A Kitchen Management System for the Worcester Regional Food Hub

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A Kitchen Management System for the Worcester Regional Food Hub

An Interactive Qualifying Project Submitted to the Faculty of WORCESTER POLYTECHNIC INSTITUTE in partial fulfillment of the requirements for the Degree of Bachelor of Science

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ABSTRACT

The Worcester Regional Food Hub is moving its culinary incubator to Union Station, where it will have six times the kitchen space as its current location. The goal of this project was to recommend a kitchen management system that will support the needs of the Hub's staff and entrepreneurs when they relocate. Using input from these stakeholders, we identified functional specifications and evaluated candidate systems. Nexudus fulfilled most of the specifications and was preferred during user testing. The benefits of this new system include time savings for the Director, more responsibility and freedom for entrepreneurs, and the opportunity to create a community.

ACKNOWLEDGEMENTS

Our team would like to thank all individuals who provided support during this project. We would like to give a special thank you to our sponsor, Director Shon Rainford at the Worcester Regional Food Hub, for his time, dedication, and feedback in this project.

We would also like to thank all WRFH entrepreneurs who participated in interviews and A-B testing. Your feedback was instrumental in completing our project, and we greatly appreciate your support.

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EXECUTIVE SUMMARY

Food hubs are important organizations in their communities and support local food systems in a variety of ways. One feature of many food hubs is the culinary incubator, which are shared kitchen spaces entrepreneurs can rent out to gain access to the kitchen space and commercial equipment. Food hubs assist food entrepreneurs in getting their food tested, teaching them to prepare their food safely, and anything else they may need to get their business off the ground. Culinary accelerators, a particular type of incubator, also aid entrepreneurs in starting and expanding their businesses.

The Worcester Regional Food Hub (WRFH) is a local non-profit organization located in Central Massachusetts whose goal is to 'Strengthen sustainable agriculture, promote healthy eating, and fuel economic development.' They support local producers and farmers, provide healthy food options to people of all incomes, assist local entrepreneurs, and increase consumption of locally produced food in the Worcester community. The WRFH launched their commercial culinary accelerator in June 2016 where local food entrepreneurs rent out kitchen space to create unique products. The WRFH is moving to a larger space in the lower levels of Union Station in early 2022. Due to this expansion, they are in need of a new kitchen management system to handle the increase in entrepreneurs and kitchen space.

The WRFH's current kitchen management system will not work on a larger scale. The scheduling and billing processes take a lot of time in the WRFH's current location, as they are done by hand by the director. Therefore, an automated kitchen management system would make the process more efficient. Other food hubs of similar scale have implemented successful automated kitchen management systems that helped organize their business. Conover et al. (2015) attributes the overall success of food hubs to strong management structures. The systems of other food hubs have shown to be efficient and effective at managing scheduling and billing. Therefore, the system software used by other food hubs can be referenced to select a new kitchen management system for the Worcester Regional Food Hub.

PROJECT GOAL AND OBJECTIVES

The overall goal was to recommend a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station. This goal was achieved with the following objectives and methods:

1. Evaluate the current management system by identifying opinions of Food Hub entrepreneurs about the current system and their needs of a new management system.
We interviewed four WRFH entrepreneurs to get their opinions on the current system, and what they would like to see in a new system.

2. Identify specifications for the new kitchen management system.
We created a functional specification document in order to have a clear outline of system requirements. This document was created based on feedback from WRFH entrepreneurs and staff.

3. Evaluate and select candidate kitchen management systems.
We created a checklist of functionalities using the specification document to aid us in determining which systems best fit the WRFH's needs. Using this document as our guideline, we selected two pre-existing scheduling systems for user testing.

4. Set up and test candidate systems with Food Hub staff and a select number of entrepreneurs.
We set up the chosen systems to test them using the A-B testing method. This form of testing involves each participant interacting with and evaluating each of the systems. After an entrepreneur interacted with both systems, they completed a survey to evaluate usability. Based on the feedback we received, we selected a final system to move forward with.

5. Provide a support framework to help Food Hub staff and entrepreneurs transition to and implement the new kitchen management system.
We provided a support framework to the Worcester Food Hub that includes documentation on front-end and back-end functionalities, along with recommendations of future actions.

Stakeholder Needs

The most valuable resource to WRFH Director Shon Rainford is his time. Currently the WRFH scheduling system requires entrepreneurs to reach out to Mr. Rainford, who then manually enters booking times into a Google Calendar. Below are the primary needs that he identified:

- **Allow for automated scheduling and billing.**
- **Integrate with WRFH's billing and payment software.**
- **Account for varying prices of kitchen and storage spaces.**
- **Include an automated check in and check out process.**

Entrepreneurs also provided feedback on what they would like in a new kitchen management system:

- **Ability to schedule kitchen time themselves.**
- **Create a community of entrepreneurs.**
- **Encourage open communication to maintain organization within the kitchen**.
- **Ability to have buffer times between bookings.**

A set of specifications based on the feedback from Director Rainford and entrepreneurs can be found in Appendix G and were sorted into the following categories: usability, performance, functional, supportability, security, and interface. These specifications were then compiled into a checklist for use in comparing different candidate systems.

System Recommendation: Nexudus

Based on our testing, Nexudus has proven to be the most capable and appropriate system to handle the needs of the Worcester Regional Food Hub. It will provide the Food Hub with the most comprehensive kitchen management system as it fulfills almost all the criteria on the functional specification checklist. Its interface is simple and easy to learn while still providing many features.

Benefits and Price

Nexudus provides features that help both Director Rainford and the entrepreneurs. These features include the following:

- **Integration with QuickBooks:** Nexudus integrates with the billing system of the WRFH, allowing the Food Hub to connect booking times with appropriate pricings and payments. This makes Nexudus cost-effective as it will save Mr. Rainford time and money in the future.
- **Automated scheduling and billing:** Entrepreneurs can schedule their own kitchen times and be automatically billed for times they booked. We estimate that automated scheduling will save Mr. Rainford 24 hours per month, and automated billing will save him 12 hours per month. This assumes all six kitchens are booked on all days of each month.
- **Interface:** The visualization of the calendar is easy to look at. It is easy to switch between the day, week, and month views of the schedule. When making bookings, the price is listed immediately as users select their time period.
- **Resource and floor plans:** These pages clearly display what equipment is available in each bookable space and where the spaces are located.
- **Dashboard:** The dashboard is effective for users to see what upcoming bookings they have.
- **Member directory:** This directory contains the contact information of all members and allows members to contact one another.
- **Discussion board:** This board allows users to send messages to each other or to make posts to the discussion board. This board also allows entrepreneurs to alert staff of any problems they are having with equipment in the kitchens. This feature could help create a stronger community at the Food Hub while also ensuring smooth operations within the kitchens.
- **Price:** Nexudus costs $85 per month for 40 active users, with an additional $10 per month for integration with QuickBooks Online, and $0.04 per transaction. These costs are reasonable for the WRFH according to the Director.

Results from User Testing

There was a clear preference for Nexudus based on A-B testing. Tasks were completed 73% faster in Nexudus than in the other candidate system, MIDAS.

73%

of tasks were completed faster with Nexudus

Results of the system usability survey indicate a clear preference for Nexudus. On average, users gave the opposing system, MIDAS, a score of 20 out of 30 and gave Nexudus a score of 28.5 out of 30. This proves that Nexudus is a more user-friendly system.

Nexudus Usability Score

28.5 / 30

MIDAS Usability Score

20 / 30

The completion times for the individual tasks were also compared. The task completion times from each user were averaged together and these average times are shown in Figure i. As seen for 5 out of the 7 tasks, the average completion time was faster for Nexudus. From these results it is clear to see users found the Nexudus system far more intuitive and easier to use.

Figure i. Comparison of Average Task Completion Times.

NEXT STEPS FOR THE WRFH

We hope to have made a strong case for Nexudus as a promising kitchen management system for the WRFH. Since this project was completed in May 2021, and the move to Union Station will not occur until March 2022, we were unable to implement the new system. Following are some key recommendations for implementation:

1. **Compiling support resources into the kitchen operations manual**. We compiled a subset of existing Nexudus documentation into member and staff guides to help entrepreneurs and staff for when the WRFH switches to the new kitchen management system. Member and staff guides can be referenced in Appendices H and I.

2. **Setting up Nexudus after architectural plans are finalized.** The following information can be entered into the Nexudus system:
    - **Floorplans:** Labelling and naming the kitchens accordingly will allow users to identified them more easily.
    - **Descriptions:** Each space has an option to add descriptions which can include what equipment will be available for each kitchen.
    - **Pricing Rates:** The pricing rates for specific kitchens can be determined based on the equipment they provide.
    - **Pictures:** Including images of both the kitchens and storage spaces in the system will allow the entrepreneurs to visualize the space. This will also help non-English speakers identify the kitchens and storage more easily.

3. **Integrating billing and payment methods with Nexudus.** We recommend that the WRFH integrates both their QuickBooks and Authorize.net accounts on Nexudus. Integrating QuickBooks will help the WRFH to manage payments made by entrepreneurs for using the kitchen and storage spaces. Integrating Authorize.net will allow for entrepreneurs at the WRFH to pay for kitchen and storage rentals directly through Nexudus.

4. **Integrating Nexudus on the WRFH website.** Closer to the move to Union Station in March 2022, some changes to the website can be made by Hunchback Graphics. Hunchback Graphics would be able to integrate Nexudus to the WRFH website on the back-end and implement member logins to Nexudus so that the software can be

properly accessed by only the entrepreneurs. If Director Rainford were to have any issues further customizing the system to fit the website and his needs, Hunchback Graphics should be able to assist.

5. **Implementing Nexudus Apps.** There are several Nexudus Apps that the Food Hub will want to use. These apps can be downloaded and used free of charge by entrepreneurs once the WRFH pays the monthly subscription fee for Nexudus. First the Nexudus Passport app will allow entrepreneurs to schedule kitchen space and interact with the community features from their smartphones. The NexIO app is what would be used to check entrepreneurs in and out of the kitchens. We recommend starting some correspondence with the Nexudus staff through their support desk to set up these apps.

6. **Optimizing the Nexudus Platform.** The CommonWealth Kitchen is a successful food hub that uses Nexudus for their kitchen management. They have their own custom template which tailors the front-end website more to their needs. The Worcester Regional Food Hub can learn a lot about how to best apply Nexudus to a shared kitchen. For future work on the Nexudus site it is highly recommended to reach out to the CommonWealth Kitchen.

AUTHORSHIP

WRFH Project Team

***Back Row**: Ben Verdesi, ME. Natalie Mohn, MIS/IUX. Ethan Farrah, ME.*
***Front Row**: Anna Shi, ECE. Azka Siddiq, BME.*

For the writing sections, the work was divided equally among all group members. The work was divided based on how familiar each group member was with the topic and what the members' strengths were. The editing process involved group members individually editing the part they worked on, making comments on anything they were unsure of, and responding to other group members' comments in the document. Group members completed a read through of the document before every submission. This process allowed group members to understand other members' parts as well as their own, and ensure all questions and feedback were accounted for before submissions. The table below shows each team members' contributions to the report.

