Makerspace Playbook*).

Table 2.1. List of possible equipment which may be implemented or requested by members.

Function	Equipment	Estimated Cost
Universal/General Equipment	Common hand tools (drill, wrenches, screw drivers, etc.)	$3,000
	Computers	$1,000 each
	Monitors	$350 each
	Computer software	$1,000
	Materials	TBD
	Tables and chairs	TBD
	Power tools	$30-$60 per tool
	Multiple bench vice	$35 each
	Multiple vice grips	$50 each
Electronics	Oscilloscope	$1,000
	Safe soldering station	$300
	Rework station	$50-$400
	Microcontroller development equipment kit	$60 each
	Analog electronics development equipment kit	$100-$150 each
	Handheld DMM	$50-$100
	Function generator	$400
	Power Supply	$200
Metalworking	Plasma cutter	$500-$3,000
	Welders (MIG/TIG)	$400
	Vertical bandsaw	$500-$700
	Horizontal bandsaw	$500-$1,000
	Hydraulic press	$200-$400
	Mechanical bender	$1,000
	Sandblasting system	$500-$1,000
	Bead roller	$100-$300
	Parts washer	$100-$1,000 based on size
	Miling machine	$4,000
	Bench grinders	$100
	Fume extractor air system	TBD based on size
	Surface grinder	$2,000
	Granite surface plate	$200-$400
	Monarch lathe	$2,500

Function	Equipment	Estimated Cost
Woodworking	Cabinet table saw	$1,000
	Drill press	$150
	Bandsaw	(See previous listing)
	Resaw bandsaw	$1,000
	Compound sliding miter saw	$200-$400
	Spindle shaper	$500-$4,000
	Belt sander	$100-$1,000
	Drum sander	$600-$1,000
	Air compressor	TBD based on size needed
	Table saw	$200-$300
	Small belt/disc sander	$100-$300
	Wood lathe	$100-$200
	Dust collection system	TBD based on size
	8' Jointer	$400-$1,000
Glasswork	Glass Furance	$200-$700
	Scoring blade	$15
	Etching tool kit	$25-$100
	Head Torch	$50
	Marking and shaping tools	$20
	Glass blowing tools	$35 each
Computer Design & Programming	Software	Free/Open-source - $1,000
	Hardware	User Preference
	Computer pariferals	$50-$15,000 per computer
Sewing & Craft	Sewing machine	$20-$100
	Silk screening kit	$100-$200
	Sewing tool kit	$50-$100
Fabrication & Prototyping	CNC and routers or	$10,000-$20,000 + additional
	Basic CNC machine	$5,000
	Laser cutter	4,000-20,000
	3D printers	$500-$10,000
	Vinyl/Circuit cutter	$2,000
	Monarch lathe	$2,500

In terms of general importance, equipment which can be used interchangeably, like the various forms of bandsaws, do not necessarily all need to be bought the general function they are needed for with nearly the same (*Hughes & Barr*). Also, given the limited space, it is also important to purchase only equipment which can fit into the space without detracting from other potential uses ("*High School Makerspace Tools & Materials" & ""Making Makerspaces: Creating a Business Model"*). For example, while bringing in a hydraulic press is feasible, but it would more worth bringing in more small 3D printers have generally higher demand. These are considerations which must be made as the makerspace grows. Makerspaces also don't need to buy all of their own tools, at least at first. Members are more often than willing and do in fact lend tools for community use. For example at one point, over 75% of the tools in the Asylum, to the tune of over $200,000 worth of equipment, belonged to members who are leasing their tools to the Asylum in exchange for discounts on their membership (*Artisan's Asylum*).

A final consideration needs to be made in terms of utilities needs, such a power supply and internet. Some of the equipment which may be brought into the makerspace need three phase power supplies, which are not standard to building, especially older infrastructure such as the SIC. This requirement has two general solutions, the first and most simple being that the power

supply company may only need to come down and do simple rerouting from nearby lines. If not special equipment can be purchased which can supply the power needed, albeit with more of a cost (*Makerspace Playbook*). High speed internet and other general technological utilities can be shared, with some prior planning, with the rest of SIC as well to reduce cost.

Recommended Building Layout

This section will examine an example building layout and tool choices. This design was made in Google Sketchup. Note that this is just one example and the actual building floor plan is not known. Also, further towards actual construction, consideration must also be given to the accessibility of the makerspace to those with physical impairment (*University of Washington*). A minimum of 30% of floor space should be empty for emergency exit routes and accessibility.

A quick video tour is available at the following link:
https://drive.google.com/open?id=0B3A73Yd0ijuVYzlNeEhIQlNIbTQ

Main Floor

Our proposed design for the makerspace incorporates both the main floor and basement of the 6,000 SF space. The main floor, which would be finished, could be seen as the heart of the makerspace where the members could come together, work on projects, and display their work to the community. It also is designed to contain the modules with common, safer, and quieter workstations. Additionally, rental workshops are designated to be placed on this floor to make them more attractive to potential tenants and to allow them easy access to a majority of the commonly used workstations. We will now explain each of these sections in greater detail from right to left.

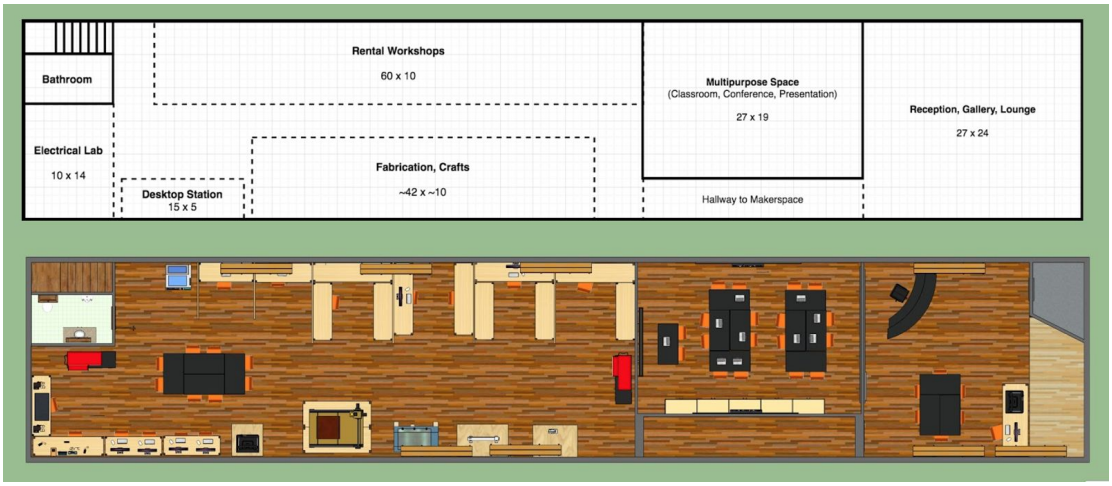

Figure 2.1. Main floor layout and schematics. The top floor plan shows that the modules present on the ground floor are the reception area, multipurpose space, rental workstations, fabrication/crafts area, desktop station, and electrical lab.

Reception Area

The reception area, roughly 650 SF, contains not only the reception desk but also a gallery and lounge area. This space functions as the entrance to the makerspace where the community can apply for a membership, relax, interact with other members, and put their work on display. This area also serves as the entrance to both the rest of the rest of the makerspace, allowing an extra level of security to protect the expensive equipment found deeper within the building. Along the front windows of the building is gallery space and a 3D printing station so the public can see what is being produced.

Figure 2.2. Reception area design. This area serves many purposes. The window area is a current structural feature of the carpet store; it should be used as a gallery space for the public to see. Tables and racks may be placed here as well for extra display space. A 3D printing station is also shown as an attraction. A reception desk and waiting/eating table should also be present.

Multipurpose Space

We have allocated just over 500 SF of space as a multipurpose area; this may serve as a classroom, collaboration area, or conference/presentation room. This area is directly accessible from the reception area to prevent students from walking through space with dangerous equipment. Furnishings include storage space, whiteboards, a projector and screen, speakers, 7-10 movable tables and chairs. Each table in this model is approximately 5’ x 2’6”. Tables should have wheels to make reconfiguration easy. This type of table is classified as a mobile training table. Some models are also flippable so they can be stored more compactly. A laptop cart may also be desirable for some classes. Technicopia has a desktop computer station in its classroom (*Technocopia*). Since we do not have the square footage that they do, it would be smart to consolidate the teaching and computer space by using laptops. This also lets the tables move as needed without fear of cords getting in the way. Laptops may not even be necessary in the teaching space if computer courses aren’t offered.

For classroom setups, there is typically 1-2 desks at the front of the class for the instructor. The instructor setup may either be in front of a whiteboard or projector. The student desks can be arranged in rows or in different groupings, depending on the level of collaboration and tablespace that the course requires.

For member presentations or meetings the tables may be arranged as one long conference table or as a rectangle with space in the middle. For demonstrations or courses that require some sort of large equipment, the tables may be pushed to the outer edges of the room to make a stage in the center of the room. This may also be useful for public events. The figure in the next page highlights some of the possible functions that this space could serve as.

Figure 2.3. Possible multipurpose-space configurations. Mobile training tables are used to create any configuration desired.

Rental Space

This area of the makerspace has been included to generate revenue and to provide aspiring business owners an affordable workspace. Rental spaces of this area come in two sizes, 100 SF and 50 SF, which are rented out to tenants at a monthly rate. The space allocated for rental space totals roughly 500 SF. As a stated previously the rental spaces were placed in this location to make them as attractive as possible. These personal workspaces could be furnished to the members liking. Renters can treat these spaces like a normal office space. They can bring in equipment, materials, and any other items. For example, a 100 SF cubical may have a desk, a work table, a computer, and small storage space.

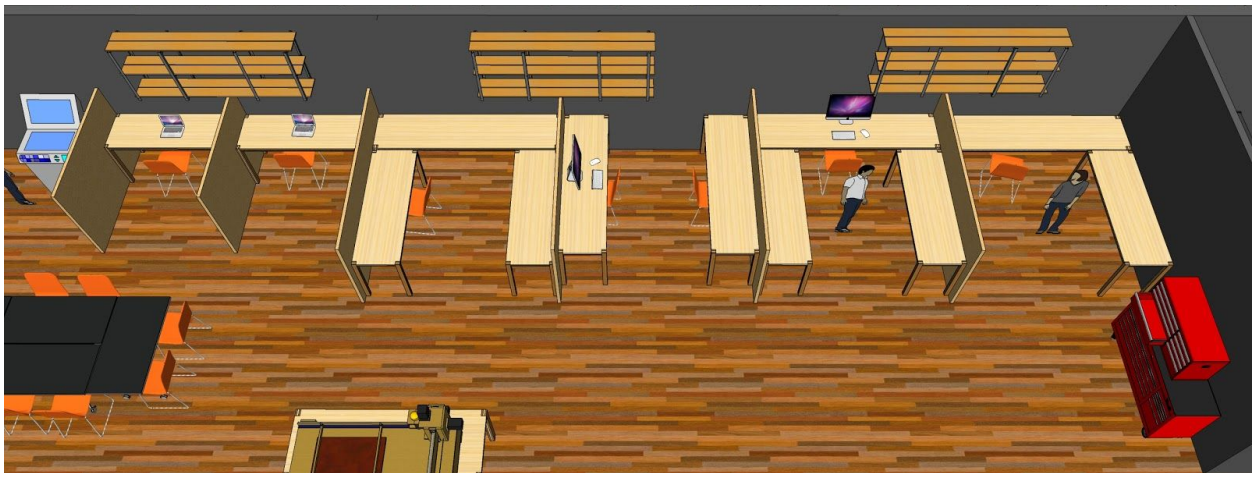

Figure 2.4. Rental space design. This 600 SF space should be set aside for member space rental. Wood borders are placed between personal workstations. These spaces are 100% furnished by the tenant. They may bring tables,desks, storage racks, computers or any other equipment needed to run a small 1-2 person business.

Crafts and Fabrication

With this section of the main floor we begin to delve into the working stations of the makerspace. On the top floor it made the most sense to include machinery that is safe, quiet, and clean. Our reasoning here is mostly due to the surrounding spaces; The upstairs work station should be quiet because there is a classroom and rent space nearby; It should be safe because this is where the most people will be; And it should not have machines that produce lots of dust or shavings because it is not very closed-off. The module on the wall opposite to the rental space is the crafting and fabrication area. This area includes equipment including, but not limited to, sewing machines, vinyl cutters, a laser cutter, a CNC router, and a 3D printer. It should also have ample space for materials and common craft-work tools, therefore we gave this particular section of the main floor roughly 420 SF of space. The image below shows a possible layout.

Figure 2.5. Prototyping and crafts space design. One or more sewing machines should be included. A vinyl cutter with plenty of spare fabric should be present in this space as well. For rapid prototyping, a laser cutter, CNC machine, and 3D printer are also shown.

Electrical and Computer Lab

Two more ground-floor modules are the desktop station and the electrical lab. In this layout, the computer area has four desktop computers spread over about 13 feet of countertop.

The electrical area is a 10’ x 14’ space in the corner of the building. On one table is a soldering and rework station. On the other table is a selection of digital electrical engineering tools including digital multimeters, a power supply (voltage source), a 4 channel oscilloscope, and a function generator. This area may also have a PCB prototyping station. Along the top wall is a tool shelf holding pliers, wire cutters, crimping tools, resistors, capacitors, breadboards and any other circuitry components.

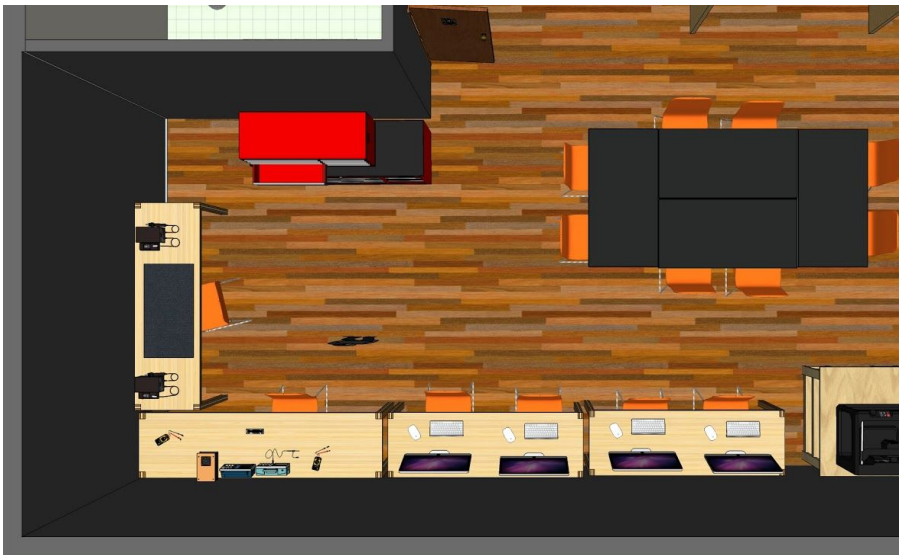

Figure 2.6. Electrical and Computer Lab design. This area doesn’t need to be very large. Some equipment that may be included are one or more digital multimeters, oscilloscopes, function generators, power supplies, and soldering/desoldering stations.

Basement

The basement of the makerspace, which as of this project is planned to be unfinished, could be seen as the specialized workspace which also serves as an area for equipment and materials storage. As opposed to the main floor, this space was designed to contain the modules with specialized, higher risk, and louder workstations. This separation allows the general safety of the whole makerspace to greatly increase, the people using the workstations have room to work and those who do not use these stations are placed near where they could be harmed. Additionally, rental storage pallets for projects and an area specifically for material and equipment storage have been designated for placement within the basement. In the same manner as the main floor, we will now explain each of these sections in greater detail from right to left, rental space of this floor will be covered only briefly however as it has already been covered.

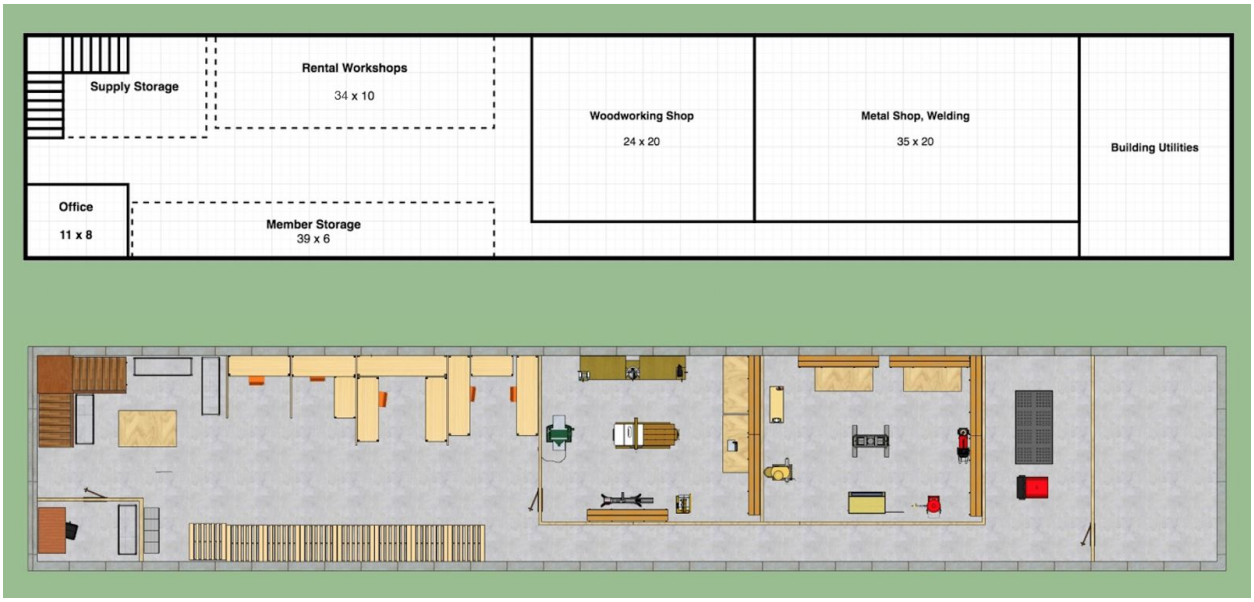

Figure 2.7. Basement layout and schematics. As shown, a large portion of the space is used for the two machine shops. The second largest portion is used for storage; both rental and public. The bottom image is a top view of the basement model, which shows what the layout could look like after it is filled with equipment.

Storage and Extra Office Space

The storage area is found immediately upon entering the basement level of the makerspace to give easy access to material and project storage. For rental project storage, wooden pallets are present along the bottom wall. Our model shows two shelves of 4’ x 4’ storage pallets covering roughly 234 SF. The rental cost will be covered in greater detail within the cost section of this report. Complimentary lockers are also available to the left of these pallets. For material and tool storage ample shelving has been included to keep the space both organized and compact. This is visible near the stairs. Members will have access to this storage area but are required to pay for any materials that they take. In the bottom left corner is an example of what the Facility

Manager's office may look like; it is furnished with a desk and storage for more expensive inventory. The office size can vary but our design provided 88 SF. Any extra space in the basement to the left of the wood shop should be converted to rental cubicles as they are requested. Some members may want to rent cubicles closer to basement shops rather than renting space upstairs.

