



Redesigning the DoughBoyz Website

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WPI

Worcester Community
Project Center



Doughballs from DoughBoyz

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Our Team

Abstract

DoughBoyz, founded by Justin Amevor, is a mission driven catering company which sought an updated website. Our project involved creating an online narrative as well as applying general, user-focused improvements to the website. To accomplish our goal, we used multiple methods, including focus groups, mind mapping, participant observation of website platforms, qualitative observations of existing websites, and interviews. Users and marketing experts found that the addition of technical features and a clearer story enhanced the website. The team presented Amevor with a renovated, flexible website model. We recommend that DoughBoyz continue to update its website to reflect the growth of its business.



Making the Doughballs



Preparing fruit for a Community Breakfast

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Food Insecurity: Facts and Facets

Food is an essential resource for every human being. In 2006, the United States Department of Agriculture introduced a definition of food insecurity: “Food insecurity—a household-level economic and social condition of limited or uncertain access to adequate food” (“Definitions of Food Security”, 2021). As of 2021, Feeding America estimates that 38 million people are facing food insecurity in the United States (Feeding America, n.d.a). An array of negative outcomes is linked to food insecurity, including mental health problems, lower levels of education, increased rates of disease, stunted growth in children, and increased health care expenses (Odoms-Young, 2018). Moreover, funds reserved for food insecurity are misspent on emergency supplies of food. Each year an astonishing \$167.5 billion dollars goes towards hunger (Odoms-Young, 2018).

Working-class individuals are especially likely to experience food insecurity, given their lower economic resources. In a survey conducted by Harvard University researchers funded by the Robert Wood Johnson Foundation (2020), one of the biggest differences in distinguishing the problems faced by working- and middle-class individuals was their food security. Their study found that out of ten working-class individuals, three reported that paying for food was a struggle (“Life and Experiences and Income”, 2020). In comparison,

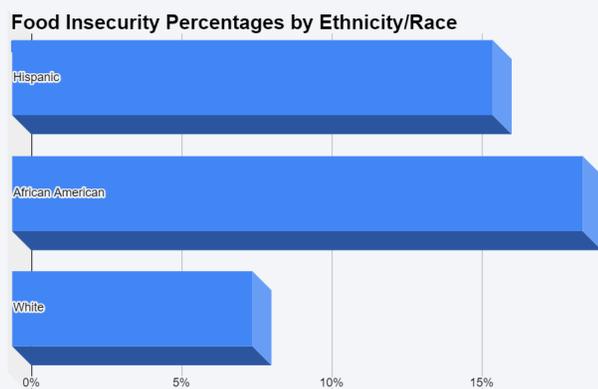


Figure 1. Food insecurity percentages by ethnicity and race. Adapted from information from Hunger in America, reported by Feeding America (n.d.a).

only one out of eight middle-class individuals reported the same struggle. In addition to this difference in struggle, there is an extreme inequality of wealth in the U.S. An alarming 40% of the wealth in the United States is owned by the top earning 1% of U.S. citizens; the remaining 60% is distributed among the low-income and the middle-class (Leiserson, McGrew, & Koppam, 2019). This distribution is far from equal and contributes to the issue of food insecurity.

The existence of food insecurity in populations is based not only on socioeconomic but also demographic factors. Ethnicity and race are also linked to food insecurity, and people of color are at a higher risk of this issue than white individuals. As seen in Figure 1, Hispanic and African American populations are roughly twice as likely to experience food insecurity than white populations (Feeding America, n.d.a). As depicted in Figure 2, the median and mean net worths of white individuals are significantly higher than those of Black and Hispanic individuals.

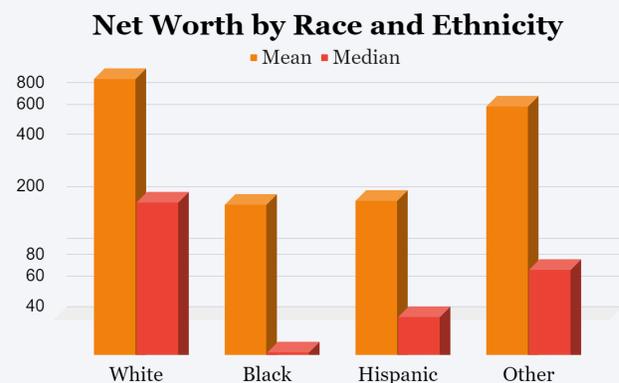


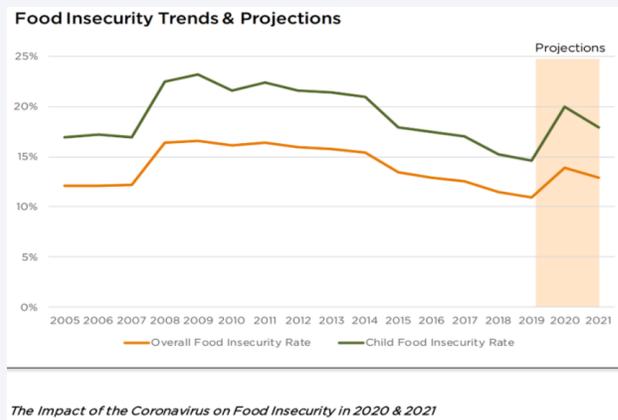
Figure 2. Graph of median and mean net worths in the United States sorted by race and ethnicity. Adapted from information by the Board of Governors of the Federal Reserve System (Bhutta et al., 2020)