Chapter	Section	Main Author
Abstract		All
Acknowledgements		All
Executive Summary		All
Introduction	Paragraph 1	Ethan Farrah
	Paragraph 2	Ethan Farrah
	Paragraph 3	Natalie Mohn
	Paragraph 4	Anna Shi & Azka Siddiq
	Paragraph 5	Ben Verdesi
Background	Importance of Food Hubs	Ben Verdesi
	Examples of Culinary Incubators in Food Hubs	Azka Siddiq
	WRFH History	Ethan Farrah
	WRFH Expansion	Natalie Mohn
Methodology	Evaluate the Opinions of WRFH Entrepreneurs	Ethan Farrah
	Identify New System Requirements	Natalie Mohn
	Evaluate and Select Candidate Systems	Azka Siddiq
	Set Up and Test Candidate Systems	Anna Shi
	Provide a Support Framework	Ben Verdesi
Findings	Software Scheduling Options for Small Nonprofit Organizations	Anna Shi
	Functional Specifications	Ethan Farrah & Anna Shi
	Comparison of Three Candidate Systems	Natalie Mohn
	Results from Candidate System User Testing	Ben Verdesi
	System Recommendation: Nexudus	Azka Siddiq
Implementation	Introduction paragraph	Anna Shi
	Connecting QuickBooks and Payment Methods	Ethan Farrah
	Finalizing Kitchens and Storage Methods	Azka Siddiq
	Connect with Hunchback Graphics	Azka Siddiq
	Talk to CommonWealth Kitchen	Ben Verdesi
	Implementing Nexudus Apps	Ben Verdesi
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1 INTRODUCTION

Local and regional food systems offer countless benefits. Many people lack accessible, affordable, and healthy food options. Urbanization further complicates the journey food goes through to get on someone's plate. These factors can lead to food insecurity in these areas. Food security is a basic human right, therefore there needs to be a robust food industry to counteract the problem in these communities. Food hubs help to provide a solution to this problem by providing their communities with access to locally grown healthy food options.

Food hubs are important organizations in their communities and support local food systems in a variety of ways. A major problem for small farmers is they lack the capital to transport and market their products to compete with corporations. Food hubs provide a solution by partnering with farmers in their communities to buy, market, and sell their products. Another aspect of many food hubs is the culinary incubator, which are shared kitchen spaces entrepreneurs can rent out to gain access to the kitchen space and commercial equipment. Food hubs assist food entrepreneurs in getting their food tested, teaching them to prepare their food safely, and anything else they may need to get their business off the ground. Culinary accelerators, a particular type of incubator, also aid entrepreneurs in starting and expanding their businesses.

The Worcester Regional Food Hub (WRFH) is a local non-profit organization located in Central Massachusetts whose goal is to 'Strengthen sustainable agriculture, promote healthy eating, and fuel economic development.' They support local producers and farmers, provide healthy food options to people of all incomes, assist local entrepreneurs, and increase consumption of locally produced food in the Worcester community. The WRFH launched their commercial culinary accelerator in June 2016 where local food entrepreneurs rent out kitchen space to create unique products. The WRFH is moving to a larger space in the lower levels of Union Station in early 2022. Due to this expansion, they need a new kitchen management system to handle the increase in entrepreneurs and kitchen space.

The WRFH's current kitchen management system will not work on a larger scale. The scheduling and billing processes take a lot of time in the WRFH's current location, as they are done by hand by the director. An automated kitchen management system would make the process more efficient. Other food hubs of similar scale have implemented successful automated kitchen management systems that helped organize their business. Conover et al. (2015) attribute the overall success of food hubs to strong management structures. The systems of other food hubs have shown to be efficient and effective at managing scheduling and billing. Therefore, the system software used by other food hubs can be referenced to select a new kitchen management system for the WRFH.

The goal of this project was to recommend a kitchen management system for the WRFH that supports the needs of staff and entrepreneurs to take advantage of the Hub's relocation to a larger space at Union Station. First, we assessed the needs of Food Hub entrepreneurs and staff to establish a list of system requirements. Then, we investigated existing scheduling software and determined which systems best met those requirements. Next, we implemented the candidate management systems and performed a series of user tests to further evaluate each candidate system and select a new system. Lastly, we developed a support framework to help entrepreneurs and staff learn the new system.

2 BACKGROUND

We begin this chapter by introducing food hubs and explaining their significance to food systems. We then focus on some food hubs' operations as culinary incubators and analyze the success of specific kitchens. From there, we introduce the Worcester Regional Food Hub's culinary incubator by giving a brief overview of their history and explaining their opportunity for expansion. Lastly, we discuss scheduling systems utilized by other food hubs for their kitchens.

2.1 IMPORTANCE OF FOOD HUBS

A food system is defined as all interactions in a food value chain, starting with the supply of agriculture and other products, continuing through all food processing, and ending with product consumption and disposal. A sustainable food system is one that provides food security in its location (International Food Policy Research Institute, n.d.). Food security is globally considered to be a basic human right. Regardless of a person's socioeconomic status, everyone needs food to survive. As a result, there is and always will be a tremendous demand for a robust food industry (Mosotho, 2014). From farm to plate, food undergoes an extensive journey and urbanization introduces additional complexity to this challenge. This is a result of basic supply and demand as cities do not produce much food but require a substantial amount.

Figure 1. What is a food hub? (White, 2014)

Regional food hubs are one way that urban areas supplement their food supply chain. As seen in Figure 1, food hubs serve as a middleman between local producers and wholesale buyers (White, 2014). Through aggregation, processing, storage and distribution, food hubs help drive food along its path. Additionally, food hubs enable the viability of local food systems thus increasing the success of small scale, sustainable farming practices. The United States Department of Agriculture conducted a study where they surveyed and interviewed many currently operational food hubs in America to identify the main role they play in their communities. James et al. (2012) list them as follows:

1. Regional food hubs increase market access for local and regional producers.
2. Regional food hubs complement and add value to the current food distribution system.
3. Regional food hubs are having significant economic, social, and environmental benefits within their communities.
4. The success of regional food hubs is fueled by entrepreneurial thinking and sound business practices coupled with a desire for social impact.

The first role of food hubs affects small farming and ranching operations which suffer from a lack of adequate processing and distribution resources. Food hubs offer an array of services to these types of producers. On-farm pickup and centralized produce drop-off points are two ways that food hubs help ease the load of transportation for local producers. Additionally, basic processing needs are offered including dry and cold storage, grading, packing, labeling, trimming, cutting, and freezing (James et al., 2012). Through these services, food hubs provide these producers access to retail, institutional and commercial foodservice markets that only purchase large volumes of adequately processed foods. Furthermore, they allow the producers to sell their products at a higher value, thus increasing their profitability. The food hub enables them to offer a broader and more diverse selection of local products they would not normally have access to.

The second role involves the food hub's connection with regional and national food distributors. Many of these retail buyers want to offer a wider selection of local, fresh foods. However, this normally comes along with high transaction costs. James et al. (2012) explains as follows: "For institutional and retail buyers that would like to 'buy local,' food hubs can reduce transaction costs by providing a single point of purchase for consistent and reliable supplies of source-identified products from local and regional producers."

Food hubs all strive to have a positive economic, social, and environmental impact on their communities. They prop up the food industry around them, create food service jobs within the hub, and retain and create agricultural jobs (James et al., 2012). Food hubs also increase people's access to fresh, healthy food by supporting programs such as farmer's markets, food banks, and the USDA's Supplemental Nutrition Assistance Program. Lastly, food hubs decrease the environmental impact of the food industry by sourcing their products from farms and ranches with sustainable agricultural practices and by offering sustainable production practice training to community food service workers. It has been shown that large-scale industrial farming, known as monoculture, has devastating long term effects on the natural environment, including nutrient degradation of soil and harmful chemicals polluting food and water supplies (Rinkesh, 2020). Food hubs enable the success of smaller farms that can operate with much more sustainable farming practices, such as reducing their waste products through recycling and lowering their electricity and fuel consumption. In a survey conducted by King et al. (2010) it was concluded that in 4 out of 5 cases, food products that were distributed through a food hub were transported more fuel-efficiently than their mainstream or direct distribution counterparts.

Figure 2. Terminology related to food hubs (N. Brooks, 2018 and James et al., 2012).

In addition to the roles stated above, many regional food hubs operate as culinary incubators. Figure 2 shows the differences between various types of food hubs. The terms are sorted by whether they are related to "Regional Food Hubs" or "Culinary Incubators" (Brooks, 2018; James et al., 2012). While not directly enhancing the food supply, these programs cultivate entrepreneurial opportunities for small food businesses. Member businesses of the food hub can rent time in a health department licensed commercial kitchen to produce their food products. These incubators are widely used by startup businesses that need the equipment offered in a commercial grade, certified kitchen, but do not have the capital to finance one themselves. As demand for more diverse foods in urban areas has risen, the number of these culinary incubators has as well. *Culinary Incubator* (2021) has over one thousand rental commercial kitchens in their database in the U.S. alone.

2.2 Examples of Culinary Incubators in Food Hubs

Many culinary incubators have been established around the world. Their successes and failures are well documented based on many factors, but we will be focusing on the impact of kitchen management on an incubator.

2.2.1 Successes and Failures of Culinary Incubators

Conover et al. (2015) reviewed eight different culinary incubators across the United States and analyzed ownership and management, funding, facility size and features, membership and usage, community networking, and community impact in order to determine key features of successful kitchens. They determined that having a strong management system was essential to the success of the operations. They suggested that staff and supervisors should be

available to open and close the kitchen as well as train food entrepreneurs how to properly use equipment. They supported their claims through the case studies of Union Kitchen in Washington D.C., Neighbor Made in Keene, NH, and Shaker Hill Kitchen in Saco, Maine.

Union Kitchen serves as an example of an extremely successful culinary incubator. It was founded in 2012 in Washington D.C. and is privately owned by Jonas Singer and Cullen Gilchrist. They have around 23,300 square feet between two locations and a wide variety of equipment. Conover et al. (2015) attributes Union Kitchen's success to their strong management system and community outreach. The kitchen's management program is extremely comprehensive, having food entrepreneurs apply to use the space online. If the application is accepted, the entrepreneur chooses a membership status regarding how often they have access to the kitchen; different membership statuses vary in price. The system is overseen by a development manager who views applications and ensures operations are running smoothly.

Neighbor Made Kitchen was located in Keene, NH before shutting down in 2015. The kitchen was intended for small-scale food producers looking to scale up their business. Conover et al. (2015) determined that their closure was mainly due to weak management. There was not enough structure within the organization to support it which led to improper allocation of funds.

Finally, Shaker Hill kitchen in Saco, Maine presents a compelling argument in the importance of strong management. It is a non-profit branch of the York County Shelter Program that was opened in 2008. Their goal was to alleviate food insecurity in the area. In 2012, they closed for a year to restructure the organization to allow for greater success. Their efforts proved useful as they are still open and now have a strong management system in place. Conover et al. (2015) attributes the Shaker Hill kitchen's success to this restructuring period in which they were able to implement a better system with an operations manager overseeing the kitchen.

2.2.2 Experiences of Food Entrepreneurs in Culinary Incubators

Functionality within the kitchen and the management system is also essential to the success of the food hub. Addae-Wireko (2020) analyzed the operations of six culinary incubators (specifically share-use kitchens) and related small-scale food producers in Manitoba, Canada in order to determine what the entrepreneurs of a food hub are looking for in a culinary incubator. These small-scale food producers utilized these kitchens because they could not financially support buying their own kitchen equipment at the level of production they were maintaining. Culinary incubators also more easily allow the users to meet health standards and regulations. Most of the food producers interviewed stopped using the kitchens of some food hubs, combined kitchens with other facilities, or used multiple kitchens. Some main challenges that they brought up about culinary incubators were scheduling issues and storage space dysfunction.

With limited storage space, the majority of these food entrepreneurs expressed interest in either additional space added or a better system for dividing up the space. They also would have liked better division of kitchen time to help solve their problem of limited time slots. The food producers expressed interest in a comprehensive scheduling system to organize the use of the space. A few users particularly wanted specific information available within this system such as what equipment is available in the kitchen (especially if the space is being

used by multiple producers at the same time) and how old the equipment is. They also highlighted the need for a scheduling system for storage spaces as well, so the space is properly divided and utilized.