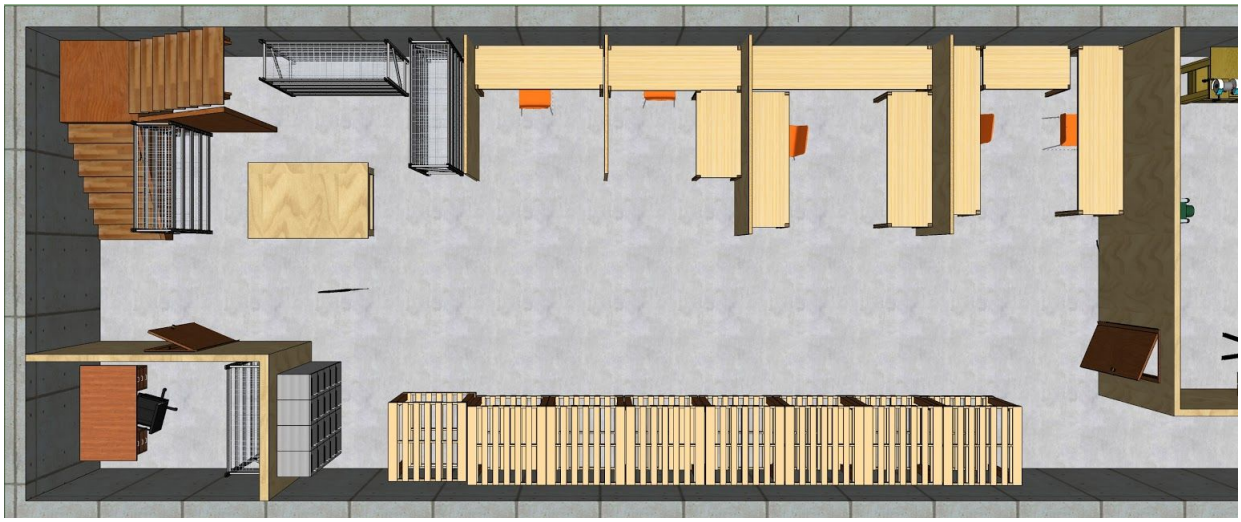

Figure 2.8. Storage and Extra Office Space design. This area must first accomplish the task of storing materials and member projects and personal items. Shelving is shown near the stairs for material and tool storage. Lockers are near the bottom left wall and pallets are along the bottom wall for rental storage. A small office was made for the facilities manager and all remaining space could be used for cubical space.

Woodshop

The woodshop found in the first separate room of the basement can be used for both construction and fabrication. The purpose behind making this space a separate room is to fold, the first of which is to reduce noise leakage into the rest of the makerspace. The second purpose is to prevent project scrap or waste product, such a sawdust, from entering areas where they could present a hazard; namely, a fire hazard particularly in the metalshop. This model includes table saws, a wood planer, a lathe, a belt sander, a dress press, a band saw, and ample shelf and table space. It is about 24' x 20' or 480 SF in size. A wide entrance was added in addition to the standard door to make relocation of larger projects possible.

Figure 2.9. Woodshop design showing table saws, a drill press, a lathe, a band saw, a sander, and a wood planer. This layout is about 24 feet wide by 20 feet long.

Metalshop

The second separated workshop included in our design of the makerspace basement, the metalshop, follows the same rational as the woodshop. The metalshop, like the woodshop, would be implemented as a separate room to reduce sound leakage and potential hazard. The equipment found in this area can be particularly hazardous to those who lack sufficient training, therefore placing this workshop in the deepest section of the makerspace is ideal, as people who go there will generally only do so with the explicit purpose of using the space. There needs to be adequate ventilation in this space, as some equipment does release significant dust or other particulate. Some machines produce sparks, so eye protection should be enforced in this space. The welding area is in a closed space because of the wider radius of danger that is presents. This module also holds a plasma cutter, a drill press, a milling machine, a grinder, a sand blaster, a sand blasting hood, and plenty of table and shelf space. Of course, more equipment should be added when requested. For the work which can be performed in the space and equipment which can be included the 700 SF provided should provide ample space.

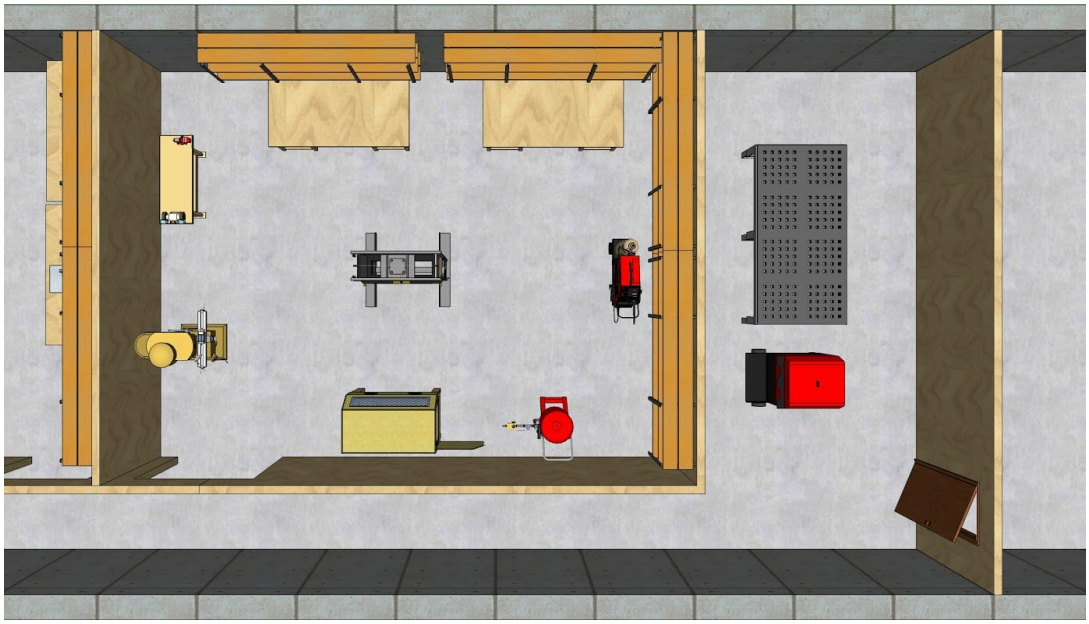

Figure 2.10. Metalshop design showing several tools including a plasma cutter, sandblaster, drill press, milling machine, and grinder. A closed off area for welding is also shown to the right.

Utility Space

The last area of the makerspace is for building utility equipment. This is where a water heater and storage tank, electrical panels, and HVAC equipment would reside. This area is off limits to members.

Again, a virtual tour is available at the following link:
https://drive.google.com/open?id=0B3A73Yd0ijuVYzlNeEhIQlNIbTQ

Legal/Insurance Considerations

Insurance and Legalities are important issues to consider for a makerspace especially because there are inherent dangers involved with the equipment involved. Insurance can be divided into a few components for a makerspace. First, the type of insurance needs to be considered. Once this is determined, the business plan gets presented to the broker and an insurance company can be found. After this, the only matters left are negotiating terms of coverage with the company and abiding by all the rules agreed upon under coverage(*"Making Makerspaces: Creating a Business Model" & "Making Makerspaces: Acquiring Insurance"*).

There are generally two types of insurance that can be acquired for a business like this. These are described in detail below.

- **Business owners policy:** This policy covers any damage to equipment, stolen equipment, or if someone injures themselves. At Artisan's Asylum, this is estimated to cost about 20-40 cents per square foot per year (*Artisan's Asylum*).
- **Umbrella Policy:** If an incident is not covered by the per occurrence limit, this policy will cover any overages acquired. This costs an additional 15-25% of the initial Business owners Policy (*Artisan's Asylum*).
- **Workers Compensation:** This will be 0.061 - 0.32 times staff salaries per year, depending on the nature of the work they are doing (*"Making Makerspaces: Acquiring Insurance" & Artisan's Asylum*).
- **Directors and Officers Liability**: This will be 0.2-0.5% of gross income (*"Making Makerspaces: Acquiring Insurance"* & *Artisan's Asylum).*
- **Other Insurance**s can be purchased as needed for that makerspace depending on the services provided and work being done. This listing is not exhaustive only a general outline (*Technocopia*).

The next step in finding insurance is finding a broker, which will serve as an agent to the insurance company (*"Making Makerspaces: Acquiring Insurance")*. Asking a similar makerspace such as Technocopia in Worcester for their broker or a machine shop is a good start to finding a knowledgeable and specialized broker for the needs of a makerspace (*Technocopia)*.

It is important for the broker to understand the business plan of the makerspace, so it will be vital to have the following materials (*University of Washington*).

- **Business plan** completed with projected annual expense and income report
- **Lease** with all requirements from insurance listed
- **Membership agreement** that all members will have to sign
- **Full equipment inventory** including cost, model and serial no., age and manuals
- **Training plan** which includes information on how the makerspace plans to train users on proper equipment use
- **Construction plan** detailing the building's including alarm system, sprinklers, etc.
- **Improvement plans** or plans for future building development
- **Full safety plan** including hazardous material maintenance and any evacuation routes
- **Security camera coverage**, if any
- Anything else the specific broker requests

Once this is complete the broker will find the right insurance company for the makerspace.

After this there is just the matter of negotiating with the insurance companies. Some negotiating points are given below (*Barr*).

- Restricting hours for members of different levels
- Installing an alarm system
- Having security cameras
- Requiring members to be 18 years of age
- Requiring basic training to use any equipment
- Basic employment policies
- Having fire suppressants in areas where there is danger of fire

Once insurance is achieved, assuring that all members and employees follow the rules is extremely important for the success of the makerspace. Good behavior can also help lessen restrictions and lower cost of insurance over years of time.

Safety and Security

Apart from insurance coverage, which is its own section of this project, the general safety and security measures of the makerspace are key features which must be addressed and detailed. It goes without saying that with all of the high cost equipment being brought into the makerspace, the security implemented to protect the investments must be paramount (*"Making Makerspaces: Acquiring Insurance")*. All entrances and exits into the building must be monitored, reinforced, and locked (*Makerspace Playbook*). Glass must also be properly covered during non-operating hours, and the current building in it's current state already has pulldown metal grating which covers not only the entrance of the building but also its display area. Alarm systems would also be required for the makerspace for both insurance purposes and when the monitoring system may fail. The design of our building's entrance area allows for the pathway to the actual workspace of the makerspace to be protected by an additional reinforced door such that in the event of a theft two barriers must be broken through to have access the more expensive equipment. Additionally, by storing materials and equipment which is not in use specifically within the basement, an additional security level can be but in place to prevent the risk theft by hiding the most realistic items for theft out of sight (*University of Washington*). For member entry into the makerspace an RFID scan locked door would also be implemented to keep entry during late night hours feasible and safe.

In terms of safety before use of any equipment there would be a mandatory classes which must be taken before uses any specific workstation of the makerspace to ensure all users was knowledgeable on how to operate the equipment that station (*Technocopia*). To be able to use the equipment in the first place requires a purchased membership. Permanent staff could also be hired later in the lifespan of the makerspace to provide expert advice for work which can be done in the makerspace and assistance if individuals are uncomfortable with a piece of equipment. In terms of staffing, there would also need to be a position specifically for equipment inspection

and upkeep to keep the equipment safe and in good operating condition (*Hlubinka*). The design of the proposed makerspace was done in a modular manner, separating the work being done in the makerspace into areas of specific work (*Barr & Hlubinka*). By physically separating the work more dangerous work types can be placed in safer or more distant areas. This would reduce the risk of accidental injury of passers and for those who work in the makerspace as they are given more room to work (*Hlubinka & University of Washington*). Finally, as a general rule, those who continue unsafe practices will need to be restricted or removed, as individuals with unsafe practices can pose a risk to everyone in this kind of environment (*Technocopia & Makerspace Playbook*).

Funding Strategies

To avoid out of pocket expenses or loans on equipment and renovations, there are several financing options to consider. Some involve donations while others rely on sponsorships and partnerships. Holding a "Tool Drive" can result in fast and easy equipment donations. Many individuals have tools that they no longer use or have space for and technical colleges may be willing to donate older equipment as well. This will get the community talking about your makerspace, as well as help build it (*Fontichiaro*).

Kickstarter, Indiegogo and DonorsChoose are online crowdfunding communities where users can donate funds to creative projects (*Barr*). If your project meets its donation goal, you keep the money. This option is attractive to many people because they are able to get investors without losing ownership of the project. On Kickstarter, 35.8% of projects meet funding goals (*Kickstarter*). This is also a good way to spread the word about your makerspace. Additionally, given the time gap between SIC's opening and the initial planning stage for the makerspace, there is more than enough time to start acquiring crowdfunding of any level just to get the word out there and acquire some funds to put towards expenses.

This option is viable for a couple of reasons. First off, this essentially works by making a pitch of what the "kickstarter" plans to do with the money. This would not only serve as a good indicator of how many people would be interested in the makerspace, but would also be a good source of funding for the initial costs of things. Crowdfunding has proved very successful for businesses especially recently in the age of information and the internet.

Seeking business and organization sponsorships is very valuable for a makerspace. Makerspace partnerships are attractive to companies in technology and science industries. For example, a partnership with Intel financed much of TechShop's move to California (*"TechShop Announces Intel Sponsorship"*). Companies will typically ask for something in return such as advertising or use of the space for events. This should be a mutually beneficial relationship.

Generating Revenue and Managing Expenses

Potential Expenses

Of course, for a makerspace to grow, the yearly income must exceed the yearly expenses. Below are expenses that can be expected of the makerspace in Springfield. Artisan's Asylum did an in-depth analysis of expenses. Many of the expenses below are based on those estimates.

Utilities (water, heat, internet, electricity, trash)

- Electricity for a makerspace will usually be around $0.10-$0.20/SF/month (*Artisan's Asylum*).
- Natural Gas in Boston during the winter was $0.15/SF/month *(Artisan's Asylum)*.
- Trash removal services cost on average around $100 per month *(Home Advisor)*.
- Internet service is going to be around $75-$150 per month. *(Artisan's Asylum)*
- Total utility cost per year will range from $20,100 to $28,200

Property tax

- According to Artisan's Asylum, this is about $1.20 per SF per year; $7,200 per year *(Artisan's Asylum)*.

Building maintenance

- This can be estimated at $2 per SF per year. This is about $12,000 per year *(Artisan's Asylum)*.

Employee salary

- Employee salary depends on a few things; for example, if we have volunteers at the makerspace then we will be able to give them free membership instead of pay. The volunteers would most likely be teachers, so in addition to that we would have 2 people ideally on duty to supervise. Assuming that teachers are volunteers or work for reduced memberships or rentals, that leaves only the makerspace Director, Facilities Manager, and Service Coordinator. The Director may earn on the order of $75,000 per year, the Facilities Manager may earn an average floor manager salary of around $42,000 (*Salary: Floor Manager in Massachusett*s), and the services coordinator may earn an average salesperson salary of around $40,000 (*Salary: Sales Representative in Boston, MA*). This totals to $157,000 in employee salary. We are not including the instructors or program developer salary because these will likely be part time employees and may even be volunteers.

Equipment, tools, maintenance, and materials

- For a detailed list of possible equipment which can be included refer to the equipment selection section.

Insurance

- Depending on which type of insurance purchased, insurance will range from 20 to 40 cents per SF per year. However, there is additional cost outlined in the legal/insurance section *(Artisan's Asylum)*.

Legal and Financial Consulting

- A bookkeeper and tax specialist is required every year and a legal consultant is needed to write legal documents.

Marketing

- An educated estimate places the cost of marketing efforts at $15,000 per year *(Barr)*.

To offset these costs, a makerspace must offer more than access to tools. Some services are explained below.

Sources of Revenue

This section will describe possible sources of income for the makerspace. Memberships, rentable workstations and storage space, classes, and partnerships are major sources of income. Other smaller services are discussed as well.

Memberships

To use the makerspace regularly, customers must sign up to become members. This is for both safety and security purposes which will be covered in later sections. There may be three membership plans available, general information of each plan have been detailed in Table 2.2 below. Each level will determine the times at which members have access to the makerspace: weekdays, weekends and nights, and 24/7 access.

Table 2.2. Possible makerspace membership rates

Membership Plan	Availability	Monthly rate
Weekdays	Mon - Fri, 8am - 6pm	$70
Weekends/Nights	Mon - Fri, 5pm - 11pm Sat - Sun, 10am - 11pm	$70
All Access	24/7 access	$110

Rental space

Many makerspaces offer rental space to members for additional cost. This could be storage or work space. Free member storage may be in the form of lockers or shelves. The lockers would however require members to provide their own lock.

Members can also rent storage space at an additional cost, outlined in Table 2.3 below. Basement storage on wooden pallets for ongoing projects is the most basic rental type available. This

would give members the opportunity to leave personal supplies and projects in the makerspace overnight. Having a personal storage space would also reduce the risk of damage or theft of parts. Members' project can be left in public storage spaces, such as shelving, however there is still the risk of damage and theft, which the makerspace is not liable for.

Makerspaces are often home to aspiring business owners or small startup companies. For members without outside office space, makerspaces will often offer 100 SF or 50 SF workstations at an additional monthly rate. At Technocopia there are a number of individuals who run companies in the makerspace (*Technocopia*).

Artisan's Asylum, TechShops, FabLab and Technocopia offer small rent (50 - 250 SF) studios. FabLab offers 100 SF and 200 SF locked spaces for $250 and $500 per month respectively (*Fab Foundation*). They also offer dedicated desks or workbenches for a lesser monthly fee. Technocopia offers 100 SF and 50 SF cubicle workstations for $150 and $75 per month (*Technocopia*).

Table 2.3. Possible rental space rates

Rental Type	Monthly Rate
100 SF Workstation	$120
50 SF Workstation	$60
16 SF Storage Pallet	$30

Classes

This could potentially make up over half of the makerspace income. Mandatory classes are typical to become members or to use particular pieces of machinery. This could be included in an entrance fee at the beginning of a membership to learn general practices. Classes can also be offered to non-members in woodworking, metalworking, electronics, soldering, sewing and computer programming. Xylem, a 3,000 SF space, offers classes to non-members to make extra money (*Barr*). There may be one or more dedicated employee(s) for education. However, some makerspaces offer renting members teaching positions to help offset the cost of rent. Classes can be taught as part of series to learn a particular skillset or to become familiar with certain tools. At Technocopia, each tool course could range in price from $35 to $110, depending on the equipment used, the length of the course, and the amount of materials used. Pricing for classes offered at the SIC makerspace can also be adjusted to fit the Springfield demographic. While higher prices make work in other locations, classes still must be affordable for the community in which the makerspace is operating. Some tool courses are: Woodshop Series (3-5 courses involving each piece of equipment in the wood shop), Metalshop Series (3-5 courses involving

each piece of equipment in the metal shop), Introduction to Programming Series, Laser Cutting, 3D Printing, Vinyl Cutting, and CNC Machining (*Technocopia*).

Workshops are also offered a more project based way. Some workshops include sewing design, jewelry design, screen printing, and sawhorse design. On average, these courses or series are $65 - $150 (*Technocopia & Artisan's Asylum*).

Classes are typically offered on weekdays from 6-9pm or Saturdays from 1-4pm. Technocopia offers about 15-20 courses per month. However, the amount and frequency of classes offered for this makerspace can vary depending on demand and instructor availability (*Technocopia*).

Corporate partnerships

This is a great way of providing continuous, guaranteed members. Technocopia is partnered with the Worcester CleanTech business incubator located on the floor right below them. CleanTech pays Technocopia to allow members of the incubator to use the makerspace (*Technocopia*). In the same manner the makerspace could partner with VVM and the other tenants of the the Innovation Center to exchange in services. Additionally, partnerships with the local universities and businesses in Springfield for equipment and material use in exchange for a set rate per month would also be a great source of income and connections (*Leonard*). This not only brings in income, but also encourages the younger students and newer businesses to consider partnering with the makerspace.

Supplies

In order to break even on materials expenses, members of any level will have access to materials, but will be charged for the purchase price or more to generate revenue (*TechShops, "Making Makerspaces: Creating a Business Model", & Hlubinka*). Materials could be obtained by filling out a request form and bringing it to the reception desk so they can go to the basement and retrieve the listed materials. In the event of repeated excess material use over the request amount will result in a revocation of membership. Members of course are free to bring in their own materials to avoid the costs, but the option is still there for members in need of supplies.

Prototyping Services

Offer online or on site submissions for 3D printing, CNC milling, and laser cutting services. FabLab offers all of these services and charges hourly rates or price per volume of material (*The Infinity Fab Lab*).

Shapeways is an online company with a similar offering for 3D printing. Price depends on quantity of material used, type of material, finishing material, printer space required, number of parts, and shipping. The appropriate assembly files are submitted and materials are chosen. The

price increases for more durable material and if finishes are applied as well. A designer's products can either be printed and shipped back to the designer or can be placed in the designer's online store for anyone to purchase and print. It also has a feature called *Hire-a-Designer* in which people can hire a maker to design a product for them. These products are printed and shipped to the hiring party. This idea could be expanded to any type of rapid prototyping. This is a great way to attract business from people who want to print their designs or want to buy someone else's design (*Shapeways*).