Wealth in the U.S is not evenly distributed among the races. Black and Hispanic households have a significantly lower net worth when compared to white households (Bhutta et al., 2020). This large gap in assets is the result of years of bias, inequality, and discrimination. For instance, Black veterans were denied benefits

from the GI Bill preventing them from purchasing homes. Redlining, a discriminatory practice denying financial services, was also used to make it nearly impossible for Black Americans to attain homeownership (Gamblin & Nitschke, 2017). This affected whole neighborhoods of people of color, where community resources and employment opportunities declined. Redlining ended in 1968 with the passing of the Fair Housing Act, however, the years of discrimination had lasting effects.

The relationship between hunger, ethnicity, and race is a complex issue. It is the result of many different factors including joblessness and impoverishment (Odoms-Young, 2018). Due to racial prejudice, parents of color are more likely to have lower paying jobs with fewer benefits (Gamblin & Nitschke, 2017). Many people of color are not able to save enough for their retirement meaning that they must depend on their children who statistically already have lower incomes.

Scholars have indicated an increase in an already existing health inequality on account of socio-political and economic disadvantage (Baciu et al., 2017; Mude et al., 2021). The COVID-19 pandemic has only further exacerbated these issues given its shock to the economy of the United States. While COVID's effects on health and hunger are still being studied, researchers from Feeding America have stated that unemployment rates took a sharp increase, and many individuals experienced job loss or decreased hours for work (Hake et al., 2021). As shown in Figure 3, authors in the *Journal of Global Health* predict an increase in food insecurity in western countries following the pandemic given subsequent economic crises (Mude et al., 2021). Racial minorities were disproportionately affected by the ramifications of the virus. The ratios of hospitalization and mortality for Black individuals were 1.87 and 1.68, respectively, while the same ratios for white individuals were 0.74 and 0.82 (Mude et



The Impact of the Coronavirus on Food Insecurity in 2020 & 2021

Figure 3. Graph of food insecurity trends and predictions by Feeding America (Hake et al., 2021).

al., 2021). The true impact of the novel pandemic is still being studied.

While typically not the focus of policy debates, food insecurity affects college students and even poses a major health issue among them. Even before the COVID-19 pandemic, 35-42% of college students suffered from food insecurity (Bruening et al., 2017). Post COVID-19, Davitt et al., investigators from Iowa State University, believed the return of students to campus would result in a rise in these numbers (Davitt et al., 2021). College students who experience low levels of nutritional security may experience worsened physical health, poor academic performance, and mental health issues including anxiety and depression (Goldrick-Rab, Broton, & Eisenberg, 2015; Knol et al., 2017). It is often hard for students to do well physically, mentally, and academically without access to proper nourishment.

Food Insecurity in Worcester

Food insecurity is no stranger to the City of Worcester, Massachusetts. With a total population of 206,518 in 2020 (The City of Worcester, n.d.b), it is the second most populated city in New England. Of that population, one in eleven people were considered "food insecure" in the Greater Worcester area in 2018 ("Greater Worcester Community", 2018). Parts of Worcester have lower incomes, have difficulties and limitations