2.3 Worcester Regional Food Hub History

The Worcester Regional Food Hub (WRFH) is a non-profit organization located in the Green Street Church in Worcester, Massachusetts. They were founded in 2015 by the Worcester Regional Chamber of Commerce (WRCC) and the Regional Environmental Council of Central Massachusetts (WRCC, 2019). The mission of the Worcester Regional Food Hub is "to increase local food access and consumption and recruit, retain, and incubate local food entrepreneurs, collectively building healthy, sustainable, and just communities" (WRFH, n.d). To achieve this mission the WRFH has three goals: to connect local producers and farmers, provide people of all incomes with healthy food options, and support entrepreneurs (WRFH, n.d).

The WRFH aids small local farmers in selling their products. The Food Hub sells the products to larger buyers the farmers would not be able to sell to on their own. These buyers include schools, colleges, universities, and health care facilities. Some of the partnerships include Worcester Public Schools, Auburn Public Schools, Holy Cross, and Clark University. The buyers are given weekly options to choose from, based on the products the Food Hub has received from the farmers. This information is provided to the buyers at the WRFH's database.

Along with working closely with the farms, the Food Hub also supports local entrepreneurs. The WRFH first launched their commercial culinary incubator in June 2016. This was made possible by the culmination of hard work from the Regional Environmental Council, the Worcester Regional Chamber of Commerce and Clark University professor Dr. Ramon Borges-Mendez. The group was able to earn a $524,485 grant for a one-year pilot program for the kitchen (WRCC, 2019). When food entrepreneurs rent out kitchen space, they become an official "client" of the Food Hub. Entrepreneurs can rent out the kitchen space, limited to a single client at a time, twenty-four hours a day for an hourly fee. If the kitchen space is rented out between 6am-10pm the cost is $30/hour, and if it is rented between 10pm-6am the cost is reduced to $25/hour (Shon Rainford, personal communication, February 23, 2021). In order to schedule the space, the entrepreneurs contact Shon Rainford, Director of the Worcester Regional Food Hub, to make a booking on the Google Calendar. There is also a small refrigerator with a freezer in the kitchen space, as well as racks that can be rented out for storage (Shon Rainford, personal communication, February 8, 2021). The Food Hub also helps entrepreneurs get their food tested, teaches them to prepare their food safely, and anything they need to get their business off the ground.

Prior to the coronavirus pandemic in 2020 the WRFH sold strictly wholesale. However, the pandemic resulted in shutdowns of their partners such as schools, restaurants, and other larger consumers. Therefore, the Food Hub was forced to adapt, and they began to sell retail. The Food Hub began to provide a weekly takeout box for people to buy. The box included the locally grown products the Food Hub would sell to the larger institutions. The online catalog for the retail business is updated weekly (Houle, 2020). Each week customers of the Food Hub can go to the curbside pick-up on Wednesdays to receive their order. The Worcester Regional Food Hub plans to continue the retail business even after the pandemic ends.

2.4 Worcester Regional Food Hub Expansion

In this section we will discuss the expansion plans of the Worcester Regional Food Hub, summarizing a conversation with Director Shon Rainford (Shon Rainford, personal communication, February 8, 2021). We will first go into the Food Hub's physical expansion plans and how they will be evolving to make the best use of a larger space. Next, we will discuss the digital expansion plans, which will lead into our concluding topic about the challenges faced due to expansion.

2.4.1 Physical Expansion Plans

In February or March of 2022, the Worcester Regional Food Hub will be expanding their operations to a new location in the lower level of Union Station. Moving to this new location will triple their space from 2,000 square feet to close to 6,000 square feet. This increase in space will allow the Food Hub to boost operations and increase production from food entrepreneurs, as they will have five more kitchens than they do in their current location. Figure 3 shows the planned layout of the Worcester Food Hub's new facility at Union Station.

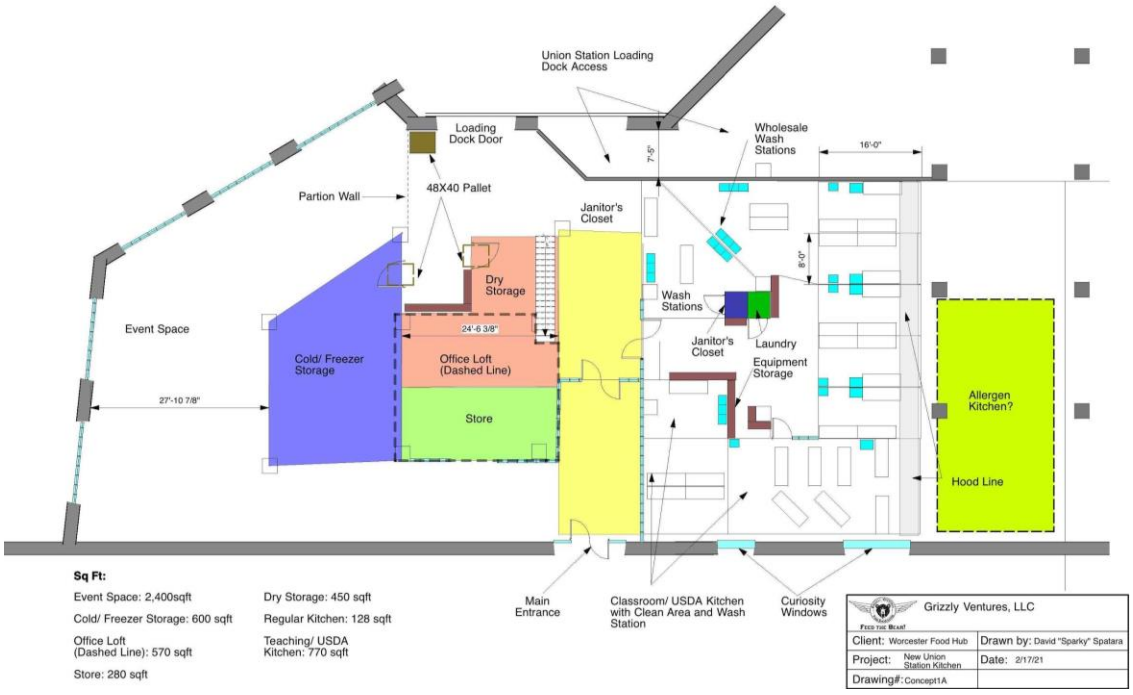

Figure 3. Layout of Worcester Food Hub's new facility at Union Station.

In the lower level of Union Station, they plan to construct six commercial kitchens, all available to book individually. These kitchens are located on the right side of Figure 3 (Shon Rainford, personal communication, 2021). Each kitchen will have a certain set of equipment and hourly charge. Three of the kitchens will be similar with standard equipment, but the other three will be kitchens that slightly differ. One kitchen will be outfitted with a 100-gallon, commercial steam kettle typically used for making large batches of sauces. Another kitchen will have a variety of specialized outlets that food entrepreneurs can use for unique appliances that do not fit standard outlets. The other specialty kitchen will be a 'cold kitchen' mostly for labeling and packing products. Entrepreneurs and their businesses may also choose to book only certain stations in this sixth kitchen, which can allow multiple

businesses to function in the same space. This will allow the Food Hub to have six or more businesses operating within the kitchens at the same time.

Along with the increase in the total number of commercial kitchens, there will be a greater amount of storage space for food entrepreneurs to use. This space will include dry, refrigerated, and frozen storage, all available for entrepreneurs to book for certain monthly charges. Other expansion plans to note are the construction of a large event space as well as a storefront for retail.

These physical expansion plans add to the complexity of managing the Food Hub and are the main reason that the WRFH needs an updated system.

2.4.2 Digital Expansion Plans

The Food Hub uses a WordPress website created by Hunchback Graphics that communicates with several different systems that assist the Food Hub staff with billing. Their accounting system is called QuickBooks Online, and it is used to bill entrepreneurs monthly for their kitchen and storage usage. To accept credit card and other payments online, the Food Hub uses a transactional system called Authorize.net. This transactional system communicates with a WordPress plug-in called WooCommerce that streamlines their customers' retail and wholesale transactions. As of April 2021, they are still working out some bugs within their website, but it will be completed soon.

The way the Food Hub is currently booking their kitchens will not be manageable when they move to a larger space with an increased number of kitchens to rent out. Director Shon Rainford describes the scheduling side of the current system in six steps, as seen in Figure 4 (Shon Rainford, personal communication, 2021).

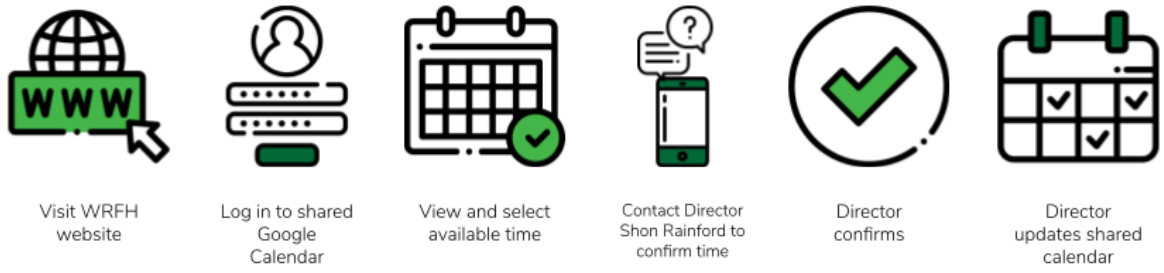

Figure 4. Current Kitchen Scheduling System.

This system relies solely on Mr. Rainford to be up to date on his text messages as well as updating the Google Calendar. Mr. Rainford spends approximately one hour per week scheduling kitchen time for entrepreneurs. The other side of the current system is the billing process. Mr. Rainford compares the entrepreneur's scheduled kitchen time to the actual kitchen duration found from the manual check-in / check-out system. The entrepreneurs are then billed based on the greater of these two time entries. It is important to note that this system is applied to only one kitchen. Mr. Rainford is aware that the current system will be unreliable when the Food Hub moves to Union Station. It will not meet the needs of the entrepreneurs and staff of the Food Hub when expanding to three times the size with six or more businesses possibly operating simultaneously.

Currently, the WRFH has three staff members that must take on a large number of roles and responsibilities; having an automated scheduling and billing system would benefit them greatly and would save them time every week. The staff can use this extra time to focus their energy elsewhere to generate more business and support entrepreneurs.

There is a wide range of automated scheduling software and applications that can be used as a kitchen management system. These systems include two third party applications, Nexudus and MIDAS, and a WordPress Plug-in. Each scheduling system varies in features and prices. The software product the Worcester Regional Food Hub chooses to move forward with will depend on their needs and priorities.

3 METHODOLOGY

The overall goal was to recommend a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station. We achieved this goal by completing the following objectives:

1. Evaluate the current management system by identifying opinions of Food Hub entrepreneurs about the current system and their needs of a new management system.
2. Identify specifications for the new kitchen management system.
3. Evaluate and select candidate kitchen management systems.
4. Set up and test candidate systems with Food Hub staff and a select number of entrepreneurs.
5. Provide a support framework to help Food Hub staff and entrepreneurs transition to and implement the new kitchen management system.

This section explains the methods we used to collect and evaluate feedback from important stakeholders, and how the conclusions we established from this analysis led to recommendations for a kitchen management system for the Worcester Regional Food Hub. Figure 5 gives a visual representation of the project objectives.