Retail Commission

BiG FabLab, located in a mall in Ohio, has a retail space in their front window (*BiG Fab Lab*). Shoppers pass by the space and see handmade jewelry, furniture, clothing, electronics, and other crafts. This draws significant attention to the makerspace and helps its members succeed. This is very common for FabLabs and many other makerspaces. A retail area can would be incorporated into the reception area of the Springfield makerspace so members can test market and sell their products. In terms of income for the makerspace, a fixed rate commission could be taken on all sales. The makerspace would be the salesman working for the member. An online store would be a viable option to eliminate the need for a large, finished gallery area. Again, Shapeways' *Hire-a-Designer* idea could be applied to any products made within the makerspace. This is easy to implement in the physical store as well as an online store listing. A retail presence of this type has the potential to attract customers from greater distances (*Shapeways*).

Maker Competitions

Each competitor pays for entry into the competition. They use supplies and safe tools to build a product based on a common theme. For example, in October competitors can be challenged to build the best Halloween decoration. These events would be open to the public, so some tools would have to be off limits.

Cost Analysis

This cost analysis is done using information found elsewhere in the paper assuming the space is 6,000 SF. All the numbers are estimations based on data from the Springfield area and other makerspaces, but are subject to change since they are only educated predictions.

Expenses

Capital Expenses

- For **equipment costs**, according to Table 2.1, and adding up the high and low values, the initial cost to buy all the equipment listed would be between $80,000 and $100,000.

    - For equipment such as computer monitors and power tools, the cost was multiplied by a reasonable number of units one would expect to see in a 6,000 SF makerspace. For example, the number of computers and computer monitors was assumed to be 15.
- **Solar panels** would be a great investment in the long run as it will help save a lot of money on utilities costs, but the capital expense for a 10kW solar panel system in Massachusetts ranges from $24,200 to $31,000 (Energysage).
- Other initial **building renovations** such as ventilation and electrical wiring could be very costly as well.
- Legal fees for trademarking and legal document writing.

Operational Expenses

- **Employee salary** depends on a few things, but generally ranges from $141,300 to $172,700
- **Utilities** would cost between $20,100 and $28,200
- **Insurance** is estimated to cost between $12,557 and $16,577 annually, including an umbrella policy, workers compensation, and officer's liability.
- **Building maintenance** is estimated at $12,000 per year
- **Marketing** is going to range from $0 - $15,000 per year, but this figure is especially hard to predict.

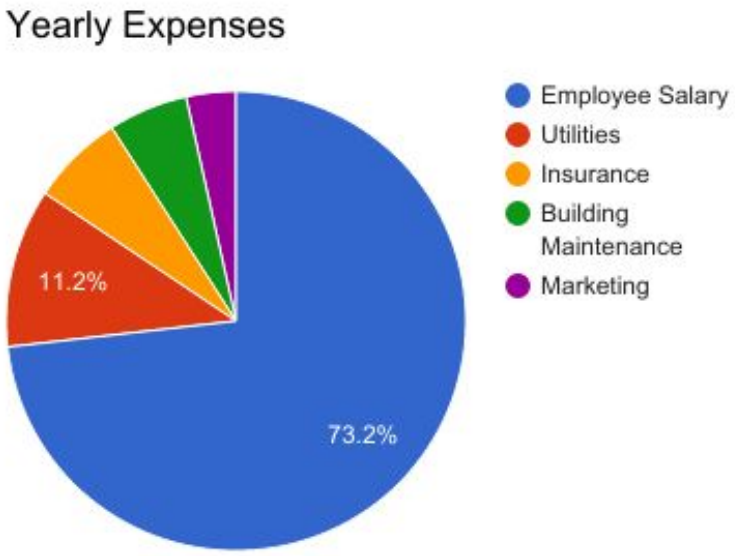

Figure 2.11. Potential yearly expenses for our model makerspace. From the graph, you can see that salaries, utilities, and insurance are the largest three expenses.

Income

Capital Income

- **Grants** and external funding is possible but rarer if the space is to be a for-profit organization. Technocopia in Worcester MA got about $80,000 for their first year to purchase equipment, but this number will vary depending on what grants are acquired (*Technocopia*). STEM grants also are offered in Massachusetts which the SIC can apply to receive. Nearly all STEM grants are awarded to local businesses which seek to enrich local education and provide a service which leads to skill development and job placement (*STEMgrants)*.
- **Donations** from the public can also serve to bring income into the makerspace (*"Making Makerspaces: Creating a Business Model"*). While not required it can help fund large scale projects or be used to set fundraising goals to bring in new equipment. This again will very important during the early stages of the makerspace and will also contribute to the integration with the community.

Operational Income

- **Classes** are the largest source of income, often contributing about half the income of a makerspace. Classes will range from $35 to $150 depending on several factors described earlier. The actual cost of the classes offered at the makerspace will be made for Springfield demographic such that the classes are affordable but still provide a solid income. However, for this financial analysis we averaged the range of class costs, setting the cost at roughly $80 per class. If one course per day is typically offered and all 16 seats are filled, this results in $1,300 per class. If only 10 of the seats are filled, the income is halved. At 6 days a week, the yearly income is about $250,250 - $400,400.
- **Rapid prototyping services** are common among makerspaces and online companies. FabLab charges 75 cents per gram for resin printing services (*The Infinity Fab Lab*). This is likely the type of printing material that would be offered in the new makerspace. The Springfield makerspace would not have as many custom options and would therefore not be able to charge more for better materials or finishes that some specialty websites offer. Estimating that the average print is 80 grams, this is a cost of $63.75. If this print takes about 2 hours to complete and we can print for 10 hours a day, the resulting income is about $318.75 per day per printer. If an employee or volunteer is around 6 days a week to print on a single printer, this comes to a yearly income of about $99,700. For laser cutting and CNC milling, FabLab charges $100 per hour of use, with a minimum 1 hour charge (*The Infinity Fab Lab*). Setting aside only 3-4 hours per day (to avoid limiting member time) for this service gives a total of $600 - $800 per day. At 6 days a week, this is a yearly income of $188,200 - $250,000. For All three types of prototyping, this results in a

total of about $286,000 - $349,000 annually. If a dedicated machines for these services are purchased, the revenue could be much higher.

- **Memberships** will serve as another main source of income with costs varying from $70 to $110 monthly according to our example plan; this is subject to change depending on the number of members and operational costs. At the current rates and estimating 20 - 30 of each type of member, the yearly income is $60,000 - $90,000.
- **Rental space** for members is also a large source of income. In our model, there is about 900 SF reserved for rental space. If 60-100% of this space is rented, the monthly income is $648 - $1,080 and the yearly is $7,776 - $12,960. The 16 rental pallets in our model result in $5,760 yearly. The total is $13,536 - $18,720.
- **Corporate partnerships** can help with getting services like software for free, which could save thousands. It could also ensure a constant number of members. We'll leave this portion out for now, since it would likely not result in direct income.
- **Retail commission** would be a smaller source of income. Assuming that only a few full time renting members will sell a significant number of products, we can estimate a total retail output. If 3 renters are startup companies who want to sell their products out of the makerspace retail area, And each makes about $40,000 per year, the makerspace could take a commission on $120,000. Estimating a 5% commission, this is $6,000 per year.
- **Maker Competitions** would be a fun community activity that may involve middle and elementary schools in the area, but would not generate a large amount of revenue. For a $20 entrance fee and 6-12 competitions per year, this might accumulate only about $3,000.

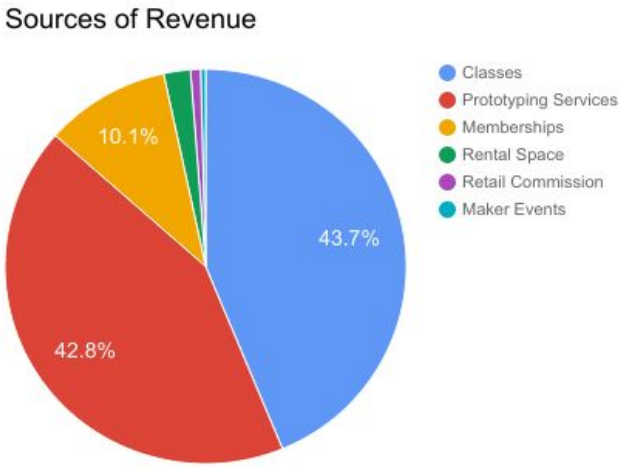

Figure 2.12. Sources of Revenue for our model makerspace. The chart shows that classes, prototyping services and memberships are the most significant sources of income. The smallest sources of income are rental space, retail commission, and maker events. Although these don't generate much income on their own, these services make the space more marketable and useful. This should be reflected in the number of members, students, and professional services income.

Net Revenue

The total gross income from the makerspace according to our analysis is approximately $618,786 - $867,120 annually. The annual expenses will range from $185,957 to $244,477 per year. This is a yearly net income of $374,291 - $681,163. In the first few years there will be less members and customers for the extra services, so this figure would be far less. However, we believe that with the correct marketing strategy, you could see a return on investment very early.

Marketing Strategies

In order to market there needs to be a strategy in place. Two key approaches to marketing are creating a product differential and targeting a niche. The following are things that must be considered regarding the two.

Creating a Product Differential

- Having a professional looking website is vital in the modern business world
- Being prevalent on social media is almost equally as necessary
- Offer a variety of classes. Springfield has several universities nearby so this is especially true
- Offer unique services but also keep in mind who will be using it
- Make sure the business has a good image. This can be helped with social media/ websites as well

Targeting a Niche

- Demographics of the area
- Knowledge of the community
- Psychographics of the community
- Behavior of residents

It is good to initially market to people involved in technology so engineers, teachers, local tech focused schools, and even artists. Creative people will assist in growing the makerspace by allowing them to "fill" the makerspace with things they find useful as well as possible employees, and income from memberships.

Once the makerspace becomes a little more established, classes can be offered to younger or less experienced people technologically. The younger clients will also help spread the word if they attend a local college which will be beneficial for the makerspace.

The more info people can readily find about the business the better. That being said, there are several marketing tools that can be used to spread word and target the audience.

Websites and Social Media

These are some possible things to have on websites and social media that will benefit the makerspace marketing.

- Photos and descriptions of members, staff and equipment
- Pictures and documentation of work done at the space
- Testimonials of members
- Schedule of events going on at the business; classes, special workshops etc.
- Blog

Advertise in the Local Community

- Use local newspapers
- Advertise on local television
- Possibly offer free memberships for people that are willing to teach
- In addition, offer beginner classes
- Get involved in the community to get the name out there
- Have a monthly newsletter
- Flyers targeting local hubs such as campuses, schools, shops, etc.

Community Impact

With SIC

A key aspect which relates the makerspace to the rest of this project is detailing how the makerspace benefits and synergizes with the rest of the SIC. To that end, this section was included to predict possible interactions between the two. For example VVM, which utilizes a majority of the first floor of the SIC and nurtures startup companies, would benefit greatly from the presence of a makerspace. The range of startup companies which could use the makerspace would only serve to increase the attraction of working with with VVM. Also, if DevelopSpringfield owns both of the buildings then the relationship can occur without money exchange of any kind. The Ground Up cafe would also see an outright increase in business due to members of the makerspace needing a location for food and drinks, and there is no better place to go than a cafe mere feet away. The co-working spaces found on the upper levels of SIC can also become members of the makerspace to use the equipment there in place of purchasing it themselves, which would save their companies a good deal of money. This would also increase membership of the makerspace during the early stages of its community building and could very well expedite the process. To summarize, the makerspace has great potential to synergize with nearly every aspect of the SIC if the relationships between the two are established early enough.

With Springfield

Apart from the Innovation Center, another key community which the makerspace must have an impact upon is the city of Springfield. Given the revitalization of the Union Station is concluding, which will increase foot traffic around the city, the presence of an urban makerspace will be highly attractive. To that end, makerspaces of this size and potential for growth are not common within a close proximity of Springfield, with the only prominent makerspace being Make-It Springfield (*Make-It Springfield*). This leads to minimal competition for membership and service utilization. While Springfield may not have the best reputation of all cities in Massachusetts, it is community centers like a makerspace which nurture the development of a stronger community that will allow Springfield to bounce back. All Springfield needs is an ignition to start a cascade of development interest, just as the medical research and development field did for Worcester.

III. Marketing Analysis

Key Findings

In this section, a website is designed to help to improve the marketing strategy of Springfield Innovation Center and editing suggestions are presented to offer a better guideline for Springfield Innovation Center future website development. We listed out the facts of five social medias, such as Facebook, Instagram, Pinterest, Twitter and Linkedin, in term of the following:

- Overview of each social media
- Amount of users
- Age range
- Education
- Income

Besides that, we also give some recommendation for the Springfield Innovation Center's guest WiFi network. Lastly, we present potential artist, John Simpson, to help to create the Springfield Innovation Center's mural artwork.

Introduction

It is tough to emphasize the importance of marketing. For an institution to grow and expand, it must have a strong relationship with its clients and the community around it. In order to achieve that, a strong and effective marketing plan must be integrated which can communicate the goals of the institution and showcase its products and services to potential clients. For SIC to be self-sustainable, it is critical to have a marketing strategy that generates interest in the organization amongst established corporations, local start-ups and entrepreneurs, and the general

population. Not only will it help build brand recognition but it will also encourage partnerships within the community.

A well-established marketing strategy can help SIC achieve its mission of reviving business in Springfield and allow it to develop into a self-sustainable entity. For the SIC to succeed in being self-sustainable it is important that it present its services and the opportunities it provides in a clear and exciting manner to entrepreneurs and other interested individuals. Through various marketing tactics, the SIC should be able to convey and promote its overall mission of reviving business in Springfield.

Website

Establishing a website is the most powerful marketing tool present in this era. It is capable of spreading information about the center, creating a "SIC" brand, and increasing the credibility of the center instantly. A professional website is able to leave a good first impression of a company to potential customers. For example, when clients are comparing different companies, they are more likely to choose a company with neat webs, since it indirectly suggests that the company is organized and capable. Additionally, customers are able to access the website's information anytime they want. Instead of making a trip to Springfield Innovation Center, for example, they can easily book a rental space online. Besides these, we list the main advantages to having a company website:

- *24/7 Accessibility*
- *Credibility*
- *Less expensive*
- *Market expansion*
- *Flexibility to modify information*
- *Keep customers up to date*
- *Growth Opportunity*

The goal of developing the SIC website is to allow people to schedule room rentals and allow the SIC to post upcoming events, event pictures, and an introduction to rentable spaces at the SIC. In our project, we developed a mock website using WIX as a future reference for the SIC's website development ("*It All Starts with Your Stunning Website*").

The structure of the website is listed below.

1. *Homepage*
    a. Brief one page summary of the Innovation Center and the website
    b. Access, link, and introduction to other pages.

2. *Membership page*
    a. Details of membership plan.
    b. Link to “pay now” page
3. *Event page*
    a. Upcoming events registration
    b. Overall events calendar.
4. *Rentable space page*
    a. Kitchen introduction page
    b. Makerspace introduction page
    c. Book online page
        i. Gives two methods for potential customers to book a room
        ii. Detail of each room
        iii. Booking online by select specific day and pay method
5. *About us page*
    a. Introduction to the team and the company.
    b. A quick view of a social network, like Instagram and facebook.
    c. Create a button to link the Facebook
    d. FAQ page
        i. A platform to post all commonly asked questions
6. *Contact page*
    a. Link directly into homepage contact section
    b. Allow user to fill out the information and send email to SIC easily
7. *Forum*
    a. A fantastic place to communicate and connect with others
    b. Users can only access the forum after they create their accounts

In the following paragraphs, we are going to describe each page and provide some suggestions for future editing as the website needs evolve. Additionally, a comparison between two website development pathways (using a standard format vs. creating a custom website) has been made to provide a future reference for the SIC.

Home Page

The homepage consists of six different sections: our community, about us, upcoming events, membership, contact us, and the SIC map. Figure 3.1 and Figure 3.2 (below) display the home page we designed for SIC.

The “our community” section of the website displays several key services the SIC offers and companies that the SIC is involved with, such as the SIC’s rental kitchen space, Valley Venture

Mentors (VVM), and the Ground Up cafe. When users click the read more button below VVM, it will show up a brief VVM introduction. The Ground Up cafe "read more" button will show a cafe menu to users when they click on that. For the kitchen space, a "read more" button will link directly to the shared kitchen introduction page. This gives users more access to the corresponding content.

The "about us", "upcoming events", and "membership" sections give a brief introduction to their corresponding information. The upcoming events section shows the first five upcoming events in chronological order on a calendar. Additionally, this calendar in the homepage is synced from google calendar and will update the events automatically.

The membership plan displays the most important amenity in the plan. The SIC map section show displays the Google Maps location of the SIC. Users are able to view it in either map or satellite mode. The "contact us" section will provide users a convenient way to send out a quick email to SIC customer service center for all inquiries and questions.

Interestingly, more people tend to use their mobile devices to search the internet. According to StatCounter (*Piejko*), in 2015 there is 37% website visits are from mobile devices. This number will only increase with time, so it is advantageous for companies to have a mobile friendly website. Unfortunately, according to our research (*Soderlund*), 23% of companies do not have a mobile-friendly site. In this project, our team also aims to design the SIC's website to be mobile friendly to provide a professional impression to the user from any web interface.

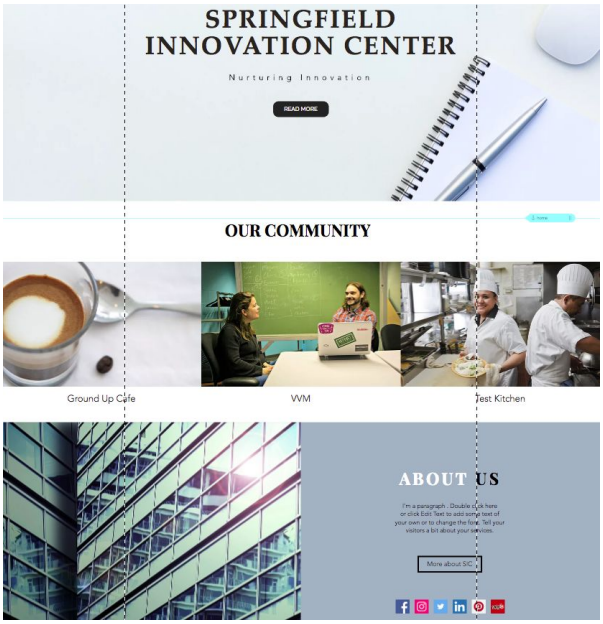

Figure 3.1. Screenshot of top part of home page designed

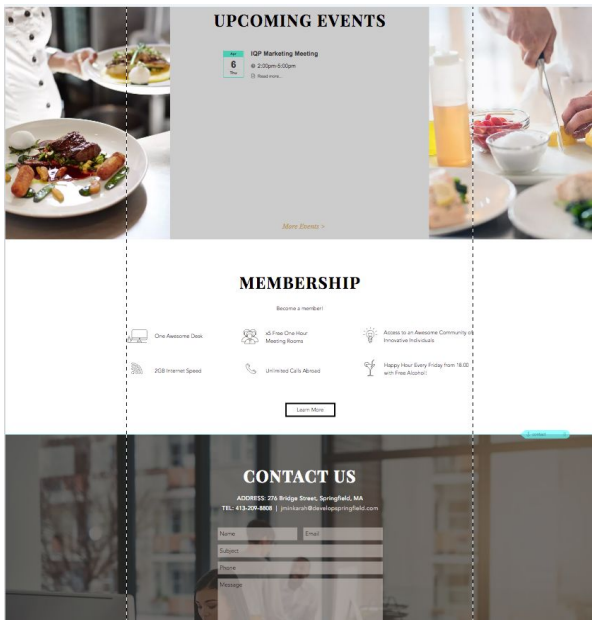

Figure 3.2. Screenshot of bottom part of home page designed

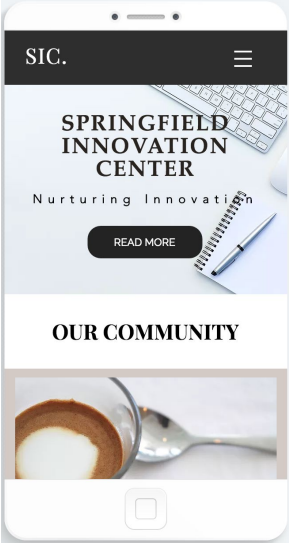

Figure 3.3. Mobile view of top part of home page

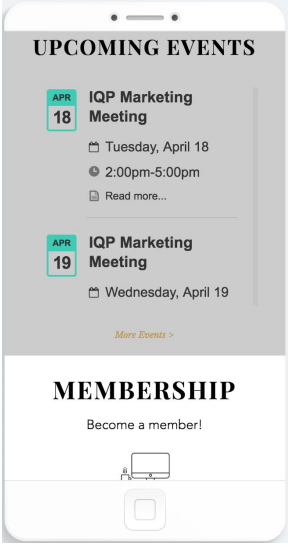

Figure 3.4. Mobile view of bottom part of home page

Editing Suggestions

In the "contact us" section, the information in the box may be changed at will to accommodate the SIC's changing needs. Below, we list several options that SIC developers can implement in the future.

1. *Change target email address*
   Instruction
   - Select the input block → click "set your email", as shown in Figure 3.5.
2. *Change email content in the input box*
   Instruction:
   - Select the input block → Setting

   List of info we can place on the block:
   - Name, Email, Phone, Address, Subject and Message

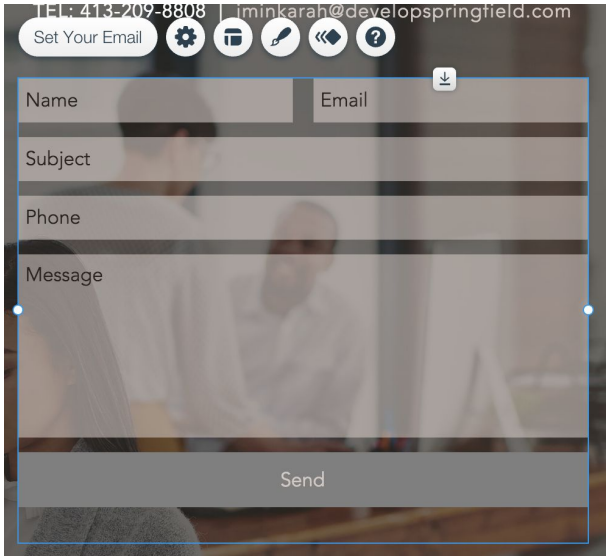

Figure 3.5. Screenshot of contact section and instruction of how to change contact setting

Membership Page

The membership page is essential to provide users information about the benefits to renting a room or becoming a member at the SIC. A good membership page will provide customers a clear, easily-understandable and concise list of all the amenities.

Keeping this goal in mind, on the membership page we included a detailed but clear list of amenities for each membership plan in the makerspace, which is depicted in Figure 3.6. The price is not displayed on the page until potential clients click the “pay now” button. In this case, we suggest adding a pay button from PayPal business account. Since we did not have a PayPal business account, we could not create a PayPal “pay now” button from the PayPal website. We put a temporary button on the page which links directly to instruction for creating a PayPal button. If the customer finishes their payment, PayPal will link directly back to member’s account page. The member’s account page can also be set for “hiding mode” in the page settings, which will show up after members log into the website. Because of this limitation, we only designed a membership introduction page.

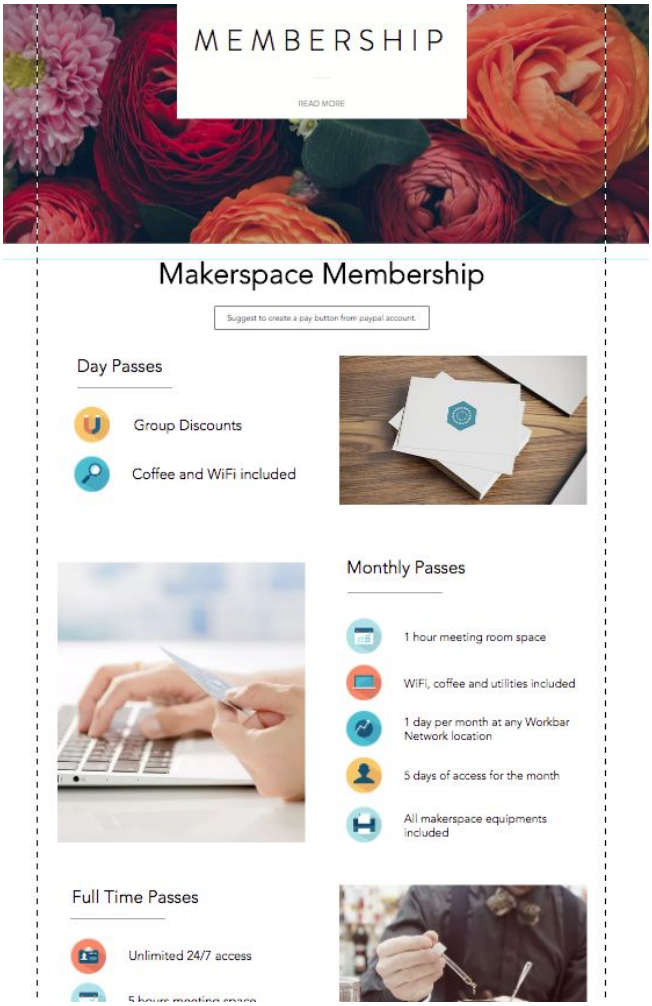

Figure 3.6. Screenshot of membership page designed

In terms of the membership dashboard, we have following suggestion

1. Membership plan overview
    a. A section to allow user to overview his purchased membership plan
2. Membership plan renew
    a. Allow user to renew their membership easily
3. Schedule detail
    a. Display the time and schedule that user made for the facility
4. Catering order
    a. Enable member to order catering for a meeting or conference

Events page

We implemented two elements into the event page. The first one is event registration section. Four key information will be displayed on the page, the countdown timer, event title, time and location. Users can click the registration button to register the event easily and share the event on social media by clicking the facebook, twitter and Instagram button on the registration button. To register the event, customers need to provide their name, email, phone number and additional guests.

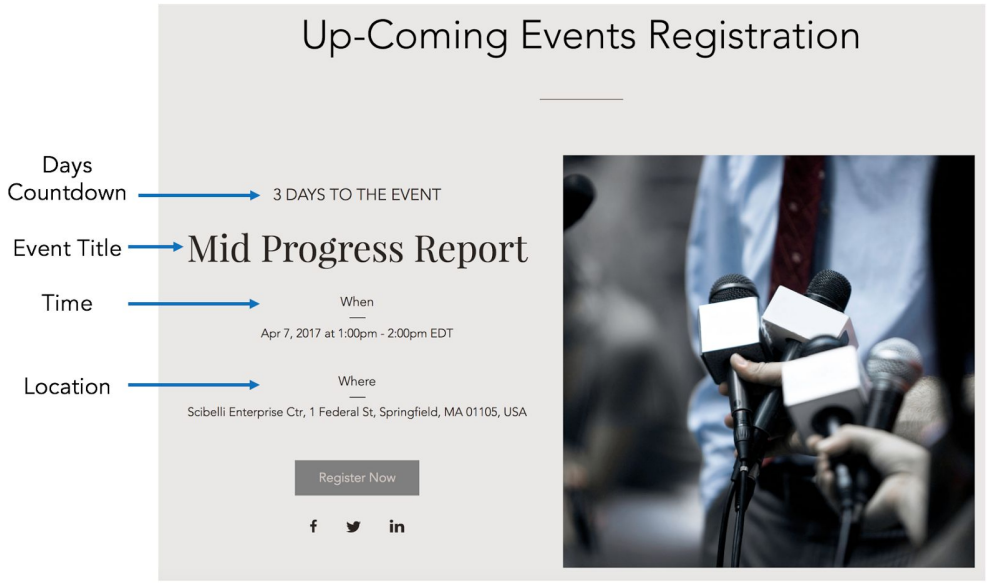

Figure 3.7. Event Registration Sample, including countdown timer, event title, time and location

We also create a calendar to show the overall events which will happen in a month. Event details, such as location and time, will pop up when users click on the specific event in the calendar. Users can also easily add the event to google calendar.

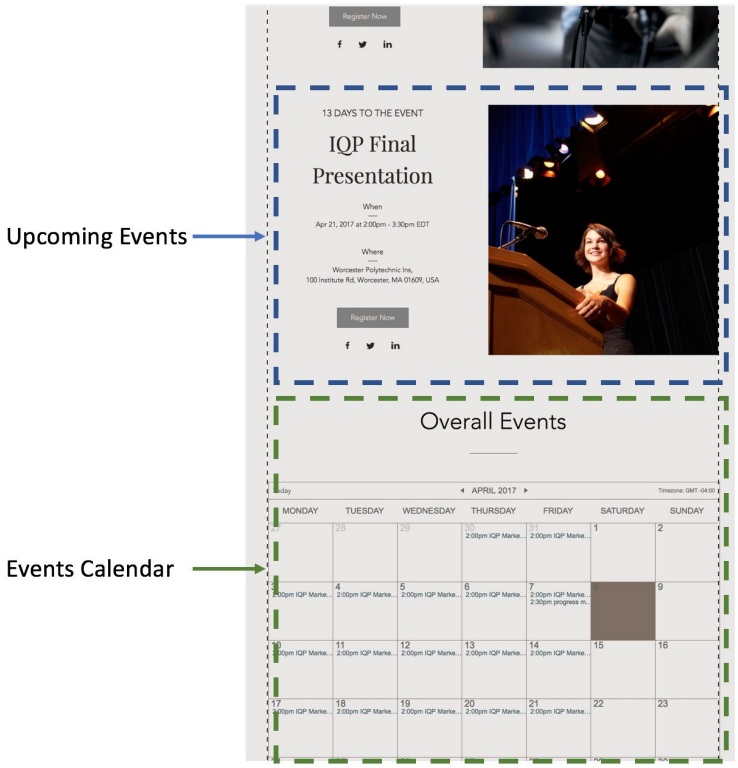

Figure 3.8. Screenshot of event page, including upcoming event and events calendar

In terms of managing and operating this page, we recommend having an event manage to converge the event date and location together in order to post it on the website.

Editing Suggestions

To add another upcoming event, please follow the instruction below.

App Market → search "WIX Events" → click "+ Add Again"

And then a new event window will be shown on the current page. Click "Manage Event" to add and enter the event details in the pop-up window. Lots of options in the manage event system are up there for us to set up our preference. For example, you can set a guest limit and set up an email alert of the event.

To edit the upcoming event registration, for example, if future developers want to edit the registration form requirement, here is the instruction:

Manage Event → Click on a specific event → Registration Form → Add more Options

There are tons of options in the system for us to choose. We list all of them in the following:

1. Phone number
2. Address
3. Data
4. Additional guest
5. Comments
6. Create a custom question

We can even create email template and send out an invitation via email. To do that, follow the instruction below:

Manage Event → Invitation → Choose a template → Next or add some text/picture on the email template → Add recipients → sent out an email

Rentable Space Page

Rentable space page consists of brief introductions to three types of spaces that can be reserved and utilized at SIC. Three different spaces include a well-equipped kitchen, makerspace, and the presentation room. Links to more details on each type of space resides on the rentable space page under the corresponding introductions. Also, 'Book your space' can be found under 'Rentable Space' tab. 'Book your space' tab links to a new page where information on reserving the space exists. Space can be reserved in two ways. One is to directly call the number provided on the page and the other is to reserve the space online. The page provides 'I like this one' button to book the type of space which directs you to a calendar where the customer can choose the date and time to book and can also see the availability of the space. It also provides you with the cost for booking the space.

We used WIX Booking system in our "book your space" page because we thought this system is user friendly. For example, it will send out an email notification to the customers and sync the google calendar.

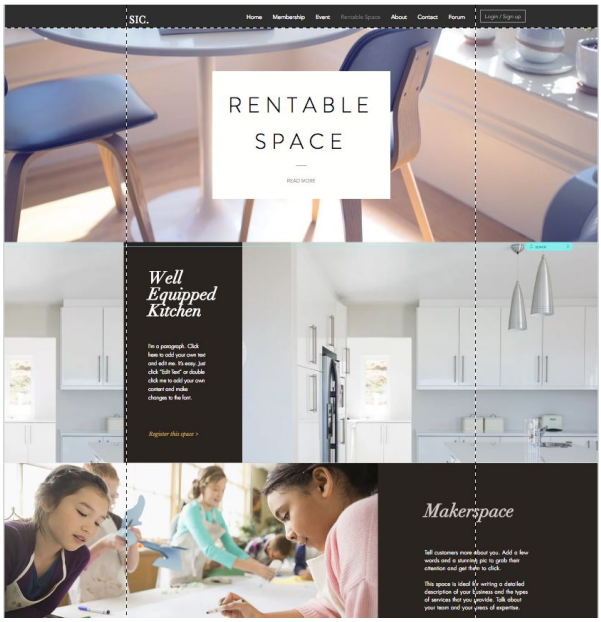

Figure 3.9. Rentable Space Introduction Page

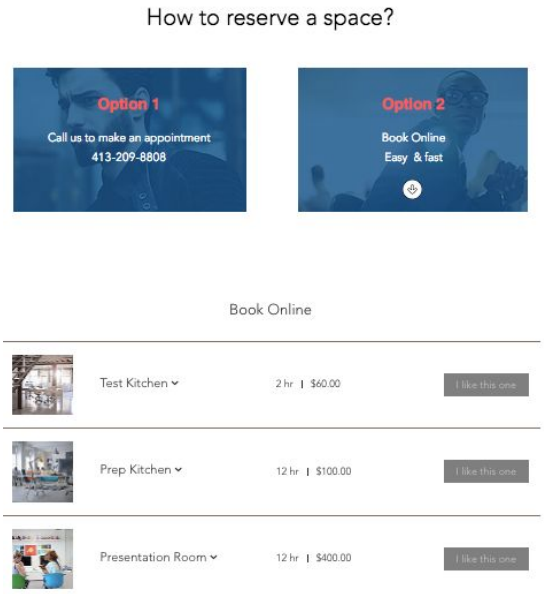

Figure 3.10. Book Online Page

Makerspace Page & Kitchen Page

These two pages provide a first impression and establish credibility with our potential clients. This first impression will determine how interested our clients will feel about our rentable space. To make an attractive introduction to this page, we utilized some animation technique.

Makerspace page displays a 3D model of the space and information on the type of tools available for use. This is to help customers have a better idea of what space looks like and type of services it offers. Kitchen's page has a similar setup giving a preface of the kitchen.

The makerspace is purely an introduction page. Considering there might be the third party to own these place or rent this place, we will create a link through their own makerspace website and guild the customer to their website for more information about makerspace.

Editing Suggestions

The list below is part of the settings and instructions that we provide for future SIC website development.

1. *Add new services*
   Instruction: Manage Bookings → Services → Private → Add a New Service.
   Comments: From there we can set the service duration for our rentable space. The time between appointments can also be set easily in the WIX booking service. For example, if we want to leave a cleanup time for each test kitchen appointment, we can set the "Time Between Appointments" to be 1 hours. In this case, we have 1 hour to clean up the

kitchen and get ready for the next appointment. In terms of the payment method, we have three options: online payment only, in person payment or both.

2. *Manage Calendar*
   Instruction: Manage Bookings → Calendar.
   Comments: We can either add a new event or sync the google calendar directly so that customers are not able to book that time period.
3. *Payment Method*
   Instruction: Manage Bookings → Payment → get paid via PayPal/get paid via Stripe
   Comments: WIX Bookings accepts either PayPal online payment or credit card. However, to do that, we need to pay and upgrade the WIX account.
4. *Change Calendar Interval*
   Instruction: Manage Bookings → Business Info → (scroll down to Advanced Setting) Calendar Settings → Calendar Intervals
5. *Manage Customers Info*
   In the customers tab, we are able to view the personal info, appointment history and payment, like what is depicted in Figure 3.9.

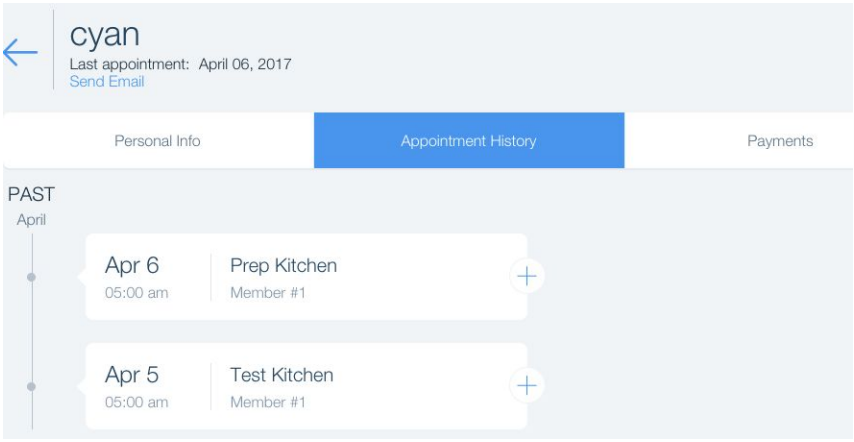

Figure 3.11. Customers Info, Appointment History And Payments

About Page

An about page is what client will look at to get to know more about the company. This is why providing a clear, straight-forward about us page is essential, since it will catch our potential clients' awareness of SIC. In our about us design, we also put some social media feed on the about us page, like Figure 3.10, since we believed that showing the most recent social media update on the website will bring up follower in our social media platform. People can easily "like" our facebook by clicking the like button on the page. Since we have a Facebook and Instagram feed on the about us page, people have more chance to get to know the recent news in SIC and the awesome pictures that are posted on Instagram.

To save some of our time in replying customers' emails and phone call, we added a "frequently asked questions" page under the about us page. We believe customers will find most of the confusion they have in mind on the FAQ page. They are also able to search the question. To make the page more straightforward, we can even categorize the topic of the frequently asked questions.

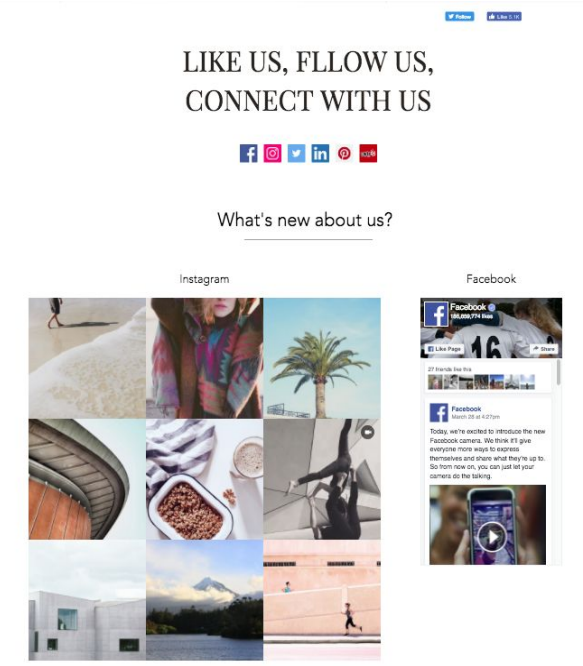

Figure 3.12. Social Media Overview on About Us Page

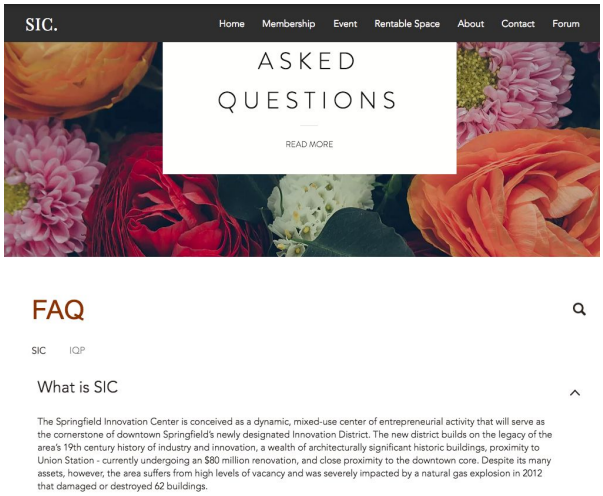

Figure 3.13. Frequently Asked Questions Page

Editing Suggestions

Here is some suggestion to edit the about us section.