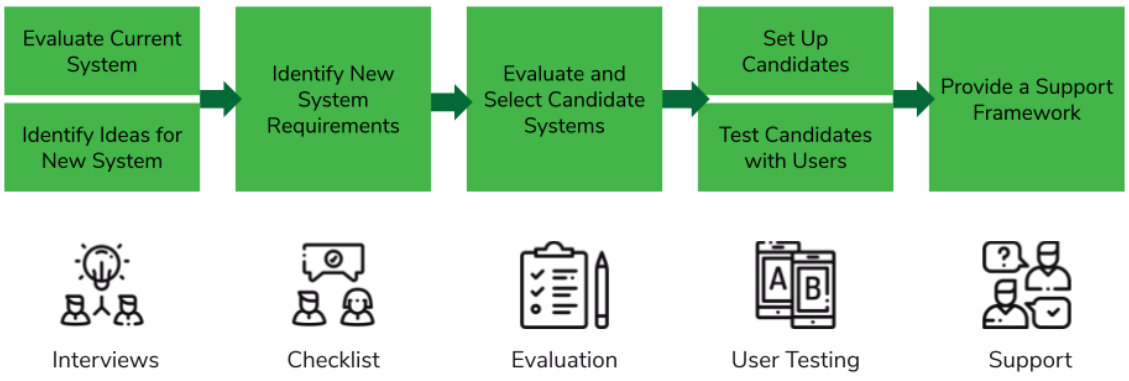

Figure 5. Visual representation of the objectives.

3.1 Objective 1: Evaluate the Opinions of WRFH Entrepreneurs

Our first objective was to identify the opinions that the Food Hub entrepreneurs have towards the current kitchen management system as well as ideas that they have to include in a new system that would better meet their needs. To complete this objective, we answered the following research questions:

1. What do entrepreneurs like about the current system?
2. What do entrepreneurs think needs improvement in the current system?
3. What would entrepreneurs like to see in a new system?

The interviews we conducted were semi-structured, informal, and completed individually with entrepreneurs. We chose to conduct individual interviews because they give the entrepreneurs more time to explain their ideas and opinions fully. We contacted 29 out of 32 active members of the Food Hub's kitchen and were able to conduct 4 interviews of entrepreneurs with various businesses.

Discussions in the interviews were based around the entrepreneurs' opinions of the current management system and what they would like to see in a new management system. The individual interview protocols and procedures can be found in Appendices A and B.

3.2 Objective 2: Identify New System Requirements

The second objective was to identify and evaluate specifications for the new kitchen management system of the Worcester Regional Food Hub. Using the feedback that we received from the entrepreneurs, along with the initial requirements specified by Food Hub Director Shon Rainford, we determined what features and functions need to be included in the candidate systems. The research questions that helped us accomplish the objective were:

1. What are the specific needs of a kitchen management system for the WRFH?
    a. What are the most important needs from an entrepreneur's perspective?
    b. What are the most important needs from the director's perspective?

The first task in this objective was to understand the Director's thoughts and opinions about the current system. Mr. Rainford's thoughts on the current system were noted in preliminary interviews conducted in the beginning of this project. All the Director's thoughts on the current system were deemed important because he would be interacting with the new kitchen management system the most.

The second task in this objective was to sort and prioritize entrepreneurs' thoughts and opinions about the current system. To complete this task, we conducted a sentiment analysis. This type of analysis is "a technique used to capture people's opinion or attitude toward an object, person, or phenomenon" (Bhattacharjee, 2012, p.116). We classified these opinions into different categories and ranked the relevance of the opinion, giving it a weight between 1 (not important) and 5 (extremely important) of how important the comment may be in helping us identify potential software requirements. The team individually ranked the comments from the interviews and selected the median value to determine its importance. Each client had an approximately equal amount of time to give feedback, and so results were

not skewed in favor of those who talk more. Positive statements helped us figure out what users might want in a system, and negative statements helped us identify what should not be in a system. The weights helped us determine what features or elements are the most important to focus on for the new system.

After synthesizing the data from interviews about a new system, we created a functional specification document, referencing Eby (2018), to come up with a clear vision of a new management system that will be compatible with the expansions being made for the new space. Based on the interview results, we categorized each criterion as "Requirement," or "Preferred." A "Required" criterion indicates a quality that needs to be in the new system; a "Preferred" criterion indicates a quality that is not required but would greatly help the new system.

3.3 Objective 3: Evaluate and Select Candidate Systems

During the preliminary research period, we identified several candidate kitchen management systems for the Worcester Regional Food Hub. For the third objective, we explored the systems we identified. Using the feedback of entrepreneurs and Mr. Rainford, new research on potential software, and our team's judgement, we evaluated these candidate systems.

In order to complete this objective, we considered the following research questions:

1. What required specifications do the candidate systems meet?
2. What preferred specifications do the candidate systems meet?
3. What is the budget for a new management system for the Food Hub? Do these systems stay within that budget?
4. How will software integrate with the Worcester Regional Food Hub website?

Using the functional specification document, we created a checklist of criteria to record which software matched the specified requirements, and which did not. We evaluated each system using the Functional Specification Checklist. To complete these evaluations, we contacted the support teams of each candidate system to obtain free trials or demos.

It is important to note that our own judgements of the user experience were used to evaluate the usability and performance aspects of these candidate systems. Specifications such as efficiency and learnability were analyzed in this step based on our experiences with the demos. We also figured out the budget of the WRFH regarding kitchen management by consulting with Mr. Rainford and applied the knowledge of this budget to evaluate the candidate systems further.

We chose which systems to move forward with by considering the specifications met, cost analysis, and software integration specifics to find the best solution. This required us to adjust the system to varying degrees, so the software's customization abilities were also an important factor to consider if it did not directly meet the needs of entrepreneurs. Based on our final selection, we worked to set up two candidate systems for testing.

3.4 Objective 4: Set Up and Test Candidate Systems

The purpose of this objective was to understand how well the candidate systems work for the Worcester Regional Food Hub and obtain feedback from the Food Hub Director and entrepreneurs on the potential new systems. In this section we describe the methods we used to set up the candidate systems; to test the candidate systems with entrepreneurs; and to obtain feedback from each of the entrepreneurs.

First, we set up the candidate systems to function specifically for the Food Hub by using information from Mr. Rainford. Once the candidate systems were up and running, we used the A-B testing method to gather data about them. The A-B testing method involves users comparing one candidate system to another to see which one performs better (A/B Testing, n.d.). Our A-B testing system used a *within* study design. Budiu (2018) may be referred to for more information on *within* study designs.

In the study, we gave each user a set of tasks to complete in each of the candidate systems during a virtual meeting. Users shared their screens as they completed these tasks, and the meeting was recorded. During testing, we timed how long it took users to complete each designated task. This timing helped us compare the intuitiveness of the system: the faster task completion time, the more intuitive the system. The A-B testing study protocols and procedures can be found in Appendices C and D. There were five users who completed this A-B testing procedure.

After the testing session was completed, we had users complete a survey to evaluate their experience with each system. The survey solicited users' thoughts on the system, including what worked well for them and what confused them. The specific statements and questions we asked in the post testing survey can be referenced in Appendix E. One section of the survey included six system usability survey statements. To remove bias, we used three positively worded statements and three negatively worded statements. Users ranked each statement from 1 (strongly disagree) to 5 (strongly agree) based on their own evaluation of the system. These statements may seem repetitive, but they were asked with the goal of eliminating any bias that occurs in asking positive or negative statements. To compare two systems with the data from these statements, we first transposed the negative scores by subtracting the rank given from six. After the negative statement ranks were converted, the data was added together. This total is a score out of thirty that evaluates the usability of the system. An example calculation can be found in Appendix F.

Based on the feedback we received from the entrepreneurs and our sponsor, we selected a final system to move forward with.

3.5 Objective 5: Provide a Support Framework

The final objective of the project was to provide the WRFH with a support framework for the kitchen management system. This framework included a tutorial system for entrepreneurs as well as a compilation of software documentation for administrators.

As the WRFH scales up, it will be necessary to have adequate support in place for entrepreneurs to learn the management system individually. Mr. Rainford mentioned that along with the expansion he will be moving to a more administrative role, meaning a

reduction in his day-to-day contact with entrepreneurs (Shon Rainford, personal communication, February 8, 2021). Establishing a self-sustained support framework for entrepreneurs will help Mr. Rainford achieve this goal.

To create effective entrepreneur and administrator support, we documented the development process along the way. We also made sure to note in A-B testing which parts of the system entrepreneurs struggled with the most. The final support framework will contain a tutorial system that will be easily available to all current and new WRFH entrepreneurs as well as a document compiling all the useful tutorials identified for administrative users.

4 Selection of a Kitchen Management System for the Worcester Regional Food Hub

In this chapter we begin by presenting the functional specifications of a new kitchen management system, based on our analysis of staff needs and input from entrepreneurs to select a new kitchen management system for the Worcester Regional Food Hub. Next, we present the different software products identified as possible kitchen management systems. Then, we present information about the candidate systems as well as evaluations of them. Finally, we draw conclusions on which of the candidate systems will best fit the WRFH's needs.

4.1 Functional Specifications

This section outlines system specifications we identified for the new kitchen management system. These specifications were given to us by Worcester Regional Food Hub's Director Shon Rainford as well as identified through interviews with the Food Hub's entrepreneurs.

The most valuable resource to WRFH Director Shon Rainford is his time. Currently the WRFH scheduling system requires entrepreneurs to reach out to Mr. Rainford followed by him manually inputting booking times into the Google Calendar. Below are a few specifications that he identified:

- **The system should allow for automated scheduling and billing:** An automated system will allow entrepreneurs to login to the system on their own and schedule times in the kitchen and storage space without the need to contact Mr. Rainford. Furthermore, the system must prevent entrepreneurs from canceling their bookings within 24 hours of the scheduled start time. Mr. Rainford believes the automated billing aspect will save him more time because it will allow entrepreneurs to pay their invoices directly through the new system.

- **The system should integrate with WRFH's pre-existing software:** Director Rainford would prefer the new system to integrate with the WRFH's new WordPress website so that it can be easily accessible to entrepreneurs. Automated billing would also require the new kitchen management system to integrate with QuickBooks Online, the WRFH's current billing software.

- **The system should account for varying prices of kitchen and storage spaces.** The rate of each kitchen changes between the day and overnight as well as the type of

kitchen. Furthermore, the rate of each storage space varies between booking a single shelf or an entire rack. If the new kitchen management system integrates with billing, this functionality would be especially important so that all kitchen and storage space are billed properly.

- **It would be beneficial to include an automated check in and check out process.** Currently entrepreneurs sign in and out in the kitchen space and Mr. Rainford must compare the scheduled times and the recorded times for billing purposes. Mr. Rainford would like to see this process completely automated to save even more of his time. Having online records of the check in and check out process, instead of his current paper copies, would also save him space.

Entrepreneurs also provided feedback on what they would like in a new kitchen management system. Below are major suggestions we received:

- **Entrepreneurs would value more control and responsibility:** Most entrepreneurs find the current system easy to use because it relies heavily on Director Rainford. Although entrepreneurs prefer the simplicity of the current system, they recognize the need for a new system giving them more control and responsibility. Entrepreneurs feel an automated scheduling system would work best and would like to be able to schedule their own kitchen time without having to go through Director Rainford. Entrepreneurs also believe an automated system will eliminate scheduling conflicts that arise when the Google Calendar is not updated.