1. *Add more questions on FAQ Page:*
   Click the FAQ block → Setting → Manage Questions → Add Questions
2. *Link Social Media:*
   Click the social media icon → choose a picture → in the right column, add a link
3. *Social Setting:*
   Add → Social → Social Settings → Add SIC Facebook Username

Forum Page

A forum is an excellent way to express and share customers' opinions on a diverse range of topics. It builds up an interactive environment allowing the users to read different articles at any time. Our forum page allows customers to either create an account or log in via facebook or google account. Once customers log in to the website, they can post, comment or like any article on the forum. For example, a customer can create a discussion about how they feel about special dinner by our guest chef. Or they can bring up a question in the forum about the question he/she meets today. We believe the forum is a fantastic place to build customer's' network.

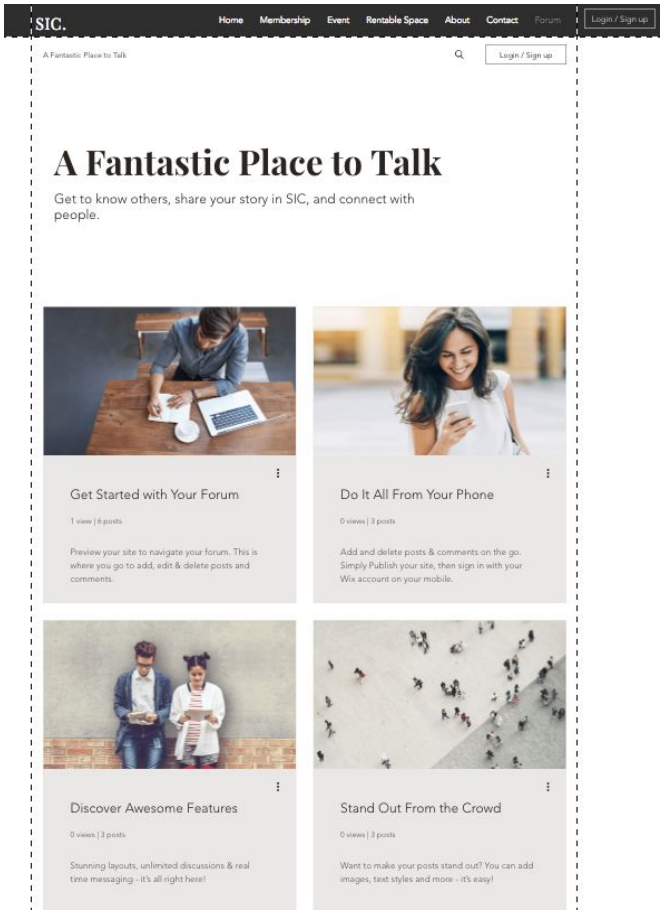

Figure 3.14. Forum Page Example

Additionally, a user can follow other people by simply click the follow button in others' profile. They can also modify their own profile by changing profile picture, username and background picture. If they get comments on their post or reply to the post, they will receive a notification about this. We set the permission to member only, which means that customers need to have an account to be able to see the forum content. We can change this setting anytime by following the steps in the editing suggestion below.

Editing suggestion

In the forum page, we set the layout in medium card mode, instead of in classic list layout. We can easily change this layout to classic mode by following the steps below:

Setting → Layout → Choose a layout → Classic

A key feature in the forum is login function. We list some key settings for the login function to give a reference of future SIC website development.

1. *Permission of the page*
   Page Menu → Forum page → Show more icon → Permission → Select "Member Only" or other options
2. *Manage signup settings*
   Click forum block → Setting → in the forum setting click "Settings" → Member Signup Settings

From there, we can multiple user signup options. For example, we can see the signup restriction to "people I approve", so that we have control of who can create an account under SIC website. We can also check or uncheck the social login to customize the login page.

Future Development Suggestions

In term of the future development, WIX might not be the only option to develop a website. One of the famous development tools called WordPress can also be used to develop a decent website. The following sections show a comparison between WIX and WordPress.

1. *WIX*
   WIX is a quick, intuitive platform to develop a website where we only need to drag and drop the template they provide. A person without any coding background can develop a beautiful and good visual website in WIX following the templates they have. With WIX, you can easily change to mobile view and edit your website there.
   - *Cost Analysis*: $19.92 per month to link the design to our SIC domain and enable email reminder function in the booking system.
   - *Advantages*
     - Intuitive drag and drop editor
     - Can easily publish by clicking one button
     - Professional template is provided
     - Host website for you
   - *Disadvantages*:
     - Lack of total control and advanced features
     - Lack of resource

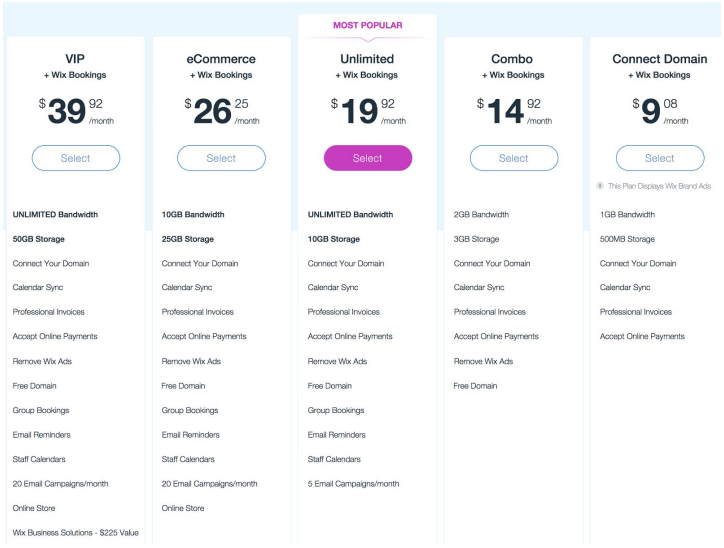

Figure 3.15. WIX Upgrade Cost ("*Premium Plans*")

2. *WordPress*

   WordPress is an online, open source website creation tool written in PHP, a programming language. To use that, the developer needs to understand how to read programming language.

   - *Cost Analysis*: Business plan: $24.92 per month; Premium plan (good for entrepreneurs): $8.25 per month. Figure 3.14 shows the cost of upgraded plan.
   - *Advantages*:
     - Widely used and lots of resource out on the internet
     - More flexible in editing the visual (enable CSS code editing)
     - Over 10k of Themes
   - *Disadvantages*:
     - Need to find a web host ourself and update the host manually
     - Developer need to have a coding background.
     - Less intuitive

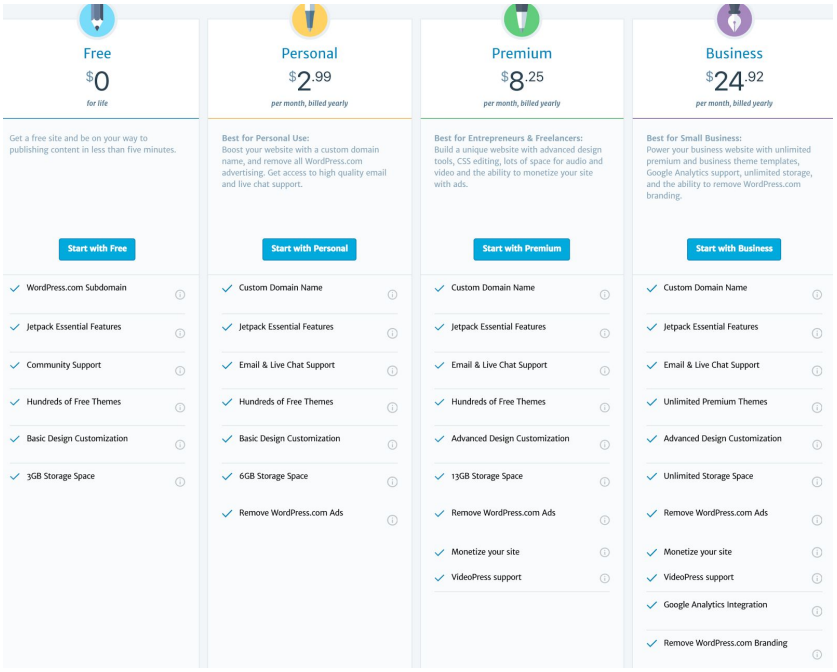

Figure 3.16. WordPress Cost ("*Choose your WordPress.com flavor*")

To sum up, while WordPress is more suitable for a professional website development, we think WIX is overall a better choice for SIC future development. Note that developers do need to understand programming language and WordPress do need some frequent maintenance in the future. Using WordPress not be as easy as WIX. WIX does all the coding and maintenance job for you and it is less expensive than WordPress.

Our website can be used as a model for future development of SIC. Besides the two methods that we discuss in the previous sections, there are lots of other choices up there to develop a website. DevelopSpringfield can utilize their existing tool or engineer to continue on SIC website development and link it to a certain domain. The login details are listed in Table 3.1 below. To access to the editing page, we need to first get into WIX page (http://www.wix.com). And use the username and password to log in. After we log in, we can access the editing page by clicking "Manage site → Edit site".

Table 3.1: Detailed Website login and password information

Website Domain	http://x33love3.wixsite.com/wpisic
WIX Login Username	testiqppvd17@gmail.com
WIX Login Password	123456789?
Gmail Login Username	testiqppvd17
Gmail Login Password	123456789?

Artwork to promote the Springfield Innovation Center

Another marketing strategy to enhance the visibility of Springfield Innovation Center is to draw public's attention towards the building. One way is to attract people through street art. Murals are a unique way of appealing to people and catching their attention. Having murals on both sides of the building frames a sense of community and makes the area more welcomed, drawing more foot traffic in the area. Besides that, it promotes economic development in the area by increasing sightseeing and property value. A case study performed in several Canadian towns showed that the creation of murals increased tourism from 96,000 to 169,000 over three years in one town, and similar increases were reported in the other towns studied (Koster & Randall, 2005).

Different approaches can be taken for murals. One way is to have local art students from University of Massachusetts paint the murals on the building. Since they are not professionals, the cost associated would be minimum allowing them with the opportunity to showcase their work and get recognition. An arrangement could be made that would allow young artists to paint new murals on top of the old one every six months allowing locals to experience new murals and will help Springfield Innovation Center gain popularity for its artwork.

Several mural projects in Springfield are being carried by City Mosaic which is a non-profit organization promoting visual arts community and working towards improving city's landscape through art. We got in touch with John Simpson, City Mosaic's Director and a professor of arts at University of Massachusetts, to get some ideas for mural. When asked about rotating murals, Simpson suggested having one big permanent mural in the top 75 percent of the building wall. Since Springfield Innovation Center is a three story building, getting a mural on it is not easy and it would not be ideal to change the mural every few months. Instead, he suggested that the lower 25 percent of the building can have four to six murals rotating every few months. This would allow young artists from Simpson's class to paint the murals giving them a chance to exhibit their work. As the lower murals are painted by young artists, Springfield Innovation Center would only have to pay for the supplies. Simpson showed great interest in the project and mentioned that he would like to paint something fascinating which would inspire people to take pictures infront of it. Simpson had many ideas about the type of content that could go on the building. A timeline for the mural was planned with John Simpson.

Figure 3.17. Mural design

Figure 3.18. Mural timeline

In addition to all this, we could allow local artists feature their artwork inside the building giving them a platform to exhibit their work. MassLive building in Springfield features paintings in their lobby on the first floor adding liveliness to the building and encouraging students and local population to visit the building. A similar approach can be taken for the Springfield Innovation Center to increase foot traffic in the building. Such events would give more exposure to the Springfield Innovation Center, allowing students and entrepreneurs learn more about the services it offers such as co-working space and makerspace. Not only that, such events could also help advertise the cafe and other events in the center such as the test kitchen where different chefs present their dishes. The cafe and Valley Venture Mentors could help advertise the artists by having their business cards around the building. In return, Valley Venture Mentors and the cafe will get free artwork rotating around creating a pleasant atmosphere for both, people working in the building and the visitors.

Another option for artwork instead of murals is to have light painting on the front or side of the building, or both. Light painting is an art formed through manipulation of light and colors. It

adds beauty to the building and attracts people to visit at night. There are two downsides of light painting. One is that it can only been seen at night. Another drawback is the cost of light painting. Light painting can get very expensive because only a handful artists have the skills and experience. Since it is an expensive form of art, having light painting on the Springfield Innovation Center can cause a fortune. However, light painting on Springfield Innovation Center will not only make the building stand out but will also start a trend of light paintings on the building in Springfield. Stephen Knapp, famous for his light art, can be approached for ideas on light painting and how much it would cost to do so.

To conclude, we think having a one big permanent mural on top of the building and rotating murals in the bottom is the best way to attract locals attention. It is the most efficient form of artwork as it costs less and is faster to implement compared to light art. For this work, John Simpson is recommended as he is experienced in painting murals in Springfield and seemed very interested in this project. Besides that, his students can help with the rotating murals every few months enhancing the visibility of Springfield Innovation Center.

Guest Wifi Network

Free wifi is becoming an expectation to customers, rather than an amenity. According to the survey conducted by iGR (*Campbell*), three-forth of the small businesses consider complimentary WiFi to be important or very important to their businesses. More than 60% tend to spend more time in the place where WiFi is introduced.

Therefore, a reliable wifi for customers will increase foot traffic, time spent in the Innovation Center and the park across it, and customer satisfaction. For example, in the makerspace, if WiFi is introduced customers can use their laptops to search for instructions, recipes, and answers to the specific questions that they might have. It will also be convenient for co-workers to share their file via the internet while their working. In this case, we listed two suggestions for SIC to set up their guest WiFi system, following by the advantage and disadvantage of each option.

Guest Wifi Suggestions

1. *Suggestion I - Captive portal*

   What is captive portal

   - A Captive portal is a web page that will show up to give access and permission to customers, allowing them to connect to the WiFi. This web page can be design in different ways (*Perez*).
     1. *Log in web page* - users will enter their phone number to get the access code to login the WiFi system. And the system will assign a specific time for users to use the WiFi.

2. *Rule agreement web page* - after users agree on the rule that appears on the web page, they should be able to get WiFi access.

Different designs will contain different rules of WiFi access, but generally, a fast and easy access method is what customers want.

Pros:

- Advertisement and marketing tactic (*Perez*)
    - We can utilize the pop-up WiFi access web page to raise the reputation of the advertisement and brand. For example, we inject an advertisement video for a certain amount of time and users need to watch the advertisement video before being permitted to access the WiFi. In this case, we are able to display test kitchen, co-working space and makerspace advertisement to the public. Besides posting an advertisement, the captive portal is also helpful when we want to display upcoming events, registration details, and social media link.
- Illegal activity tracking (*Perez*)
    - Setting up a captive portal will give the right to SIC to keep track on user's internet activity to prevent possible illegal activities on a free public WiFi network. Due to the captive portal, SIC is also able to keep un-trusted users away from the network and also from the confidential data. And limit the access inside the corporate and employee network.

Cons:

- If the WiFi login web page crash for a certain reason, customers will not be able to login the WiFi and use the internet. Additionally, if the design of the WiFi login page is complicated and it takes customers a long time to figure out how to login to the WiFi network, it would generate a negative impact on customer return rate. Another disadvantage is that to setup a captive portal, the company need to spend money on hiring senior software developers to develop the system, or on buying an existing product which supports the captive portal service.

Captive Portal Development Suggestions

1. Start from scratch
    a. Need employees
        i. Senior developer ($10k/month)
        ii. New graduate software developer ($5k/month)
    b. Computers for certain amount of employees ($800/developer)
2. Buy an existing product

a. NETGEAR ProSAFE WAC730 Business 3x3 Dual Band 802.11ac Wireless Access Point (WAC730-100NAS) & PAV12V AC/DC Power Adapter Bundle
    i. Price: $229.99

2. *Suggestions II - Provide customer WiFi password*
   The other option to provide a free WiFi network is to set up a common password for guest WiFi and provide your customers the WiFi password. This sound very easy at the first pace. However, this method will not promise to provide a security network for the company.

   If we choose to hire some developers, we need to take the hiring risk into account. For example, the maintenance of this WiFi network would become a trouble if some of the developers quit the job. Additionally, the network security plays a vital role in a company. In this case, we would suggest to buy an existing product and build up the captive portal based on the existing product, instead of hiring software developers to develop the captive portal from scratch or providing WiFi password to customers.

Social Media

Social media is integrated into the daily lives of most adults. 68% of United States adults are active members on facebook alone. With many social media platforms available on the internet, there is a social media site for almost every demographic available. Social media is also being used in a variety of ways by businesses, from being the businesses main “website” to being a way for them to advertise for themselves. Because of the prevalence of social media in today's culture, we believe that it is a vital marketing component for the SIC, and will help make a large number of people aware of the Springfield Innovation Studio. Below are the platforms we feel will work best with the SIC, and the reasons we like them or would be cautious about using them.

Facebook

Facebook was founded in 2004 and has grown tremendously since it was founded. Facebook is by far the most popular social media platform today (68% of adults in the United States use Facebook) and has over double the amount of users of the 2nd most popular platform, Instagram (*Duggan, Greenwood, and Perrin*). Facebook allows users to upload pictures, videos, and text to the platform, and also allows you to have your own page where people can view information about you. In the case of the SIC, this info could be location, services, pictures of the place, reviews, and daily updates about what is going on at the SIC. Since we are suggesting that the

SIC should be using social media, the must have an account would then logically be facebook. Facebook is a great tool for businesses for many reasons. According to a 2015 Forbes magazine article (*DeMers*), 80% of marketers are currently using Facebook as a marketing platform. On top of marketers using Facebook most often, most consumers prefer to connect with brands through Facebook as a whole. The goal of Facebook in this capacity is not necessarily to send ads to people over the platform, but rather to obtain a fan base. Many other businesses, especially small to medium sized ones, do this as well, and it allows people in the community to visualize what the SIC is all about, and peaks interest in it (*DeMers*).

Demographics are important as well when considering social media platforms, as we want to make sure we are being visible to the groups of people we visualize using the SIC. According to research done by pewinternet.org, men and women use Facebook in roughly equal amounts (75% of men who use the internet vs. 83% of Women). Between the ages of 18-29 and 30-49, Facebook is used by about 86% of adults who use the internet (*Duggan, Greenwood, and Perrin*). This is important because these are the age ranges VVM, the Test kitchen, and the makerspace will be targeting, younger people who want to or are trying to become entrepreneurs. Facebook is also used by 84% of people who make less than $30,000 a year and use the internet, and is used by 81% of people who live in the urban locations and use the internet. With the average income per capita in Springfield under $20,000 (*Duggan, Greenwood, and Perrin*). These statistics about Springfield and the use of Facebook, can lead us to assume that Facebook will be a great way to reach people living in Springfield that would be attracted to the Innovation Center. We strongly recommend that Facebook should be used at minimum by the SIC to increase its presence among the general public in Springfield and surrounding areas.

Instagram

Instagram is another great social media platform that we believe will work great for the Springfield Innovation Studio. Instagram was founded in 2010, and was bought by Facebook in 2012. Facebook's involvement with Instagram has helped Instagram grow into the second most used social media platform used today (28% of adults in the United States) (*Duggan, Greenwood, and Perrin*). Even though Facebook owns Instagram, Instagram continues to run as its own separate platform, but at the same time allows both platforms to be linked to each other. Instagram allows users to post pictures or videos with a small caption under each one. The simplicity of Instagram is mainly used as a way for people to get an idea visually what is going on in people's lives, or at a business. This is in contrast to Facebook, which is much more well rounded, but more text based, where as Instagram is very visual based, but not very text based. However, because of this contrast, the combination of Facebook and Instagram will be a great way for people to learn what the SIC is all about, while increasing the center’s internet presence.

Instagram does have different demographics than Facebook, however, and while different isn't bad, it is still important to be aware of what the typical Instagram user is like. Instagram is used by a higher percentage of women (38%) than men (26%). There is a giant difference, however, with the people who use Instagram based on age groups. People between the ages of 18-29 use Instagram a lot. 59% of all Adults who use the internet in this age range use Instagram. However, this percentage dramatically drops off as you get to older age groups. For adults who use the internet between the ages of 30-49, 50-64, and 65+, the percentages are 33%, 18%, and 8% respectively. This trend tells us that with Instagram, we will be reaching mostly a younger audience, which could be very valuable as the SIC is geared towards younger entrepreneurs. Instagram is used by about 33% of adults, no matter what their income is, and is used more by people in urban areas (39%) than in suburban (28%) or rural (31%) areas (*Duggan, Greenwood, and Perrin*). This to us shows that there are plenty of people in or near the Springfield area that use Instagram, and will help draw a lot of younger adults to the SIC.