- **There is an opportunity to create a community within the Food Hub:** In the current kitchen management system WRFH entrepreneurs do not have an easy way to communicate with each other. They must manually find others' contact information through the WRFH website. Cultivating a community within the WRFH will be beneficial, and several entrepreneurs liked the idea of having a platform to get to know each other and have a community. Previous case studies (Conover et al., 2015) found that networking within kitchen communities contribute to the overall success of food hubs. The Common Kitchen and The Starting Block, shared-use kitchens in New Hampshire and Michigan, were able to increase their outreach through community networking (Conover, 2015). Additionally, the Starting Block states that the "'key' to the success of Starting Block has been 'extensive networking at each step'" (Conover, 2015).

- **Open communication could maintain organization within the kitchen**: In addition to getting to know each other, entrepreneurs thought it would be helpful to contact staff and other entrepreneurs in case they run into an issue in the kitchen space. These issues include running out of kitchen materials, if a kitchen tool is not working properly, and scheduling conflicts. For example, entrepreneurs mentioned running out of paper towels and being unsure of where to find new ones. Additionally, if there is a last-minute change in booking times, entrepreneurs need to be able to contact staff to let them know of the schedule change, and entrepreneurs who are affected by the schedule change.

- **Entrepreneurs prefer buffer times between bookings:** The current kitchen management system involves having entrepreneurs complete a checklist of tasks

before leaving the kitchen space, such as cleaning. However sometimes in back-to-back bookings, entrepreneurs do not have enough time to clean the kitchen space thoroughly before the next booking begins. Therefore, entrepreneurs wanted to have a small buffer time in between bookings, as it would give them enough time to complete the tasks on the checklist and have the kitchen space ready for those in the next booking session. Entrepreneurs believe having an approximate buffer time of fifteen minutes between back-to-back bookings would be the most beneficial.

A set of specifications based on the feedback from Director Rainford and entrepreneurs can be found in Appendix G and were sorted into the following categories: usability, performance, functional, supportability, security, and interface. These specifications were then compiled into a checklist, shown in Tables 2 and 3, for use in comparing different candidate systems.

4.2 Evaluation of Candidate Kitchen Management Systems

The identified candidate systems include Nexudus, MIDAS, and the WordPress Plug-in. Each of these systems have their benefits and drawbacks. After comparing each system based on price and specifications met, Nexudus and MIDAS were identified as the strongest candidates to test with WRFH entrepreneurs. After several user testing sessions, Nexudus was selected as the kitchen management system that will best fit the needs of the WRFH entrepreneurs and staff.

4.2.1 Introduction to Candidate Systems

The software product MIDAS, a room scheduling system, is used by the Western Massachusetts Food Processing Center as their scheduling system. The scheduling software is easily accessed on laptops, tablets, and mobile phones (MIDAS, 2020). There are many help resources on the company website. MIDAS has varying prices depending on the number of venues (spaces people can book) and users; they also offer a demo and free trial. Customers can host a MIDAS system on the cloud or use a self-hosted system (downloading MIDAS onto a server). The cost of hosting a MIDAS system on the cloud varies based on the number of venues available and active users. For example: MIDAS for twenty venues and forty users costs $62 per month.

The software product Nexudus is used by the CommonWealth Kitchen in Dorchester, MA for their scheduling and billing systems. Members' billing details are entered when they sign up for a membership, and then they can log in to make room bookings (CommonWealth Kitchen, n.d.). Nexudus helps organizations manage operations, create flexible workspaces, and offers an app for use on various devices (Nexudus, n.d.). Customers can manage room bookings, invoices, events, and discussion boards. Customers can also keep track of how many people are in a room at a time, charge users based on the booking duration and type of room booked, and automate invoice reminders. Nexudus offers a free trial; the cost increases to access more features and depends on the number of active users at one location. The price is $85 per month for up to 40 active users per location (Nexudus, n.d.).

WordPress.org has a Booking Calendar plug-in to create and manage bookings. Customers choose which days on the calendar they want to make bookings, choose time slots, and fill in information about their booking. The administrators of the scheduling system are notified when a booking is made and can accept or decline the booking. The plug-in easily integrates into any WordPress site, and allows for imports to and from Google Calendar. Additionally, all bookings can be stored in a database, and the administrator can manage all bookings in one

place. The price of this software and the number of features available depends on which version is used; these versions include Personal, Business Small, Business Medium, Business Large, and MultiUser (B., Gugerty, 2020).

4.2.2 Comparison of Three Candidate Systems

The price of the new kitchen management system is an important consideration for the WRFH. Table I presents a comparison of these prices.

Table 1. Price Comparison.

Nexudus	MIDAS	WordPress Plug-in
$85/month (base fee) + $10/month (QuickBooks integration) + $0.04/transaction (transaction fees)	$62/month	$149 (one-time)

Each of the different candidate systems have prices that vary based on different criteria. For the WordPress Plug-in, the price is a one-time fee based on the size of the business. For MIDAS, the price is based on the number of spaces available to schedule and the number of active users. For Nexudus, the price is based on the number of active users along with additional fees to include certain features. The WordPress Plug-in is the most inexpensive option and Nexudus is the most expensive. The WRFH currently pays $660 / month for a system called FreshByte, which is one part of the current management system they will no longer be using. These prices are very reasonable for a new management system according to Director Rainford.

The new kitchen management system to be implemented in the Worcester Regional Food Hub must satisfy certain required specifications. In Table 2 these required specifications are listed in the leftmost column. In Tables 2 and 3, a green checkmark means a specification was fully met by the candidate system, a yellow circle means a specification was partially met by the candidate system, and a red “X” means a specification was not at all met by the candidate system.

Table 2. Comparison of Required Specifications.

Required Specification	Nexudus	MIDAS	WordPress Plug-in
Final entrepreneur bookings made viewable to all staff and entrepreneurs	✓	✓	✓
Ability to have multiple, different types of spaces	✓	✓	✓
Can schedule kitchen time on the same day	✓	✓	✓
Kitchen members can book and edit times themselves	✓	✓	✓
Ability to schedule spaces days or weeks ahead of time	✓	✓	✓
Entrepreneur billing info is private	✓	✓	✓
See at first glance who is booked for what time and day, and everyone's ending times	✓	✓	✗
Ability to clearly designate spaces (kitchen/storage/space descriptions)	✓	✓	✗
Ability to schedule in 5 min increments or custom times	✓	✓	✗
Ability to schedule any times (24/7) and weekends	✓	✓	✗
Ability to change rates based on kitchen/space/time of day	✓	◯	✗
Cannot cancel within 24 hours of scheduled time without Director Rainford's approval	✓	◯	✗
Ability to schedule recurring times	◯	✓	✗

Nexudus satisfies nearly all these specifications, except for being able to schedule recurring times. Administrators, or back-end users, can schedule recurring times; entrepreneurs, or front-end users, do not have this ability. Therefore, this requirement is only partially satisfied.

MIDAS satisfies almost all the specifications as well. One specification it partially satisfies is the ability to change rates based on the space and time of day. MIDAS allows you to input custom rates, but it does not allow you to change the rates of each space for different times of day. For this specification, we had to implement a confusing workaround where we split up the kitchens into two separate venues: normal hour kitchens (6AM-10PM) and night shift hour kitchens (10PM-6AM). The other specification MIDAS partially satisfies is the ability to restrict entrepreneurs from cancelling their bookings within 24 hours of the scheduled time. MIDAS will allow users to cancel their bookings within 24 hours, but they will still be billed for it.

This is the functionality that Director Rainford had specified, but it is not exact because entrepreneurs are still able to cancel their bookings.

The WordPress Plug-in only satisfies 6 out of 13 required specifications. The most notable required specification that it does not satisfy is the ability to see at first glance who is booked for what time and day and everyone's ending times. To be able to schedule kitchen time accurately and efficiently, entrepreneurs must also be able to see what is going on in the kitchen.

The preferred specification evaluation for the new kitchen management system is shown in Table 3. These specifications were identified as preferred because they would greatly help but are not required to have in the new system.

Table 3. Comparison of Preferred Specifications.

Preferred Specification	Nexudus	MIDAS	WordPress Plug-in
Integrates with WordPress	✓	✓	✓
Is flexible and can be updated easily	✓	✓	✗
Built in tutorial/support	✓	✓	✗
Ability to set buffer times (built into booked times)	✓	✓	✗
Easy to make changes if there are conflicts	✓	✓	✗
Ability to contact other entrepreneurs / WRFH staff	✓	✓	✗
Desktop and mobile compatible	✓	✗	✗
Integrates with QuickBooks, Authorize.net	✓	✗	✗
Fast, efficient, accurate	✓	✗	✗
Easy to use and learn	✓	✗	✗
Digital check in / check out	✓	✗	✗
Good support team	✓	✗	✗
Automated billing to client for greater time spent in kitchen	✓	✗	✗

A specification that was met by all three candidate systems was the ability to integrate into WordPress. Any of these systems would be able to be linked to the WRFH website for easy access for the entrepreneurs.

Nexudus meets all preferred specifications. The most notable preferred specification that it meets is the ability to integrate with the accounting systems of the WRFH: QuickBooks and Authorize.net. This integration adds $10/month plus 4 cents for every transaction to the price of Nexudus. We confirmed with Director Rainford that these extra costs were not expensive enough to remove Nexudus as an option. Another preferred specification that Nexudus meets is that it is desktop and mobile compatible. Busy entrepreneurs would be able to access

Nexudus right from their phones, rather than having to use their desktop or laptop to schedule kitchen time. Another notable preferred specification that it meets is the ability to automate the billing process when comparing the time the entrepreneur scheduled in the kitchen to the time they actually spent in the kitchen. In MIDAS and the WordPress Plug-in, billing the entrepreneur for the greater of those two times would have to be done manually.

Candidate Systems Nexudus and MIDAS were chosen for user interaction to further test which candidate system will work the best for the WRFH. Nexudus was selected because it meets nearly all our required and preferred specifications. Although Nexudus is a strong candidate and meets all the preferred specifications, MIDAS was selected because it meets nearly all the required specifications, and it is less expensive compared to Nexudus. The WordPress Plug-in was ruled out because it did not meet enough of the required specifications to be considered for testing.

4.2.3 Results from User Testing

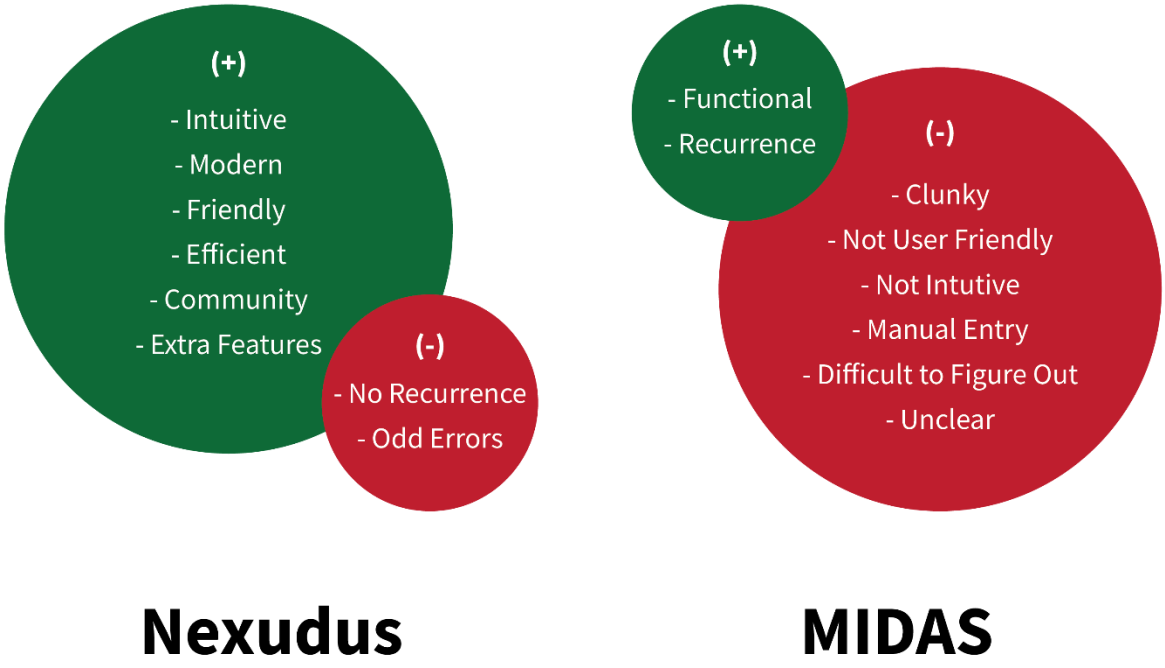

Figure 6. User Testing Feedback. Green indicates positive features, and red indicates limitations or drawbacks.

Users exhibited a clear preference for Nexudus based on our A-B testing and liked its interface and many features. First, users stated that the visualization of the kitchen schedules were easy to look at. They liked how simple it was to switch between the day, week, and month views of the schedule. When making bookings, users liked that the price was listed immediately as they selected their time period. They also liked the extra features Nexudus provides them. The resource and floor plan pages clearly display what equipment is available in each kitchen and where the kitchens are located. The dashboard was effective for entrepreneurs to see what upcoming bookings they have. They were excited about the entrepreneur directory as it will be nice for them to learn about other businesses using the kitchens. They liked that the conversation page will create a more tightly knit community by

allowing them to get in contact with other entrepreneurs or kitchen managers. Overall, users found the system friendly, efficient, and easy to learn.

Users did not find much to dislike about Nexudus, however there were some negative comments. First, Nexudus does not currently have any way for users to make recurring bookings. This is a more significant issue because many entrepreneurs often try to schedule multiple bookings at once for several weeks into the calendar. Additionally, users found it annoying that after making a booking, they would not return to the calendar on the same day they were looking at originally. Lastly, when there was a conflict with a requested booking, the error message presented to the user was not effective at explaining what exactly the conflict was.

Even though Nexudus is a more comprehensive system, users still stated that MIDAS was functionally adequate. MIDAS was able to effectively perform the basic tasks they needed. Users liked that this system displayed a miniature calendar in the corner which made it easy to navigate between the daily schedules. Additionally, once they learned how to use the recurring booking feature, it was easier for entrepreneurs to schedule multiple days at once.

The overall judgement of MIDAS from users was that it was clunky, not user friendly and outdated. They did not like the month schedule view as it was hard to navigate to and did not display what entrepreneur was assigned to the booking. Additionally, users found it annoying that there had to be separate rows for bookings made during the day and night shifts. They were not able to easily make a booking that ran between each shift and the unavailable kitchens were not marked clearly enough. When making bookings, they found that there were several unnecessary input fields and it required more manual entry. For editing and canceling bookings, the drop-down bubbles were slow and did not intuitively show their functionality. While MIDAS does have a recurring booking feature, users found it difficult to use. The interface was cumbersome and did not provide a comprehensive set of options. Lastly, many users could not figure out how to make long term bookings for storage spaces without assistance.

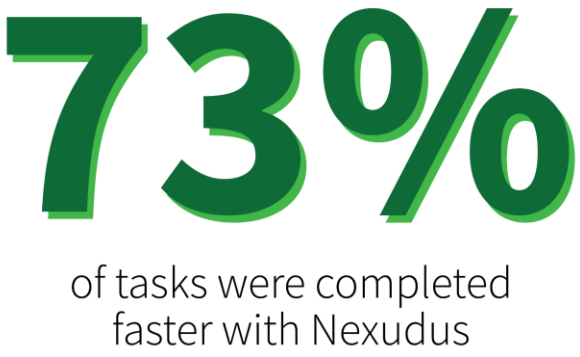

Figure 7. Task Completion Time: Nexudus Tasks Completed Faster.

A general comparison between the efficiency of MIDAS and Nexudus was completed. We found that out of all the tasks the users completed, 73% were completed faster through Nexudus. The completion times for the individual tasks were also compared. The task completion times from each user were averaged together and these average times are shown in Figure 8. As

seen for 5 out of the 7 tasks, the average completion time was faster for Nexudus. From these results it is clear to see users found the Nexudus system far more intuitive and easier to use.

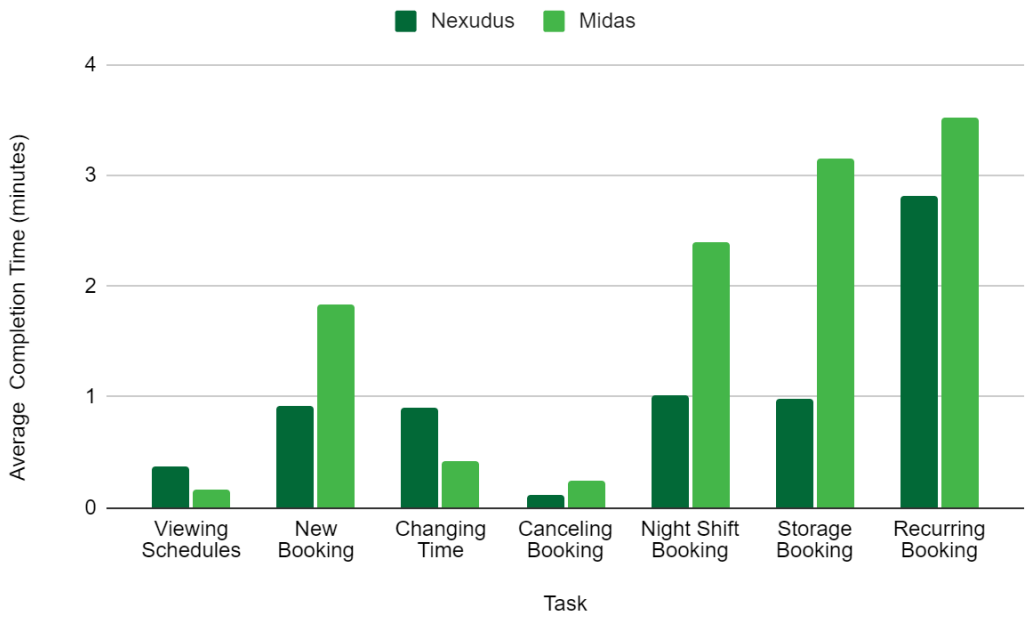

Figure 8. Comparison of Average Task Completion Times.

Results of the system usability survey also indicate a clear preference for Nexudus. On average, users gave MIDAS a score of 20 out of 30 and gave Nexudus a score of 28.5 out of 30. This further proves that Nexudus is a more user-friendly system and that entrepreneurs prefer it over MIDAS.

Figure 9. Nexudus and MIDAS Usability Scores.

4.2.4 System Recommendation: Nexudus

Based on our testing, Nexudus has proven to be the most capable and appropriate system to handle the needs of the Worcester Regional Food Hub. It will provide the Food Hub with the most comprehensive kitchen management system as it fulfills almost all of the “requirement” and “preferred” criteria on the functional specification checklist. Its interface is simple and easy to learn while still providing many features.

Nexudus provides features that help both Mr. Rainford and the entrepreneurs. While it has the highest cost of the candidate systems, it is also the only one that integrates with billing. This integration makes Nexudus cost-effective as it will save Mr. Rainford time and money in the future. Based on Mr. Rainford's current time spent scheduling and billing entrepreneurs, we estimated the amount of time he will save by using Nexudus when they move to Union Station. Entrepreneurs will be able to schedule their own kitchen space meaning Mr. Rainford will not need to spend any time on scheduling. We estimate that this would save him 24 hours every month (this assumes that all six kitchens would be booked on all days of the month). Through Nexudus, the billing system will also be automated, and we estimate that this will save him an additional 12 hours per month.

The system's community tab allows entrepreneurs to connect with each other in a way they were not able to before. Entrepreneurs can send direct messages to each other or post on a discussion board. These interactions can be for social purposes between members, but it can also be beneficial to the management of the kitchen. Entrepreneurs could potentially alert staff of any problems they are having with equipment in the kitchens. This feature could help create a stronger community at the Food Hub while also ensuring smooth operations within the kitchens.

It is our recommendation that the Worcester Regional Food Hub should move forward with Nexudus as its kitchen management system. It is the most capable at handling their expansion to Union Station.

5 Implementation Resources and Next Steps

We hope to have made a strong case for Nexudus as a promising kitchen management system for the WRFH. Since this project was completed in May 2021, and the move to Union Station will not occur until March 2022, we were unable to implement the new system. In this chapter we summarize some key tasks for implementation.

1) **Compiling support resources into the kitchen operations manual**. Despite the participants' preference for Nexudus, there were still tasks that they struggled with in this system: making and managing bookings, scheduling storage spaces, and returning to the calendar view. Therefore, we compiled a subset of existing Nexudus documentation into member and staff guides to help entrepreneurs and staff for when the WRFH switches to the new kitchen management system. Member and staff guides can be referenced in Appendices H and I. We recommend that these guides be included in the Operations Manual.

2) **Setting up Nexudus after architectural plans are finalized.** Once the architectural plans and operations manual for the kitchen are finalized, the following information can be entered into the Nexudus system:
    a. **Floorplans:** Labelling and naming the kitchens accordingly will allow users to identified them more easily. This is important for the kitchen management system as well as the physical space. Entrepreneurs will be able to book the correct kitchen and find which one they booked when they arrive at Union Station.

b. **Descriptions:** Each space has an option to add descriptions which can include what equipment will be available for each kitchen. This will allow entrepreneurs to properly choose which kitchen will best suit their needs.
c. **Pricing Rates:** The pricing rates for specific kitchens can be determined based on the equipment they provide. The prepping kitchen is going to cost less than the standard kitchen, but prices are still yet to be determined. This information is able to be included into the kitchen management system now that it integrates with billing. With the correct prices in the system, entrepreneurs will be able to immediately see what they will be billed for each time slot and then charged accordingly.
d. **Pictures:** Including images of both the kitchens and storage spaces in the system will allow the entrepreneurs to visualize the space. This will also help non-English speakers identify the kitchens and storage more easily. Entrepreneurs may not want to read the whole description, and instead rely on the image of the kitchens and storage.

3) **Integrating billing and payment methods with Nexudus.** We recommend that the WRFH integrates both their QuickBooks and Authorize.net accounts on Nexudus. One of Mr. Rainford's goals was for the new system to allow for an automated billing process to save him more time; Nexudus allows the WRFH to do this. Integrating QuickBooks will help the WRFH to manage payments made by entrepreneurs for using the kitchen and storage spaces. Integrating Authorize.net will allow for entrepreneurs at the WRFH to pay for kitchen and storage rentals directly through Nexudus. Our project team was unable to complete this step as it was not appropriate for us to access the WRFH's clients' personal information for any reason.

4) **Integrating Nexudus on the WRFH website.** Closer to the move to Union Station in March 2022, some changes to the website can be in made by Hunchback Graphics. Since Nexudus is a third-party software, it would have to be integrated into the WordPress Website. Hunchback Graphics would be able to do this on the back-end of the website and implement member logins to Nexudus so that the software can be properly accessed by only the entrepreneurs. The Nexudus website would also need some updates including the finalization of kitchen and storage methods mentioned above. If Director Rainford were to have any issues further customizing the system to fit the website and his needs, Hunchback Graphics should be able to assist.