We believe that the SIC should use Instagram to showcase events that had previously happened. Posting a picture of a workshop at the makerspace, or of the test/prep kitchen showing off what the cooks are making, will allow users to visually see what is going on at the SIC. Allowing people to see what a typical day/event at the SIC through daily posts, we believe when people see things that look interesting to them or something they would like to learn/try to do, they will then actually go to the SIC to experience it for themselves. And you could post a link to the website in the pictures/videos captions, so if they are very interested, they can click on the link that directs them directly to the signup tab on the website so they can reserve a spot for an event at the SIC.

Pinterest

Pinterest was founded in 2010 and is the third most used social media platform, and is used by 26% of adults in the United States. Pinterest is a photo sharing platform, that is primarily used to act as a "catalog of ideas". People on Pinterest tend to use the social media platform as a way of finding and trying out new fashion, food recipes, and arts and crafts. Pinterest also allows businesses to create pages that can promote their companies online. Because of Pinterest's focus on arts and crafts, food recipes, and fashion, we believe Pinterest could benefit the SIC, more specifically benefiting the test kitchen as well as the makerspace.

Pinterest is the social media platform that has the biggest difference in males versus females who use the website. Only 17% of men who use the internet use Pinterest, compared to 45% females. This shows that Pinterest is predominantly used by females (Duggan, Greenwood, and Perrin). This makes this social media platform one of the best platforms for posting material directly targeted for females. The age demographics that use Pinterest follow the same trend that most of

the other social media platforms do. Most of the people who use Pinterest are between the ages of 18-29 years old (36%), followed closely by the 30-49 year old age range (34%), then by the 50-64 year old range (28%), and lastly the 65+ year old range (16%). Pinterest is used less by people who have a high school education or less (24%) than by people who have at least some college education (34%). Pinterest is used more or less evenly by all incomes under $75,000 (~31%), and is used by 35% of adults who use the internet and have an annual income of over $75,000. Lastly, Pinterest is used most by adults who live in suburban areas (34%) as compared to adults that live in urban (30%) and rural (25%) areas (*Duggan, Greenwood, and Perrin*).

The SIC could definitely benefit from having a presence on Pinterest. Although Pinterest is used much more by women than men and does not hit every demographic area evenly, Pinterest's number one benefit to the Innovation Center could be showing the recipes the guest chefs use for the test kitchen and have Pinterest users follow the recipe at home and rate how they thought it tasted, giving the guest chef much more feedback. Pinterest could also be used by the makerspace to show people how to do certain crafts at home, and maybe even having a written tutorial section on the Pinterest page for people to follow, so they can learn to use the machines that are in the makerspace from home. Overall, while Pinterest won't play as big of a role as Facebook or Instagram, it can be very beneficial for the test kitchen and the makerspace.

LinkedIn

LinkedIn is the oldest social media platform that we will be talking about. Founded in 2002, LinkedIn is a social media platform that is focused on businesses, employment, and professional networking. Since the SIC is trying to be a hub for innovation, LinkedIn could provide a great way for it to contact new tenants, reach new partners, help connect the people who attend Valley Venture Mentors events with each other, and help small or single person businesses find out about the makerspace.

LinkedIn is used by 25% of adults in the United States. Men use the social media platform more than women, 31% and 27% respectively. The percent online adults who use LinkedIn in the 18-29 age group is 34%, 33% are in the 30-49 year old range, 24% are in the 50-64 year old range, and 20% are 65+. LinkedIn use appears to be heavily influenced by a person's education. Only 12% of online adults who have a high school degree or less use LinkedIn. In comparison, 27% of online adults with some college and 50% with a college degree use LinkedIn. LinkedIn is used by a higher percentage of people who make over $50,000. Adults who make less than $50,000 use LinkedIn much less (under 20%) compared to adults who make between $50,000-$75,000 (32%) and over $75,000 (45%) a year. People who live in urban areas also use LinkedIn at a higher percentage (34%) than people who live in suburban (30%) and rural (18%) areas (*Duggan, Greenwood, and Perrin*).

LinkedIn could be a great way for the SIC to connect with business professionals. This could be used to help find small companies that want to use the makerspace and rent out offices in the SIC. This could also be used to help find chefs and catering companies to use the prep/test kitchen LinkedIn would also be good for connecting people attending Valley Venture Mentors sessions to each other as well as connecting them to whomever is leading the session. LinkedIn might not draw people into the Innovation Center like the above social media platforms, but it will have the value of connecting business professionals to each other and creating a networking group for the people who go to or work at the SIC.

Twitter

Twitter is an online news and social media platform that was created in 2006. Twitter allows users to post messages that are limited to 140 characters. Twitter has a heavy use in hashtags, which are searchable, as well as a trending feature that shows what hashtags or users have had the fastest growth over a short period of time. Twitter is similar to facebook, except for the fact that it has a character limit, and while facebook is a mix of text, pictures, and videos, Twitter is a short post that is usually text only. Twitter can also be a useful tool to share information with large groups of people. This can be very useful, if the Springfield Innovation Center's Twitter account joins groups that are centered around test kitchens, prep kitchens, makerspaces, innovation centers, and entrepreneurs, where all these different groups of people can share information about research and effectively operating an innovation center. Twitter can be a way of seeing how the population reacts to the SIC, especially events, and can be used as a marketing tool to gauge how people thought the event went, or how people are feeling about an event at the SIC before it begins.

Twitter is used by 21% of all adults in the United States. Of men and women who use the internet, 24% of men and 25% of women use Twitter. Of internet users, Twitter is used by 36% of 18-29 year olds, 23% of 30-49 year olds, 21% of 50-64 year olds, and by 10% of adults over the age 65 who use the internet. Twitter's use appears to go up with a person's education. Twitter is used by 20% of online adults who have a high school diploma or less, 25% of online adults who have some college, and 29% of online adults who have at least a four-year degree. Twitter seems to be used more by people who have a higher income. Of online adults who make less than $30,000 a year, 23% of them use twitter. Of online adults who make between $30,000-$50,000, $50,000-$75,000, and $75,000 and up, Twitter is used by 18%, 28% and 30% of them respectively. Twitter use does not seem to be based on whether a person lives in a urban, suburban, or rural area as all these areas have a highly similar percentage of online adults who use Twitter (26%,24%, and 24% respectively) (*Duggan, Greenwood, & Perrin*).

Overall, Twitter might be a social media platform to consider for helping to make more people aware of the SIC. While it is not as vital to have as Facebook or Instagram, and has the lowest use out of the big social media platforms, having a presence on every platform will ensure you are reaching as many people as possible through having a large social media presence. Using Twitter's hashtag feature, the SIC will be able to spread its appeal by using hashtags that relate most to the kind of people we are trying to bring in. Examples of this could be #innovation or #entrepreneurs just to give two quick examples. With Twitter's hashtag and trending features, it is the social media platform that can potentially give the SIC the fastest rise in an online presence, over the shortest amount of time.

Conclusion

With a combination of the mock website, the free WiFi, the social media platforms, and the mural, we believe that we can increase the foot traffic into the Springfield Innovation Center. The mock website will be a great template for the Springfield Innovation Center that is very intuitive for people accessing the website. The free guest WiFi will further increase online traffic to the Springfield Innovation Center's website by having the guest's internet browser automatically go to the Innovation Center's website when they connect to the WiFi network. We strongly recommend using all of the social media platforms above to help increase the online presence of the Springfield Innovation Center. Using all of them together in combination with the website will make sure that we are reaching as many internet users as possible. At a minimum, the website and Facebook alone can suffice as a major online presence for the Springfield Innovation Center, but we strongly encourage the use of all the social media platforms we looked into (Facebook, Instagram, Pinterest, LinkedIn, and Twitter) along with the website. As for the mural, we believe that having John Simpson as the artist for the outside wall mural will be a huge benefit for the Innovation Center. John believes in the Springfield Innovation Centers vision, and is someone who can bring in a lot of experience and creativity in creating a beautiful mural that connects with the people of Springfield. Overall, we believe that these suggestions that we have made should be implemented as they can greatly increase the public's awareness and excitement about the Springfield Innovation Center.

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Appendix

A. Shared Kitchen Space Research

Commercial Kitchen Licensing and Legal Information

In order to determine the correct plan of action to receive legal permission to house food prepping, food processing and commissary activities, food storage, and alcohol at the Springfield Innovation Center, national, state, and local government regulations were consulted.

At the national level, the governing bodies for food activities included the FDA (US Food and Drug Administration), the USDA (US Department of Agriculture), and the HHS (US department of Health and Human Services). In Massachusetts, the state bodies of these departments (Department of Health) operate to ensure their regulations. These departments collectively have established guidelines that protect the consumer, and which all food operators must follow to receive operating permits and maintain health and quality assurance in their food products. One major source for these guidelines is the Federal Food Code (*Services, U.D.*). Because the SIC plans to operate as commissary kitchen, renting out its food processing space to entrepreneurs, both SIC and the renting parties need follow the food code guidelines for their practices, and each receive permits before the food product can be sold retail and wholesale.

According to the Food Code (*Services, U.D.*), businesses (including the SIC) must provide several articles before it can file for inspection and obtain a federal food processing permit (590.012: Permit to Operate). These include:

1. **Having a Designated Person in Charge:** This person oversees all processing on site to ensure everything is manufactured to quality standards.
2. **Having a HACCP** (Hazard Analysis and Critical Control Points) **Plan:** this is a written document outlining the procedures and safety protocols for the whole facility
3. **Having a Water Sanitation Plan:** this should be in place from the restaurant's activities but additions may be required for food processing based on the product.
4. **Proven Facility Health and Safety:** Through inspection; must meet the following:
    a. Facility must be vermin free
    b. Proven sanitation and waste removal at the facility
    c. Proper fire code/ kitchen evacuation design and tools in place
    d. Careful sanitation and separation in handling of potentially hazardous foods (meat, eggs, dairy, etc.)
    e. Proven time and temperature cooking
    f. Clear allergen labelling/ separation in food preparation

g. Proper amount and placement of windows and vents above cooking surfaces
h. Accurate time and temperature (freezer) for food storage equipment

In addition to this, individual businesses renting out the kitchen space will also need to file for a food product permit (as an officer of food production at the SIC) to sell and distribute their product based on federal regulations. This may include additional inspection of each process depending on the food type:

- **Breads/Cakes/Pies:** These, and most other baked goods, are considered non-hazardous due to their high sugar content, which makes them less susceptible to harboring bacteria. They do not require additional inspection to manufacture. This would most likely positively impact bakers renting out the kitchen space.
- **Air-Tight Sealed Products:** These are canned products with a low acid content (not pickled products). The FDA will need to inspect each chef's product process and each batch will need to be tested for safety at an independent food-quality laboratory before it is allowed to be sold to wholesalers.
- **Meat, poultry, and dairy products:** Any products derived from these ingredients (excluding baked goods) will either need to be pasteurized or the process approved (for yogurt/cheese, etc.) by the USDA before they can be sold.
- **Carbonated Beverages:** Excluding alcohol, the carbonation and airtight sealing process will need to be approved by the FDA.
- **Sugar Additive/Flavoring Products:** Approval of the ingredients and process inspection by the FDA required.

Food product labeling is also required for the products to be sold commercially (*Services, U.D.*). Food product labels need to be accurate, list the standard nutritional information, the product ingredients by weight, any allergy warnings, the facility the product was packaged in, and the expiration date. The labels need to be attached to the food product's packaging at the time of production, provided by the chefs.

Once all the required specifications are met, both the SIC kitchen and any food product entrepreneurs working out of the kitchen may apply for federal food processing permits. For the SIC kitchen, a chief officer (appointed management for the kitchen space), or a renting food entrepreneur will use their name to apply for the permit through the online application (*Services, U.D.*). If the application is processed, then a health inspector will visit the SIC kitchen and facilities to approve the kitchen or a food manufacturing process carried out in the kitchen. Upon approval, the facility and chefs can then operate to manufacture products. Every six months, the inspector may return to ensure compliance is kept at the facility. For federal regulations,

registering the facility is free of charge, while the Massachusetts state food processing/wholesaler licence fee is $300/year.
In addition to commissary kitchen licensure, the Ground Up cafe also requires several permits to operate. While most of the health and safety compliance will be handled by the owners of Ground Up, it is important to ensure the regulations for operating the restaurant are met for other SIC activities in the kitchen space to occur. Sharing common federal compliance with the registration for the SIC commissary kitchen in the food codes (listed above), the restaurant is additionally subject to local (Springfield) regulations (*"Permits Issued"*). The Ground Up cafe will need a General Restaurant Permit ($100/year), and a Full Restaurant Liquor License ($2,800/year). While the latter is a hefty sum, negotiation between the SIC and Ground Up will decide which entity retains income from the sale of liquor during certain events in exchange for covering this license's annual cost.

Insurance Information

Insurance in an essential piece in functionalizing the kitchen space at the Springfield Innovation Center. Insurance ideally should cover the restaurant, the kitchen space, the proposed food storage space in the SIC basement, and any activities occurring in and around these spaces. Types of insurances that the kitchen space and operations would need include (*"How Much"*):

- Business Owner's Insurance:
    - General property damage (floods, fires, break-ins, etc.)
    - Theft of equipment
- Commercial Kitchen Insurance:
    - Customer Foodborne Illness
    - Food Product False Advertising
    - Worker Injuries
    - Customer Identity Theft
    - Allergic Reactions
- Cooking Class Insurance:
    - Injury to workers/students
    - Property Damage
    - Allergic Reactions
    - Foodborne Illness
- Liquor Liability
    - Customer Injury
    - Theft
    - Property Damage

Several quotes were taken from various sources to estimate the cost of these insurance policies ("*Coverage Details*"). The widest covering insurance was taken from FLIP, or the Food Liability Insurance Program (Contact phone #: 888-568-0548). Its plan detailed a comprehensive list of coverage for a commercial kitchen (see kitchen space insurance in the main paper), including an extension for cooking classes for $424 annually. Liquor liability insurance was separately covered through Insureon (*"How Much"*), estimated to be between $966-$3,360 annually. Furthermore, business owner's insurance in needed to cover all commercial property and damage to all equipment (including glassware, dishes, etc.). Insurance estimates for this are between $560-$1,180/year for the restaurant and kitchen space, with more for the basement storage space. Some of this coverage, however, may already be covered under the Ground Up cafe's insurance policy or under the general property insurance for the Springfield Innovation Center. This insurance policy will also need to be negotiated and the cost possibly split between the SIC and the cafe.

Food Allergy

Food allergy is a key aspect to be considered when hosting guest chefs event or using the space as prep-kitchen since more than 50 million Americans have an allergy of some kind. According to the Centers for Disease Control and Prevention, food allergies are estimated to affect 4 to 6 percent of children and 4 percent of adults. An allergic reaction to food can affect the skin, the gastrointestinal tract, the respiratory tract, and even the cardiovascular system. Reactions can range from mild to severe, including the potentially life-threatening condition known as anaphylaxis. Moreover, in the U.S., food allergy symptoms send people to the emergency room every three minutes. Therefore, food allergy safety is a significant focus in the kitchen.

Mild symptoms may include one or more of the following:

- Hives (reddish, swollen, itchy areas on the skin)
- Eczema (a persistent dry, itchy rash)
- Redness of the skin or around the eyes
- Itchy mouth or ear canal
- Nausea or vomiting
- Diarrhea
- Stomach pain
- Nasal congestion or a runny nose
- Sneezing
- Slight, dry cough
- Odd taste in mouth
- Uterine contractions

In addition, there are eight main types of food account for about 90 percent of all reactions. They are as follows:

- Eggs
- Milk
- Peanuts
- Tree nuts
- Fish
- Shellfish
- Wheat
- Soy

Foodborne Illness

Foodborne illness, sometimes referred to as food poisoning or foodborne disease, has several causes. The most common disease-causing microbe contributing to it is a contagious virus called norovirus. Other common causes are the bacterium Salmonella, Clostridium perfringens (C. perfringens) and Campylobacter.

Table A-1. Top five pathogens contributing to foodborne illness, and the Nyco products that Mitigate them

Top 5 Pathogens Contributing to Foodborne Illness, and the Nyco Products that Mitigate Them:

Pathogen	Annual Illnesses in the U.S. (estimated)*	Nyco Products with Efficacy Against these Pathogens
Norovirus	5,461,731	• Sani-Spritz Spray • Uno
Salmonella	1,027,561	• Sani-Spritz Spray • N601+ • Uno • Neutral Q128 • Ever-Pine
Clostridium perfringens	965,958	• N601+
Campylobacter spp.	845,024	• Table Time 200® • Sani-Spritz Spray • N601+ • Uno
Staphylococcus Aureus	241,148	• Table Time 200® • Sani-Spritz Spray • Neutral Q128 • N601+ • Uno • Ever-Pine

According to the Centers for Disease Control and Prevention (CDC), 1 in 6 Americans, or roughly 48 million, get sick each year through eating contaminated food or drinking contaminated beverages. Additionally, of that number, 128,000 are hospitalized and a sobering

3,000 die. Therefore, foodborne illness will become a serious problem for the restaurant and the kitchen. After doing some research, we find some effective ways to avoid foodborne illness.

- Clean food contact surfaces and tools
- Sanitize kitchen equipment
- Practice good housekeeping
- Don't let sick workers prepare food
- Cook to the right temperatures
- Store food correctly and at the right temperature
- Label food with expiration date

Cooking Class in Sur La Table

Cooking classes are a great way to increase foot traffic and also build connections between chefs and diners. After doing some research on cooking classes, we found that Sur La Table is a good cooking class model that we can learn from. As the largest avocational cooking school in the United States, Sur La Table has now grown to more than 100 stores across America, with a website and catalog viewed by millions of people each year and a highly regarded cooking class program.

The first main reason that the cooking class in Sur La Table is so successful is their workshop themes are very interesting. For example, some popular cooking class in Sur La Table are Spring Macaron Workshop, Global Street Foods, Tasty Thai from Scratch, and etc, which are more distinctive other traditional cooking classes. In addition, the cooking class in Sur La Table focuses on hands on and teamwork. Student in the classes will work together with other students in a fun, hands-on environment led by the professional chef instructors instead of just listening theory. Last but not least, in Sur La Table, students will also receive a coupon for 10% off in-store purchases the day of class, which can link the cooking class with the store closely. Therefore, we also suggest to give 10% off guest chefs event coupon for people who come to the cooking class in order to let people also join in other events.

Networking Events

Networking events allow people to connect and develop contacts, typically for business purposes. Building connections at these events is their sole purpose. Whether it is by conversation or by exchanging business cards or contact information, meeting new people opens up opportunities for clients, business partners and even friendships. These connections are meant to be long-term so that people may ask each other for advice and utilize someone's influence and expertise in their respective field which they may not necessarily have themselves.

For the SIC, networking events will attract a diverse crowd, though the hope is that most attendees of these events are entrepreneurs or aspiring entrepreneurs. Keeping a focus on entrepreneurs will help cultivate a tightly-knit community within the SIC. Ideally, these events will entice VVM and encourage them to attend. The more people that attend these events, the easier it will be to spread the word and get more people involved at the Innovation Center. Garnering public attention and interest will be key to the success of the SIC.

Commissary Kitchen Model Research

Research for the commissary kitchen was conducted through interviewing Curt Felix, the owner and operator of Eat at the Fleet, a successful commercial commissary kitchen and food truck prep kitchen in Wellfleet, MA (*Felix, C*). The interview was conducted as a series of questions asking how Mr. Felix's business was organized and operated. These questions, Mr. Felix's answers, and relationships between Eat at the Fleet and the SIC's commissary kitchen are described below.

- Tell me about your kitchen business operations:
  - Food trucks and food manufacturers use this kitchen; food trucks were free to park and serve customers outside on the commissary property (private). In total there were 5 food trucks operating during the summer (operating) season last year.
- How big are your kitchen and storage spaces:
  - The kitchen space is 225 SF
    - Each operator rents out the kitchen separately in distinct 2 hour time slots.
    - 3 time slots in the morning (5-7, 7-9, 9-11) and two at night (7-9, 9-11).
    - The spaces in between are occupied by food manufacturers
  - The storage space is 400 SF
    - Each renter had individually locked dry and refrigerated storage units.