5) **Implementing Nexudus Apps.** There are several Nexudus Apps that the Food Hub will want to use. These apps can be downloaded and used free of charge by entrepreneurs once the WRFH pays the monthly subscription fee for Nexudus. First the Nexudus Passport app will allow entrepreneurs to schedule kitchen space and interact with the community features from their smartphones. The NexIO app is what would be used to check entrepreneurs in and out of the kitchens. This can be integrated with a 'pay as you go' system where entrepreneurs will be charged for any extra time they spend in the kitchen that is not already accounted for in their booking. We have found the Nexudus support staff to be very helpful for technical questions. We recommend starting some correspondence with the Nexudus staff through their support desk to set

up these apps. Additionally, new Nexudus features can be requested through the support desk.

6) **Optimizing the Nexudus Platform.** As mentioned earlier, The CommonWealth Kitchen is a successful food hub that uses Nexudus for their kitchen management. They use the Nexudus platform very effectively and have their own custom template which tailors the front-end website more to their needs. Their business model is slightly different in that they have monthly membership rates; however, the Worcester Regional Food Hub can learn a lot about how to best apply Nexudus to a shared kitchen. For future work on the Nexudus site it is highly recommended to reach out to the CommonWealth Kitchen.

6 FINAL THOUGHTS

The new kitchen space in Union Station presents an important opportunity for the Worcester Regional Food Hub to support local producers, entrepreneurs, and consumers. “A shared-use commercial kitchen can play a critical role in developing a healthy, safe, and secure local food supply” (Conover, 2015).

Since opening, the WRFH has greatly impacted the community. Their work with Worcester Public Schools and other community members have provided access to healthy food options to people of all incomes. We hope that our project will help maintain Food Hub operations, save time for the Director, strengthen the WRFH community, and help them continue to provide these services to Worcester.

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APPENDICES

APPENDIX A - INTERVIEW CONSENT DOCUMENT

Project Team: Ethan Farrah, Natalie Mohn, Anna Shi, Azka Siddiq, Ben Verdesi

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Title of Research Study: Kitchen Management for Local Food Entrepreneurs

Study Purpose: The purpose of this study is to understand the opinions of staff and entrepreneurs at the Worcester Regional Food Hub about the current kitchen scheduling system, and to understand the needs of entrepreneurs to select a new scheduling system for the Food Hub. We'll be using your responses to choose our prototype systems. Our goal is to implement a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station.

Number of People Taking Part in the Study: If you agree to participate, you will be one of approximately 4 entrepreneurs who will be participating in this initial research.

Procedure for the Study: If you agree to be in the study, you will be asked to participate in an individual interview where we will ask you some general questions about the current kitchen scheduling system in the Worcester Regional Food Hub, as well as what you would like to see in a new system. *The interview will be recorded.*

Benefits of Taking Part in the Study: Your participation in this research will be most helpful in the understanding of the Worcester Regional Food Hub's current kitchen scheduling system and developing a new system that meets the needs of entrepreneurs.

Confidentiality: No participants will be identified by name in this study without permission. Your comments will not be shared with anyone other than our project team. Constructive criticism is encouraged and will not negatively affect your relationship with the WRFH.

Voluntary Nature of Study: If you feel uncomfortable once you begin the study, you may stop participating at any time.

Please contact gr-WRFH@wpi.edu with any questions.

APPENDIX B - INTERVIEW PROTOCOL

Introduction

Good [morning/afternoon] [Entrepreneur Name]. Hi, my name is [name]. I am a student at Worcester Polytechnic Institute, and I will be walking you through the interview today. My colleagues, [names], are also on the line, who will be taking notes and asking follow up questions during our session.

Study Purpose

The purpose of this study is to understand the opinions of staff and entrepreneurs at the Worcester Regional Food Hub about the current kitchen scheduling system, and to understand the needs of entrepreneurs to select a new scheduling system for the Food Hub. We'll be using your responses to choose our candidate systems. Our goal is to implement a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station.

Consent

Before we start, we would like to go through important parts of the interview information document (Interview Consent Document) that was sent to you via email earlier. You can find the link in the chat. If you have trouble accessing the link, please let us know. This interview will be recorded and transcribed for the purpose of analysis only. All your personal information will be kept confidential and stored where only group members can access. Your name will not be used in any publication or presentation without your permission.

Your participation in this research will be most helpful in understanding your views on the Worcester Regional Food Hub's current kitchen scheduling system and developing a new system that meets the needs of clients and staff.

Do you have any questions about the interview today?

(Participant asks questions if they have any)

Are you comfortable with the study procedures and ready to move forward?

(Participant gives oral consent)

Interview Time

Our interview will last about 30 minutes. There are no right or wrong answers. We are interested in your ideas and opinions. At any time if you feel uncomfortable and wish to stop the interview, please let us know. Are you ready to start?

Great. Let's get started.

Possible Question to Guide Conversation

1) How long have you used the current scheduling system at the WRFH?
    a) How often do you book time in the kitchen (weekly, monthly)?
2) What do you think is easy to use about the current system?

a) Is the current system easy to use overall?

b) What do you like most about the current system?

3) What do you think needs improvement in the current system?

a) What specific aspects of the current system are difficult or complicated to use?

b) Is the current system difficult or complicated to use overall?

4) What device do you prefer to use when making reservations? (Mobile or Desktop)

a) In general how confident do you feel about using new technology?

5) How did you learn to schedule kitchen time with the WRFH?

a) Are there any other support frameworks or tutorials in place at the WRFH? Are they helpful and if so why?

b) What would you like to see in a new support framework to make it stronger and more helpful?

c) What tutorial format do you prefer (video, written, images)?

6) What other shared kitchen scheduling systems have you used?

a) What did you like about them?

b) What did you find to be the most complicated part?

7) What would you like to see in a new kitchen scheduling system?

End of Interview

Thank you. This marks the end of the interview. Do you have any questions for us?

Thank you very much for participating. Have a great day!

[Interviewer stops recording]

APPENDIX C - A-B TESTING CANDIDATE CONSENT FORM

Project Team: Ethan Farrah, Natalie Mohn, Anna Shi, Azka Siddiq, Ben Verdesi

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Title of Research Study: Kitchen Management for Local Food Entrepreneurs

Study Purpose: The purpose of this study is to understand the opinions of staff and entrepreneurs at the Worcester Regional Food Hub about the current kitchen scheduling system at the Worcester Regional Food Hub, and to understand the needs of entrepreneurs to select a new scheduling system for the Food Hub. We'll be using your responses to choose the candidate systems for the new kitchen scheduling system. Our goal is to implement a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station.

Number of People Taking Part in the Study: If you agree to participate, you will be one of approximately 5 entrepreneurs who will be participating in this further research.

Procedure for the Study: If you agree to be in the study, you will be asked to share your screen while attempting several tasks using two different kitchen scheduling candidates. When participating, please use a device that allows you to share your screen. After using each candidate system, you will stop sharing your screen and complete a short survey that will ask you to evaluate your experience with each system. The session will be recorded.

Benefits of Taking Part in the Study: Your participation in this research will be most helpful in understanding your views on the Worcester Regional Food Hub's current kitchen scheduling system and developing a new system that meets the needs of entrepreneurs.

Confidentiality: No participants will be identified by name in this study without permission. Your comments will not be shared with anyone other than our project team. Constructive criticism is encouraged and will not negatively affect your relationship with the WRFH.

Voluntary Nature of Study: If you feel uncomfortable once you begin the study, you may stop participating at any time.

Consent:

I certify that I have read and understood the consent form, that I have been given satisfactory answers to my questions on project procedures and other matters and that I am free to withdraw my consent and to discontinue participation in the project or activity at any time.

I give my consent to participate in this project. (Participant gives oral consent)

APPENDIX D - A-B TESTING PROTOCOL

Introduction

Good [morning/afternoon] everyone. Hi, my name is [name]. I am a student at Worcester Polytechnic Institute, and I will be walking you through the interview today. My colleagues, [names], are also on the line, who will be taking notes during our session.

Study Purpose

The purpose of this study is to understand the needs of entrepreneurs to select a new scheduling system for the Food Hub. We'll be using your responses to choose the candidate system for the new kitchen scheduling system. Our goal is to implement a kitchen management system for the Worcester Regional Food Hub that will support the needs of their staff and entrepreneurs in order to take advantage of the Hub's relocation to a larger space at Union Station.

Consent Form and Incentive

Before we start, we would like to go through the consent form that was sent to you via email earlier. Here is a document with all of the links and account login information you will need for today's testing session [link]. You can find the link in the chat. If you have trouble accessing this link, please let us know. This interview will be recorded and transcribed for the purpose of analysis only. All your personal information will be kept confidential and stored where only group members can access. Your name will not be used in any publication or presentation without your permission.

Your participation in this research will be most helpful in developing a new system that meets the needs of entrepreneurs.

Do you have any questions about the study today?

(Participant asks questions if they have any)

Are you comfortable with the study procedures and ready to move forward?

(Participant gives oral consent)

Interview Time & Screen Sharing Test

The testing will last about one hour. There are no right or wrong answers. We recommend you voice your thought process verbally as you complete the tasks. We are interested in your ideas and opinions. At any time if you feel uncomfortable and wish to stop the interview, please let us know.

Please make sure to keep the document containing all of the links and login information open throughout the testing session as it contains all the information you need for today.

Are you ready to start?

(Participant gives oral consent)

Great. Let's get started. You may begin screen sharing with your preferred browser.

Tasks

The account login information to the candidate systems are shown below:

MIDAS Login Information
Demo Website: https://demo.mid.as/worcesterfoodhub/index.pl
Username: wrfh.entrepreneur@gmail.com
Password: g00df00d!

Nexudus Login Information
Demo Website: https://worcesterregionalfoodhub.spaces.nexudus.com/
Username: wrfh.entrepreneur@gmail.com
Password: G00df00d!

The tasks we come up with are general to a booking system but also include more specific tasks based on the candidates we select. This was developed through our project work. The following were the tasks we asked entrepreneurs to complete:

- View all schedules on 4/30/2021
- Book a standard kitchen for 2 hours on 4/30/21
- Change the time of your booking
- Cancel the booking
- Book Kitchen E from 10PM-12AM
- Make a recurring booking in any kitchen for 4 weeks *(Not available in Nexudus)*
    a. For Nexudus: Schedule 4 weeks of the same time, same day in Kitchen C
- Book Dry Storage for the whole month of May

Once testing was complete for a candidate system, the entrepreneur was asked to log out of all accounts and close all irrelevant tabs.

APPENDIX E – SYSTEM USABILITY SURVEY

Section II below was asked verbally to the participant after their interaction with each candidate system. All other sections below were recorded using a Google Form.

Section 1: Demographics / Other info (our use only)

1. Name
2. Name of their Business
3. How many people schedule kitchen time for your business?
4. On a scale of 1-5 how comfortable are you with using technology? (1 being not comfortable at all and 5 being very comfortable)

Section II: Comparison of Systems

1. What did you LIKE about candidate system A?
    a. Short Answer Response
2. What did you DISLIKE about candidate system A?
    a. Short Answer Response
3. What did you LIKE about candidate system B?
    a. Short Answer Response
4. What did you DISLIKE about candidate system B?
    a. Short Answer Response
5. Which system did you like better?
    a. Candidate System A
    b. Candidate System B

Section III: Statements about Candidate System A

Respond to each statement below selecting from a range of Strongly Disagree to Strongly Agree (with 5 = Strongly Agree and 1 = Strongly Disagree).

1. I found the system unnecessarily complex.
2. I thought the system was easy to use.
3. I found the various functions in this system were integrated well.
4. I thought there was too much inconsistency in this system.
5. I would imagine that most people would learn to use this system very quickly.
6. I did not like the way the system looked.