This kitchen space is much smaller than the 900 SF kitchen space in SIC, so it is likely that the SIC kitchen will be able to accommodate at least two chefs at a time if this is required for shared food prepping or guest chef events. Additionally, the proposed basement storage space in SIC is at least as large as the Wellfleet storage space, so there will be room to accommodate at least 5 renters' storage needs at the SIC.

Moreover, each renter at the Wellfleet kitchen had an individual storage space for their ingredients. Mr. Felix recounted that these units each had individual locks on them to ensure food product safety, so that there was no chance for stolen or tampered food products. This was an essential step in securing the permit to operate the kitchen commissary (see below), to ensure

health inspectors of food safety. Similarly, similar lock precautions will need to take place for the SIC's proposed basement food storage units.

- Kitchen equipment and services provided at your facility?:
  - Stove
  - Oven
  - Grill
  - Large counter spaces
  - Cooking utensils and dishes
  - Refrigerator/Freezing Units
  - Excess wall power outlets
  - Trash removal
  - 24 hour parking of food trucks
  - Dining environment (tables/chairs/umbrellas/customer parking)

The Wellfleet Kitchen allowed renters to store and hook up any specialized equipment that they owned. This stopped the Wellfleet Kitchen from purchasing unnecessary equipment and wasting money, and allowed the growing tenant businesses to take their specialized equipment with them if and when they decided to move or expand. The Wellfleet Commissary Kitchen did provide a full power hook-up, trash removal, a guest dining environment, and residential parking for 5 food truck businesses; this increased the site's appeal and probably allowed the Wellfleet Kitchen to attract so many food trucks. Given that the SIC cannot offer any parking to kitchen renters, it is more likely that the SIC will be renting more to food manufacturers and other food prepping business startups than to food trucks.

- What kind of permits did you need to operate your facility? :
  - The Wellfleet Commissary Kitchen required a commercial kitchen permit and a food manufacturing permit issued by the Massachusetts board of health and the FDA, respectively.
  - Food manufacturers were required to have permits to make their specific products on site for wholesale and retail.
  - Food Trucks were required to have permits to operate their businesses, in addition to being registered kitchen space renters and truck parking tenants at the Wellfleet kitchen commissary.

This certification will be required similarly for the SIC to operate as a commissary kitchen. The separate licensing of both the kitchen space and the entrepreneurs occupying the space was required for operations to take effect at the kitchen. This dual licensing was assured to Mr. Felix upon leasing by requiring potential tenants to give their certifications before signing lease papers.

While this may be less practical for some of SIC's occupants (food startups that need the space to master their prepping technique for commercial certification), the SIC could protect itself from food liability by agreeing not to let tenants sell their food product on the SIC premises unless they have obtained the required wholesaler commercial license.

Commissary Kitchen Renting Cost Research

Because Mr. Felix failed to quote his renting rates for his kitchen, this information was obtained through adjusting the Hood Commissary (a commercial shared kitchen space in Orange County, CA) rental rates (*"Kitchen Rental"*) with the cost of living in Springfield (*Payscale*). In addition, because the freezers are rented as individual units, a sample individual freezing unit was found ("*Avantco 5.3...Freezer"*) at 5.3 ft.cu. and freezer rental rates were calculated based on this volume. Dry storage rates were calculated based on an assumed $10/ft.cu. rate ("*Kitchen Rental"*), with an estimated 4 ft.cu./ shelf on locked dry storage units. Rates for the Hood Commissary and calculated rates for the SIC are provided below:

Table A-2. Kitchen Space Rental Rates Table

Space Usage	Hood Commissary	The SIC Kitchen
Kitchen Prep (hourly)	$22.14	$18
Equipment Storage (piece/month)	$30	$30
Freezer storage (per fridge)	$53	$53
Dry storage (per shelf unit)	$40	$40

B. Makerspace Implementation Research

Makerspace Examples

FabLabs

Makerspaces of this type deal mainly with electronics and their construction, along with other technology to give the ability to construct almost anything after basic learning. The first fablab was created at MIT and since this 200 fablabs exist globally across 30 different countries (*Fab Foundation*). Equipment needed for this kind of makerspace is generally varied and with that will come a higher cost. For high end equipment FabLabs generally contain 3D printers, laser cutters, and computer controlled milling machines. Equipment of this caliber is needed to produce and work upon any time of electronic material which may be needed for construction. For less expensive, yet still necessary equipment, includes vinyl cutters, a computer router for the vinyl cutter, and basic electronic equipment like raw materials, soldering irons, and other electronic components. A full list of materials used in FabLab construction can be found within the main website and generally range from $25-$65k in capital equipment and about $15-40k in consumables (*Fab Foundation*).

In terms of building design, blueprints already exist for the ideal layout of a FabLab which can be found on the Fab Foundation site. Also found on the FabLab main site is a charter which can be taken, and if selected by MIT's Center for Bits and Atoms via partnership. This partnership funds the development and deployment of the sites and its projects (*Fab Foundation*). If a viable option for SIC there is no harm in applying for the partnership if partnering was viewed as the desired option. A partnership with the Fab Foundation would help fund not only the development, but also provide much needed connections, equipment, insight, and notoriety for the makerspace.

The Fab Foundation also lists positions which must be filled a functional FabLab, these included trainers who are themselves trained to maintain, operate, and instruct for each piece of equipment present in the lab. Along with the trainers, three managing positions are needed, the first is a general "champion" who focuses on the relation with the community, the second is the technical "guru" who anyone can turn to for technological assistance, and finally a director to control the general direction the FabLab is taking in terms of project work and general operations (*Fab Foundation*).

Hackerspaces

Hackerspaces, as the name implies, dives much more heavily into the computer programming and design aspects of electronics. The actual work performed can range from computer software production, to computer hardware repair and repurposing, even as so far as to digital art design (*Hackerspaces*). Overall the costs for this kind of makerspaces is comparably lower because

most of the cost comes in the form of computers and basic electronic equipments. Materials and software are more readily available the longer a hackerspace is open due to the accumulation of partially damaged electrons which can be repurposed. Design patterns for hackerspaces are also found on the main hackerspace site (*Hackerspaces*).

In terms of popularity there are 1,342 active hackerspaces found globally, only a handful are located in Massachusetts. The most notable among these are the Cambridge Hackerspace and Artisan's Asylum (*Hackerspaces & Artisan's Asylum*). A very important distinction to make however is that any makerspace can apply to be considered a hackerspace as seen with Artisan's Asylum among many other locations but not the other way around. Hackerspaces are often very specific with the services they provide while general makerspace provide a wide array of services.

TechShops

"The goal of TechShop is to provide members with every conceivable tool and machine that they would need to build, hack, fix or create just about any kind of project." Therefore, TechShop makerspaces can be seen of the jack of all trades in terms of franchised makerspaces. Work that can be done can include welding, sewing, woodworking, 3D printing, fabrication, automotive work, and electronic work depending on the equipment present within the space. A full list of equipment which can be included in a TechShop for different functions can be found at the techshop main site (*TechShops*). Also, as a general trend, each TechShop itself can become an online retail location for basic supplies, safety equipment, and hardware which is present within the space. This alludes to the fact that this form of franchised makerspace, as opposed to others, is for-profit. In terms of distribution, there are currently no TechShops located in New England meaning there is an opportunity for the introduction of a completely new concept into the region, albeit with the restriction that most TechShops are much larger than the 6,000 SF space available (*TechShops*).

Technocopia

In order to obtain a better understand of how a thriving makerspace is designed and operates, group members took a guided tour of Technocopia, a makerspace located in Worcester, MA. Also important to note is the similarity between the cities in which the makerspaces are located, Worcester and Springfield. These two cities are more similar to one another than many of the other cities where other makerspaces are located, making it an even better makerspace to serve as inspiration. The guided tour was given by a founding member of the makerspace and WPI graduate, Kevin Harrington. During to tour we observed how a company that started with a makerspace of only 1,500 SF grew into a thriving makerspace with roughly 11,000 SF.

One aspect of a makerspace which was said repeatedly was that order for the makerspace to be successful it needed to start of slowly, recruit a following in the community, and then grow and

develop with the community that supports the makerspace. The community must play a role in the direction a makerspace takes to grow in order for the community to accept the makerspace and utilize it. A makerspace is run for the community and if this is not the case, a makerspace will struggle (*Technocopia*).

Technocopia also provided as with a valuable resource on how to manage and run a makerspace. During the tour we were informed how a membership plans, rental spaces, and instructional classes should be implemented. We also learned another aspect of why community involvement is crucial for management as well. Simply put if the community supports the makerspace members can and will help manage and run the makerspace where possible, without the need for as much offical hired positions (*Technocopia*). From the Technocopia website we also learned a great deal about management structures within a makerspace.

In terms of design of the makerspace project, Technocopia provided a great deal of inspiration. The team learned during the tour not only how a makerspace should look, but also how it should functions and be designed. FabLabs, Hackerspaces, and TechShops may have online tours and equipment lists but did not compare to an actual site visit. Many of the design choices the team made were heavily influenced by Technocopia, such as the multipurpose room design. Many photos taken of the workstations and equipment within technocopia served as lasting guides as to what workstation within a makerspace should become when the makerspace is thriving. These images can be seen below.

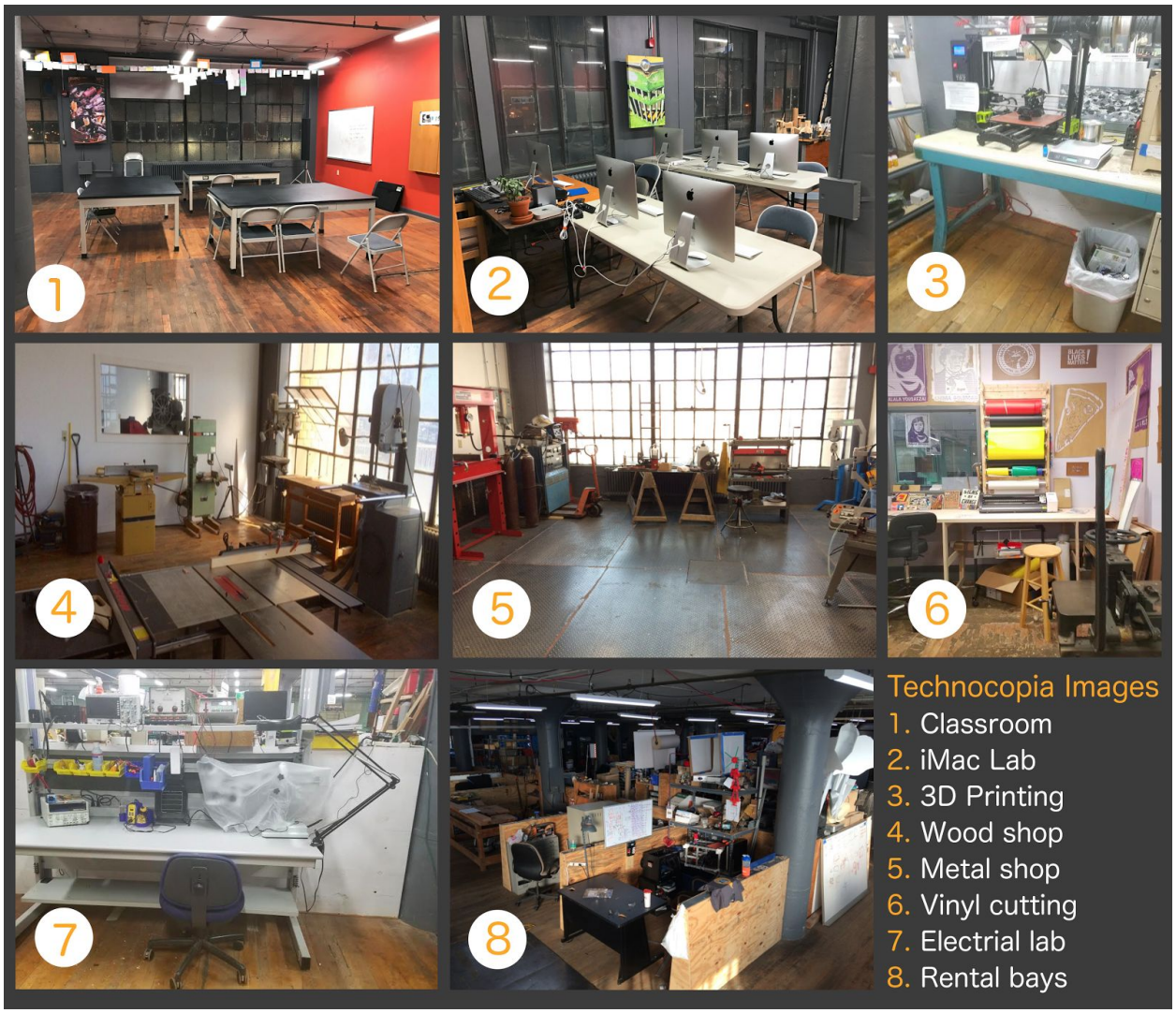

Figure B-1. Wood and metal shop images courtesy of Technocopia, all other photos courtesy of group member Eric Larsen

Foisie Innovation Studio Makerspace

At Worcester Polytechnic Institute, The Foisie Innovation Studio intends to have a makerspace that will have rapid prototyping equipment and electronic equipment. This is to be completed in 2018 so the exact equipment list was unavailable. The makerspace will also have a collaborative work area for students. A diagram of the floor plan is shown below.

Figure B-2. Floorplan schematic of the Foisie Innovation Studio

What is the Value Proposition of a Makerspace?

Although a makerspace is comprised of tools and materials, its main product is collaboration. In an interview, one of the founders of Makerworks was asked what the value proposition of a makerspace is; he answered "A lot of people think the value proposition here is around the space, we've got a nice space. A lot people think it's the tools. I mean why would you join this place? So you would have access to all the equipment. But the real value he are all the other people." (*Makerworks*) People join a makerspace because they want to be part of a community. Even if a member is working on a project that involves a skill they do not have, it is likely that someone else there does.

How Much Space is Required?

In most cases we have examined, the space occupied by a makerspace changes as the organization matures. Technocopia started out with a 1,500 SF area and are now in an 11,000 SF area (*Technocopia*). Industry Lab started in 2009 with a small space with a workshop, several co-working spaces, two conference/instructional rooms, and a dedicated workspaces (*Barr*). They moved up to a 5,000 SF area in 2010 and then 10,000 SF more recently. They are now looking for a 13,000 SF space to occupy. The size of your space will determine cost, quantity of

equipment, and number of services that can be offered. Studies have shown that the biggest draws for a makerspace are laser cutters and 3D printers (*Barr*). A space should at least be large enough for one of these pieces of equipment and a few smaller tools. There must be a dedicated conference room or instructional room as technical course offerings are one of the largest attractions of a makerspace. There should be a large collaborative space and at least a few 100 SF dedicated workstations.

The size of your space will dictate what type of makerspace you can be. The size requirements for a few types of spaces are shown below:

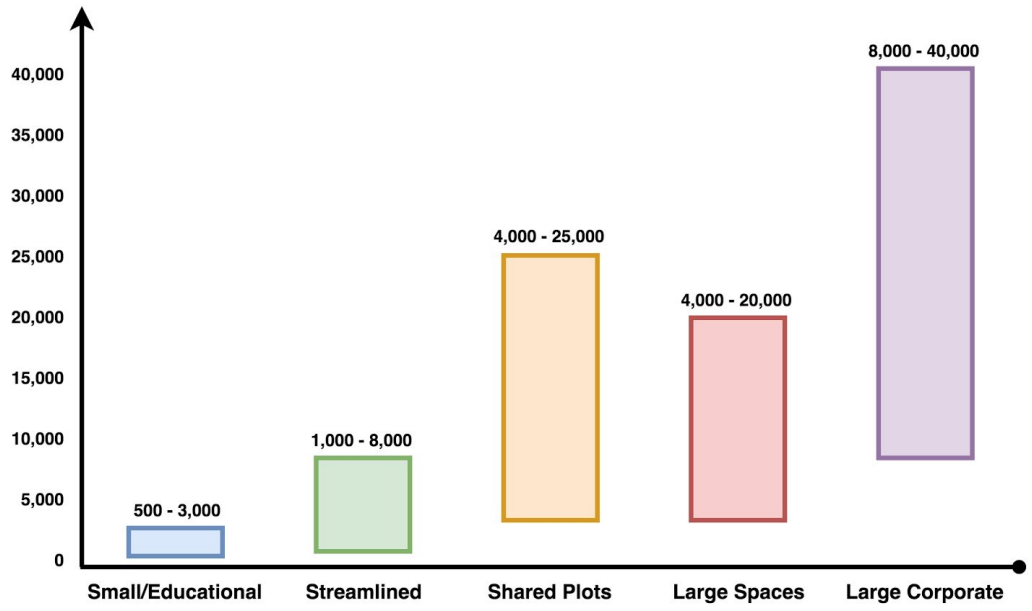

Figure B-3. Comparison of makerspace type to average size in square feet. Data taken from *Barr*

- **Small/educational only makerspaces**: Provides classrooms and minimal equipment. Usually run by 1-2 people.
- **Streamlined makerspaces:** Provides the minimum services. 1 large piece of equipment and a couple smaller pieces in one workshop, workbenches, 1 classroom and minimal storage. Volunteers take care of a lot of the day-to-day operations. The Geek Group has a 1500 SF space that has small artist studios and business stalls and a couple pieces of milling equipment. A space like this requires a couple of founding members, or one founder with several paid/volunteer staff.
- **Shared plots**: Many individuals and business co-rent a space and share equipment.
- **Large makerspaces:** Members have access to classrooms, large equipment, and can rent storage facilities, studios, workshops etc.

- **Large corporate and non-profit makerspaces**: These makerspaces can rent space to small businesses, provide mentorship networks, shared tools and workspaces, and require paid staff.

Where to put a Makerspace?

When designing a makerspace, it is important to choose a model that will thrive in your specific area. The first step in growing a makerspace is community assessment. Thriving makerspaces are found in explorative and creative environments. There should be evidence of savvy entrepreneurs who want to collaborate with others. Otherwise, a makerspace will not be of use.

The demographics of a makerspace-friendly area have some trademarks. Users are usually younger (ages 20 to 40), have some college experience or trade schooling in industrial equipment or manufacturing, and are predominantly male. It is important to examine the types of new businesses in the area. Are they art, computer, or hardware related? Knowing this will help determine the type of makerspace you should grow (*Barr*).

There should be little competition surrounding a makerspace. Schools, libraries, and other non-profits may have makerspaces that could draw away potential members. Even if there are none in the area right now, you should find out if any are being planned in the near future. There are no real makerspaces of this kind in the Springfield area as of now. There are a few in the Boston and Worcester area, but the less expensive space cost of Springfield could make a new makerspace very desireable to groups in eastern Massachusetts.

Relative location in a city is also important. Makerspaces should be accessible by public transportation such as the commuter rail or busses. They should not be in rural areas where transit is made difficult in winter months. It is helpful if they are near restaurants or business incubators as well. They should be in an area where people want to spend time (*Barr*). The new Springfield Union Station, VVM, and the growing arts and culinary communities make downtown Springfield a great location.

Universities

In Springfield, the most common majors are Community Organization & Advocacy, General Psychology, and Criminal Justice. Compared the the rest of the country, there is a high number of degrees awarded in General Communication, Speech Communication & Rhetoric, and American & U.S. Studies. In 2015, Engineering degrees were 5th most common and business degrees were 3rd most common. The number of engineering degrees awarded is increasing in recent years. The colleges in Springfield awarding the most to least degrees per year are Western

New England University, American International College, Springfield College, Springfield College-School of Human Services, STCC, and Branford Hall Career Institute. More women than men are being awarded degrees from all of these school except for Western New England University (*Data USA*).

There are 25 universities within a 15 mile radius of Springfield, which provides a huge opportunity for using the makerspace to teach. A decent number of these 25 colleges, including Springfield College, do not have their own makerspaces and would benefit from having one available for their use in teaching or just hobbying for students. Some benefits of having a makerspace available for college students and even lower levels of education are listed below.