Section IV: Statements about Candidate System B

Respond to each statement below selecting from a range of Strongly Disagree to Strongly Agree (with 5 = Strongly Agree and 1 = Strongly Disagree).

1. I found the system unnecessarily complex.
2. I thought the system was easy to use.
3. I found the various functions in this system were integrated well.
4. I thought there was too much inconsistency in this system.
5. I would imagine that most people would learn to use this system very quickly.
6. I did not like the way the system looked.

Section V: Conclusion

1. Please write any other comments you have (about the systems, the study, or anything on your mind from this testing process!)
    a. Long answer response

APPENDIX F - USABILITY STATEMENT SCORE CALCULATION

Original Data

positive	positive	positive	negative	negative	negative
5	4	5	2	3	2

Transposed Data

positive	positive	positive	negative	negative	negative	**Total**
5	4	5	4	3	4	**25**

Score = 25/30

APPENDIX G - FUNCTIONAL SPECIFICATION DOCUMENT

Must be reasonably priced.

Usability Ideas

- Easy to use and learn
- Easy to make changes when there are conflicts

Performance Ideas

- Interfaces with current system software (QuickBooks, WordPress)
- Fast, efficient, accurate
- Flexibility and updatability

Functional Ideas

- Be able to schedule time to wash dishes
- Cannot cancel within 24 hours of scheduled time without Shon's approval
- Change rates based on kitchen / space
- Can schedule kitchen time on the same day, and add time if available
- Ability to contact other entrepreneurs / WRFH staff
- Be able to make changes if there are conflicts
- Be able to book recurring times
- Be able to book any times (24/7) and weekends
- Be able to book days / weeks ahead of time
    - Be able to rent out 6 kitchens, event space, classroom space, storage space
- Kitchen members can book and edit times themselves
    - 5 min increments or custom time
- Digital check in / check out
    - Automatically figure out which time is greater (check ins / outs vs booked time)
    - Link to billing
    - Can clearly designate kitchens / has descriptions for spaces to be booked
- 15 min buffer in new system between people scheduling the kitchens to allow for cleaning → should be built into booked times
    - Ability to have reminder to complete arrival / exit checklists

Supportability Ideas

- Good support team
- Built in tutorial
    - Quick YouTube tutorial / concise written steps with annotations

Security Ideas

- Client registrations for bookings, billings are private
- Final client bookings made viewable to all WRFH staff and clients
    - Clients know ahead of time if they need to leave kitchen at specific time (when next person comes in)

Interface Ideas

- Desktop and mobile
- Easy to see what's going on in kitchen
- See at first glance who is booked for what time and day, and when everyone's ending booking times

APPENDIX H - STAFF GUIDE

Nexudus Administrator Support

Backend Documentation

1. Nexudus Support
    a. The WRFH account is managed by Leonardo Santoro from Nexudus
        i. leonardo@nexudus.com
        ii. support@nexudus.com

2. Maintaining the Backend
    a. Memberships
        i. This link is given to entrepreneurs to set up their accounts. (Can be found from 'Settings'→ 'Website Modules '→'Sign-up Invite link')
        ii. There is a $0/month membership plan that is required for new users (this is just to establish new users as members so they can be billed monthly)
            1. Entrepreneurs can add on storage 'products' to their plan while signing up.
            2. These products can also be added or removed later.
        iii. Memberships will always be created and billed on the 1st of every month.

    b. Booking Settings
        i. We have created kitchen A through F for future use at Union Station with the descriptions and prices as listed in the table below.
            1. These kitchens have been archived for now and will not appear on the calendar
        ii. The Current available kitchen has the following settings.
            1. Is displayed both on front and back-end calendars.
            2. Can only be booked by members.
            3. Users cannot cancel bookings within 24 hours of making them.
            4. Bookings do not need to be confirmed by administrators.
            5. A 15-minute buffer gap is required between bookings.
            6. 6am to 10pm price: $30/hour
            7. 10pm to 6am price: $25/hour

    c. Product Settings
        i. Fridge and Freezer storage options have been archived.
        ii. Dry storage is currently available in two options.
            1. One shelf: $15/month
            2. Whole cage: $45/month
        iii. The storage products do appear on the website to be purchased by entrepreneurs.
        iv. They are available only as recurrent purchases that are directly added to the member's plan and monthly invoice.
        v. Sold products can be viewed through this method:
            1. Go to the reports tab on the bottom left of the backend site.
            2. Navigate to 'Members and Contacts' then to 'Recurrent Charges'.
            3. This will list the members who have purchased storage products.

4. Alternatively, selecting a user then navigating to the 'sales' tab will show what products they have added to their plan.

d. Check-in System
    i. There are several options for a check-in system.
        1. NexIO is an app that can be used to check in members through a tablet in the kitchen space.
        2. Nexudus Automation Tiles can also be used where entrepreneurs will scan the QR codes to sign in and out.
        3. The check in system can be integrated into a preexisting 3rd party access system such as a swipeable key card.
    ii. All these options will Integrate with Pay as you Go (PAYG).
        1. (PAYG) is used to charge entrepreneurs for the extra time they spend in the kitchen.
        2. There is an option to 'exclude the time of bookings' for PAYG charges.
            a. With this option, entrepreneurs will only be charged for extra time spent in the kitchen.
            b. If the time spent in the kitchen is less than the booking, they will still be charged for the full booking duration.
        3. Pay as you go rounds up 15 mins.
            a. Ex: 17 mins → charged for 30 mins
        4. Entrepreneurs will need to check in/ check out at the correct time.
            a. If they check in early, they run the risk of being charged extra.

e. Billing
    i. The default is that members will be billed monthly on the day their plan starts (the 1st of the month)
    ii. Kitchen bookings, pay as you go charges and storage products will be added to their monthly invoices.
    iii. After integrating authorize.net, entrepreneurs should be able to pay via an online credit card transaction.
    iv. QuickBooks Online can also be integrated for accounting and/or payment purposes.

f. Mobile Applications
    i. The Passport by Nexudus is recommended for entrepreneurs who would like to make bookings and use community features from their smart phones.

Helpful Resources Links

Category	**Link**
General Support	Nexudus administrator guide How to start Nexudus subscription Pricing Customizing Website Website Settings Managing Users
Memberships	Managing Membership Plans
Bookings	Booking Settings Booking on Behalf of Entrepreneurs Editing Bookings Canceling Bookings Recurring Bookings Approving Bookings Managing Booking Spaces Editing the Rules for Booking Space Set the Price for Each Booking Space
Products	Creating New Products Different Ways to Sell Products Selling Recurrent Products Setting Stock Options for Products
Billing, Accounting, and Invoicing	Billing Overview Automating Payments How to integrate QuickBooks Online account How to integrate Authorize.net account Invoicing Resources Setting up Financial Accounts Managing Financial Accounts
Check In System	Check in settings Using NexIO to check in Using Automation Tiles to Check in 3rd Party Access Control Integration
Mobile Applications	Passport by Nexudus

Tentative: Kitchen Descriptions and Prices

Key
6AM-10PM
10PM-6AM

Kitchen	Description		Pricing (per hour)
Food Hub Kitchen	Full access to the Greendale People's Church's commercial kitchen.		$30.00 $25.00
A	Standard: 5 burner range w/ refrigerated base, Vulcan double convection oven, Hobart 20qt mixer, prep tables		$30.00 $25.00
B	Standard: 5 burner range w/ refrigerated base, Vulcan double convection oven, Hobart 20qt mixer, prep tables		$30.00 $25.00
C	Standard: 5 burner range w/ refrigerated base, Vulcan double convection oven, Hobart 20qt mixer, prep tables		$30.00 $25.00
D	Large Batch Bay: Standard plus a 100-gallon commercial steam kettle typically used for making large batches of sauces, tilt skillet, retort		$35.00 $30.00
E	Standard plus a variety of specialized outlets that food entrepreneurs can use for unique appliances that do not fit standard outlets		$25.00 $20.00
F	All	A ‘cold kitchen’ mostly for labeling and packing products. You can book spaces F1, F2 and F3 separately or all together.	$27.00 $21.00
	F1	Prepping	$9.00 $7.00
	F2	Packaging	$9.00 $7.00
	F3	Labeling	$9.00 $7.00

APPENDIX I - MEMBER GUIDE

Worcester Regional Food Hub Member Support for Nexudus

The Worcester Regional Food Hub is now using a Nexudus platform to manage their kitchen. This is a guide to help entrepreneurs learn the new Nexudus system. First, some helpful links to user guides created by Nexudus are listed. Then, there are some detailed instructions on using Nexudus features including creating your account, booking kitchen space, purchasing storage space, using community features, checking in and out and using the mobile app.

Helpful Resource Links

- Nexudus Members Guide
- Updating your account information
- Making a Booking
- Add a storage space to your plan
- Billing & Invoices
- Nexudus Mobile App

Creating Your Account

- Use the sign-up link given to you by the Food Hub staff.
- This will lead you to a form to create your account.
    - Please try to fill out as much information as possible regarding you and your business.
    - Including your profile in the "Directory" will allow other Food Hub members to see your profile in the community tab.
- You will then be asked to choose a plan.
    - Join the $0/month plan and this will give you access to the website features.
    - You can use the date that you plan to first use the kitchen as your start date.
- Next, you can add-on any amount of storage space to your plan.
    - These spaces are sold on monthly rates as indicated and will be added to your monthly invoice.
    - You can add or remove storage spaces from your plan later as well.
- Once your account is created you can view your account and begin making bookings.
- You can always go back and edit your account information through "settings" and "My Account"

Booking Kitchen Space

- To book kitchen space you can go to the calendar and then click and drag on the day you want to book time
- You can then edit the start and end time by changing the "Start" and "End" time
    - These times will be able to be booked in 15-minute intervals
- The bookings also have a 15-minute buffer; therefore, you will have to schedule time at least 15 minutes after the previous entrepreneur
- When booking kitchen space, the price will appear before you book the time
- To change a booking go to "My Bookings" and click the change button and edit the booking
- To cancel a booking go to "My Bookings" and click the change button and click "Cancel Booking"
    - Bookings are unable to be canceled within 24 hours and you will receive an error if you try to cancel it

Purchasing Storage Space

- The products section will allow you to purchase the different storage spaces available
- To book a storage space go to the “Products and Services” section and click “Add to my Plan” and select the number of storage spaces you need
    - You will be able to book dry storage as well as fridge and freezer space
- The storage spaces will be booked for a month at a time and will appear under “Your Additional Products”.

Using Community Features

- Community features will allow you to connect with other entrepreneurs.
- Utilize the discussion board feature to post what is going on in the kitchen to allow other entrepreneurs to respond.
- Also, you will be able to message other entrepreneurs through the site.

Checking In and Out

- Make sure to check in and out of your kitchen before starting and after finishing your work.
- If there is no other entrepreneur booked before or after you can choose to come in early or stay later as needed.
    - The check in system will automatically add this extra time to your monthly bill.
    - The extra time is determined on 15-minute time intervals and will always round up from the time you check out.
    - Example: If you choose to stay and extra 20 minutes later you will be charged for 30 minutes of extra time.
- Please try not to use the 15 minutes between bookings to continue working. This time is intended for final cleanup steps and for letting floors and tables dry so they are ready for the next entrepreneur.
- If you do not plan to use any extra time it is important that you check out before the last minute of your booking as to not be charged for additional time.

Mobile Use

- Passport by Nexudus is the application used to make bookings, manage your account and interact with the community features from a smartphone.
- More info on the app can be found in the resource link above.