- Allow for students to be self motivated and create
- Especially for STEM students, introduce basic concepts to enhance understanding
- Immersion in an environment that encourages new ideas/ creativity
- Teaching students how to identify and invent solutions to new problems
- Facilitates principles of entrepreneurship through innovation
- Fosters a sense of community for people
- Provides a networking opportunity for students, especially if businesses also use the space
- Supports students by providing feedback to important questions and encouraging inquisitiveness

Local Businesses

In Springfield, the most common industries by number of employees are Healthcare & Social Assistance, Retail trade, and Manufacturing. Compared to the rest of the country, there are a high number of employees in Healthcare & Social Assistance; Agriculture, Forestry, Fishing, Hunting; and Public Administration. In all of Hampden County, the comparatively high industries are Healthcare & Social Assistance, Retail trade, and Manufacturing. Hampden County as a whole is more manufacturing oriented than in Springfield alone (*Data USA*).

Compared to other counties, Worcester County, MA has an unusually high number of employees in Life, Physical, & Social Science; Community & Social Service; and Architecture & Engineering. These more technically oriented groups are the people that a Springfield makerspace would attract. It is clear that makerspaces have prospered in Worcester and Suffolk Counties, so a less expensive alternative in Springfield may catch their attention. Simply looking at the costs to rent in Worcester and Boston reveal that using a Springfield makerspace would be much easier on the wallet. For example, the average price to rent a one bedroom apartment in Boston, MA is $1979 per month (*DeLuca*). Springfield on the other hand is only $997 per

month for a one bedroom apartment (*"Rent Trend Data In Springfield"*); this is almost half the price of Boston, which is where several makerspaces currently do business. Aspiring makers in central Massachusetts, the middle of the two places, will be more likely to choose a Springfield makerspace because of the reduced cost.

At Technocopia, there is rentable space for new local tech entrepreneurs to craft their products and conduct business (*Technocopia*). These businesses were generally smaller and did not have the capital to spend on pricey equipment they would need to run their business. Providing this service not only helps out these businesses, but would also spark innovation in the community. People become inspired by their peers and may even start up their own project.

Springfield Demographics

The people that would use a makerspace and who would be interested in one generally lie in the age range of 20-40 years old. The average age of Springfield residents is 30.7 according to the latest census data. In all of Hampden County, the average age is 37.3 years old. Both of these figures are less than in the average American city (*Data USA*).

About 95% of Springfield residents are US citizens, which is higher than the national average. This number has been increasing in recent years. The most abundant ethnicities are Hispanic, White, and Black making up 42.2%, 34.2% and 18.8% of the population respectively. In all of Hampden County, Whites make up 64% of the population, with the second most common race being Hispanic (*Data USA*).

The average yearly household income is about $34,000 per year, compared to $54,000 in the whole country and $68,000 in Hampden county. Similarly, the average property value in the US is higher than in Springfield, but much lower than in all of Hampden County (*Data USA*).

In 2015, Springfield was ranked the second most dangerous metro area in Northeast according to Law Street Media.

C. Marketing Analysis Research

Websites

A company can be benefit from having a website. For example, a website can prove the existence of a company and keep customers informed about the recent events. When potential customers are looking for a business online, a company with a decent website is much easier to be found, comparing with a company without a website. According to a Small Business Survey

in 2016 (*Soderlund*), nearly 54 percent companies already had a website. However, there are still a significant amount of companies are still planning to build one. Agency leader was surprised about this.

"It's still surprising that so many businesses don't have a website. This ignores the fact that most Americans are on the web, looking them up. Studies have shown that over 70-80% of people will research a company on the web before making a purchase decision, usually by visiting its website. Even having a one-page website can establish credibility. It shows that the business is actually real and has taken the time to put out a presentation."
– Rehan Fernando, CEO at EIGHT25MEDIA

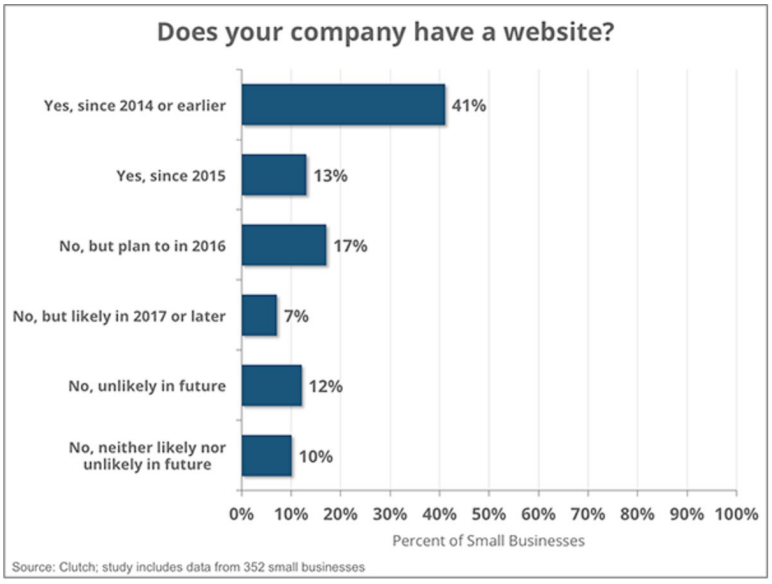

Figure C-1. Does your company have a website? (*Soderlund*)

Even if some companies have developed a website, nearly 23 percent of company do not have a mobile friendly website. Since mobile technology has been developed rapidly, more and more people tend to use their mobile devices to search for information. According to StatCounter, 37% of website visits in 2015 were generated by mobile web browsers.

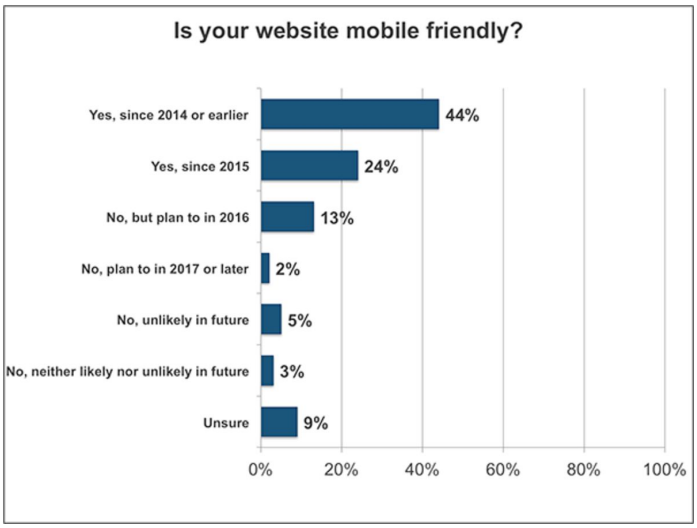

Figure C-2. Is your website mobile friendly? (*Soderlund*)

In order to gather some inspirations in Springfield Innovation Center website designing, we investigate two websites which will be discussed in detail in the following section.

Cambridge Innovation Center Website

Cambridge Innovation Center is a real estate company who offer infrastructure to entrepreneurs to develop their product and ideas. Considering that CIC share some similarity with Springfield Innovation Center, our group did some in-depth research on CIC's website ("*CIC Homepage*") design and content.

The structure of the Cambridge Innovation Center website design is listed below.

1. *Home page*
    a. Introduction header
        i. Company introduction video (linked by button)
        ii. CIC on WCVB-TV's Chronicle (linked by button)
        iii. Mission statement
    b. Office space
        i. Access to each space description
        ii. Brief summary of the space
        iii. Target group identification
        iv. Suggested employee group size
    c. Who's here
        i. Name and title of the company CEOs that are in the Cambridge Innovation Center
        ii. Corresponding pictures are attached on the right

d. Common asked questions
e. Community
    i. Cambridge Coworking Center (C3)
    ii. Impact hub boston
    iii. Venture Cafe
    iv. CIC partners
    v. Lab | Central
    vi. District Hall
    vii. Roomzilla
f. Upcoming events
g. Latest blog posts
h. CIC startup Twitter list
i. CIC Footer
    i. Copyright
    ii. Newsletter signup
    iii. Helpful links
    iv. Contacts
    v. Social media links

2. *Membership*
    a. Amenities description
        i. Button link through “Schedule a Tour”
    b. Options and Pricing
        i. Button link through “Schedule a Tour”
    c. Community
        i. Button link through “Schedule a Tour”
3. *Who we are*
    a. Number listed to introduce cambridge innovation center
    b. About CIC (detailed paragraphs description)
    c. Leadership Team
    d. Communities
        i. CIC Partners
        ii. Cambridge Coworking Center (C3)
        iii. Impact Hub Boston
        iv. Venture Cafe
        v. District Hall
        vi. Lab | Central
        vii. Roomzilla
4. *Common questions*
    a. How much does it cost to locate my business at CIC?

b. In addition to my workspace, what else is included?
c. Will you charge me extra for my Internet use or using conference rooms?
d. We plan to grow in the near future. How can CIC accommodate us?
e. What do I need to get started?
f. How does CIC help entrepreneurs?
g. How long do companies tend to stay at CIC?
h. Do you have meeting rooms that can fit my large team and investors?
i. How quickly can I get settled in my office and return to focusing on my business?
j. Are there any other perks for CIC members?
k. Don't see your question here?

5. *Blog*
    a. Posts from different authors
    b. Recent comments
    c. Search posts
6. *Events*
    a. Book space
        i. Different location picture slideshow with brief description
            1. Lighthouse East - Boston
            2. Lighthouse West - Boston
            3. Lighthouse North - Boston
            4. Venture Cafe - Cambridge
            5. Havana - Cambridge
            6. 4th Floor Kitchen - Cambridge
            7. Render Cafe - Boston
            8. 5th Floor Conference Center - Boston
            9. Meridian - Boston
            10. 18th Floor Kitchen - Boston
        ii. Request event space online link
        iii. Link through FAQ page
        iv. Corresponding room/space picture are shown
    b. Upcoming events
        i. Calendar event overview
        ii. Search events
        iii. Change view mode (list, month, day)
7. *Perks*
    a. CIC Wellness Program
        i. Newsletter signup link
        ii. Mission statements
        iii. Weekly schedule

1. Link through the main events calendar
2. Detail schedule

iv. Gym memberships
1. Several places to link to the website of their partner, BodyScapes Fitness
2. Details information of gym memberships

v. Our team
1. CIC wellness program coordinators

vi. Acupuncture
vii. Massage
viii. Meditation
ix. Yoga
x. Get involved
1. CIC Wellness Service Proposal Form

xi. Newsletter

b. Tech
i. Amazon Activate
ii. Rackspace Startup Program

c. Transportation
i. Hubway
ii. Zipcar
iii. Pure Fix Cycles | Pure City Cycles
iv. Enterprise Rent-A-Car
v. Fortified Bicycle

d. Services
i. Notary Services
ii. inDinero
iii. SPRY Moving & Storage
iv. TriNet
v. UPS
vi. Cubiq
vii. Optima/FedEx
viii. InExpress/DHL
ix. Kendall Press
x. Ambit Creative Group
xi. Tundra

e. Community
i. Venture Cafe
ii. Interns
iii. Startup Institute

iv. Startup Federation
v. Cambridge Youth Outreach Group

8. *Schedule a tour*

CIC created lots of links to access to the home page, membership page and "who we are" page, which provides straightforward directions for users to certain site location. Their navigation elements in the website can easily draw users' attention to other important parts of the site. Their mission statements are simple but power, short but unforgettable. In the membership page, CIC listed all the amenities in bullets, which makes it clear and persuades potential clients to schedule a tour or purchase a membership plan.

Figure C-3. Strong mission statements, which is simple but powerful to pursue people to rent the space

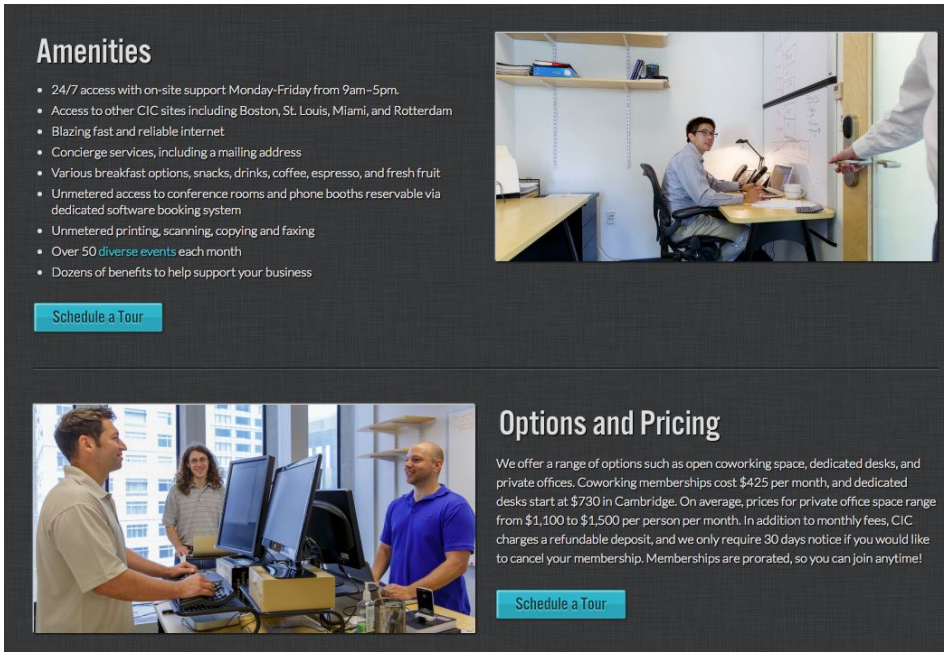

Figure C-4. Membership page sample

Roxbury Innovation Center Website

Roxbury Innovation Center is a local innovation center, located in Boston. It provides a platform and support to domestic companies to develop their new ideas and business. They utilized WordPress to design the RIC website. Below is the structure that inspires us on the design a website for Springfield Innovation Center.

1. Home
    a. Quick link
        i. Our spaces
        ii. Cafe nights (event)
        iii. Calendar
        iv. Donate
    b. Join the email list
2. About
    a. Brief introduction to RIC
    b. Team members
    c. Partners & sponsor
3. Book the space
    a. Official event request form
    b. Space description
        i. Price

        ii. Capacity
        iii. Technology included
    c. Last minutes booking
4. Program
    a. Cafe Nights @ RIC
        i. Registration link
        ii. Count down timer
        iii. Date and details
        iv. Details schedule
    b. Small business workshops
        i. Learn Lab Workshop Series
        ii. Google Workshops
        iii. SBA Workshops
        iv. SCORE Workshops
    c. FAB LAB ROXBURY
        i. Registration
        ii. Date, location, age range information are provided.
        iii. Picture of the events
        iv. Workshop video
        v. Workshop registration deadline
        vi.
5. Calendar
    a. Event overview calendar
6. Contact
    a. Become an office hours mentor
    b. Demo your business
    c. Host an info table
    d. Lead a cafe night session
    e. Link through book the space
    f. Link through john mailing list
    g. Map, phone number, address are provided
7. Donate

Comparing with Cambridge Innovation Center website, the structure of Roxbury Innovation Center is cleaner and more straightforward. The Fab lab section can be a good reference to our makerspace introduction page. Putting lots of well-done project on the website will inspire customers' interest and encourage them to keep on exploring these space. Using number like shown in Figure C-5 can provide a very clean but power statement and description about the program.

Figure C-5. Sample of Fab Lab Roxbury website design in Roxbury Innovation Center, which can be a very good model for Springfield Innovation Center website design

Even more important, embedded corresponding video into the website can pass more details information to people without writing thousand of words. Users tend to pay more attention to the video than reading multiple descriptive paragraphs.

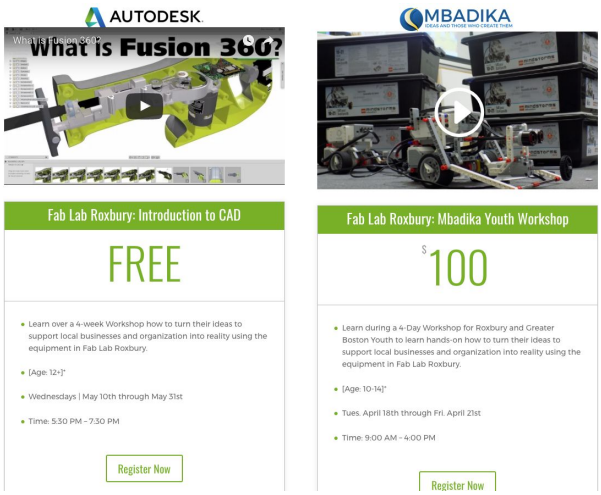

Figure C-6. Embed video into the registration section to show more details of the workshop

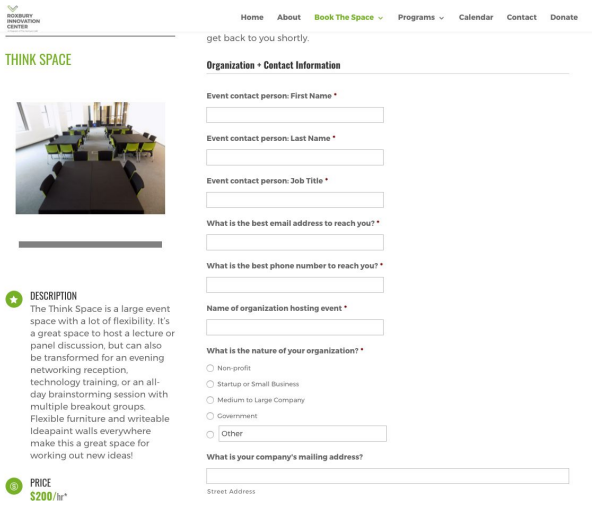

Figure C-7. Sample of space registration form that allow people to submit request online and wait for email about their registration later

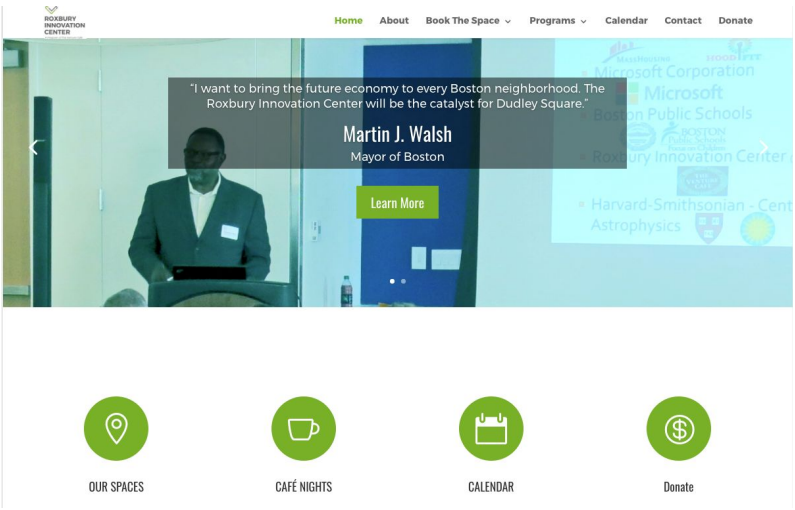

Figure C-8. Screenshot of Roxbury Innovation Center home page

Murals

City Mosaic ("*SPRINGFIELD CITY MOSAIC*"), a non-profit organization working to improve Springfield's landscape through art, was explored to find potential artists who could guide us regarding murals on the building of Springfield Innovation Center. John Simpson, one of the directors of City Mosaic was contacted and a meeting was set up in Springfield Museums to discuss ideas for the murals and what would be the best way to implement different murals which can gain maximum attention. Since Mr. Simpson has already painted murals in downtown Springfield and is an expert on murals, he was asked if he is interested in painting a mural for Springfield Innovation Center to which he was very interested. Mr. Simpson's website was used to get in touch with him. More meetings will follow in the future to finalize the content for the murals.

Social Media

Research was conducted through Forbes and Pew Internet in order to obtain the demographics of the different social media platforms and how they can be used for marketing applications. For the demographics, we looked into what percentage of people who use the internet use these social media platforms throughout the 18-29, 30-49, 50-64, and 65+ age ranges. On top of this, we looked into what percentage of adults use these platforms based on income, education, and the area they live in and compared each of these statistics from each social media platform to make our analysis. Also, using the apps first hand, using my own analysis in how these sites work through using them over the years was also considered when coming up with conclusions and recommendations. Another research topic was seeing how other businesses and Innovation Centers (Like the Cambridge Innovation Center) used social media and connected it to their website.