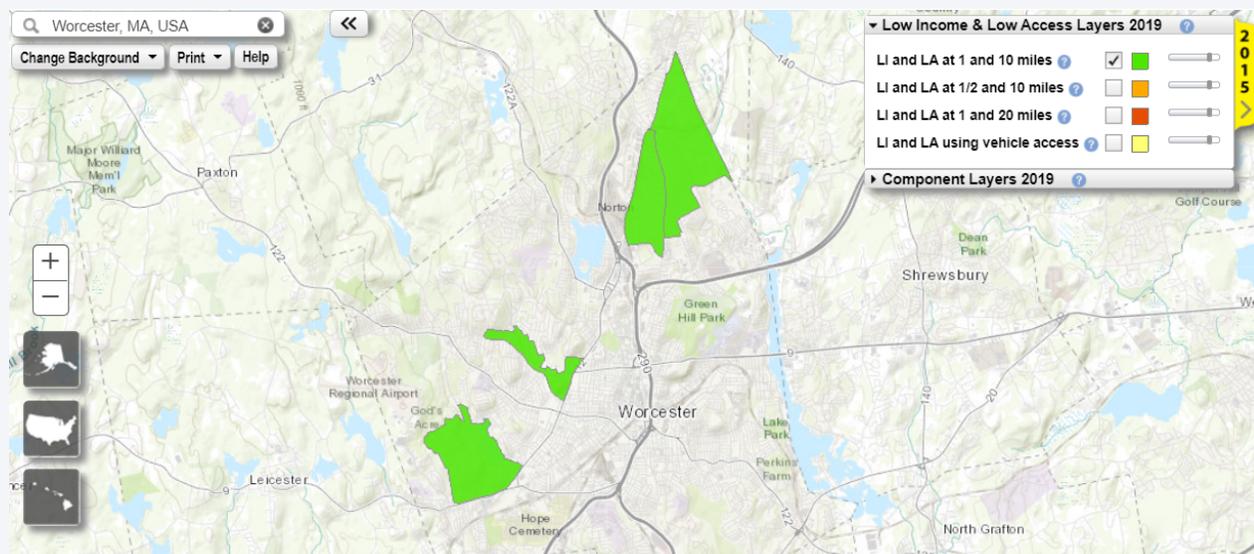


Figure 4. USDA Food Access Research Atlas showing food desert areas in Worcester, MA (Food Access Research, 2021).

in obtaining healthy and affordable food and lack adequate transportation options. The USDA's Food Access Research Atlas (Figure 4) indicates that there were four identifiable food desert regions in Worcester, MA in 2019 ("Food Access Research", 2021). As shown in the green-filled shapes, the majority of Worcester residents in these areas were located more than one mile from any supermarket or grocery store. Three areas had a high number of households without vehicles to be able to drive to supermarkets more than half a mile away. Without easy access to transportation, an individual may have difficulty reaching healthy food options.

Worcester, MA is one of the most diverse cities in Massachusetts (Jones, 2019) with 46.7% nonwhite individuals in 2019 ("Race", 2019); residents come from various backgrounds and socio-economic status. Unfortunately, Worcester race and income demographics are disproportionate, thus affecting how residents and students can access food. As mentioned previously, people of color often experience food insecurity at higher rates than their peers. In 2019, 46.7% (86,462) of the Worcester population was non-white, and there was a recorded 38,000 foreign-born individuals ("Poverty in the last", 2019). According to the

U.S. Census Bureau (2019), the Massachusetts median income for households was higher at \$81,215 than the Worcester median income at \$57,092 in the same year. This comparison suggests that Worcester has a greater proportion of lower income residents compared to the overall state. Additionally, among those experiencing poverty in Worcester, 21.8% were Black or African American and 22.9% were of Hispanic origin (U.S. Census Bureau, 2019). While poverty is not always a direct cause for food insecurity, financial status is often heavily associated with food insecurity due to a lack of money and resources.

Worcester houses eight colleges and universities, totaling about 35,000 students as of 2021 (The City of Worcester, n.d.a). A closer look at two universities, Worcester Polytechnic Institute (WPI) and Worcester State University (WSU), shows that students are not exempt from experiencing food insecurity. A 2019 survey revealed that 24.3% of 554 WPI students identified as food insecure (Gaffney, Renfro, & Sutor, 2019). Researchers at Worcester State University performed a similar survey in 2019 and found that of the 514 sample students surveyed, 18% and 16% have low and very low food security, respectively (Saltsman et al., 2019). Statistical test results of the WSU study

revealed that there is a significant relationship between inability to obtain quality food and poor grades as well. Both studies indicated that racial minorities make up a majority of the food insecure.

Food Assistance Programs

Both non-profit organizations and government agencies are working to fight food insecurity. It is important that these types of hunger-relief programs, community-wide or across the nation, are implemented in order to reduce food insecurity rates. For example, the Supplemental Nutrition Assistance Program (SNAP) has been shown to keep people above the poverty line and improve the long-term health of the participants. SNAP is a federal program administered by the USDA Food and Nutrition Service. The program assists eligible

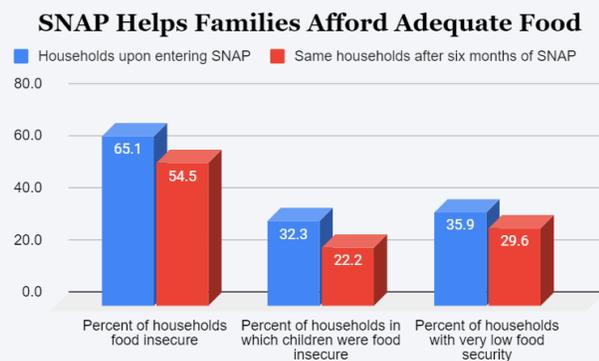


Figure 5. Graph showing that SNAP has decreased food insecurity in households (“Chart Book”, 2019). Adapted from information by the Center on Budgets and Policy Reports.

non- and low-income people, families, and students by providing in-store benefits when purchasing food. SNAP has helped families to become more food secure by decreasing food insecurity in households (Figure 5). The program promotes access to healthier lifestyles by making nutritious food purchases more affordable and allowing more time to be used for health-improving activities (Gregory & Deb, 2015; Carlson & Keith-Jennings, 2018). Furthermore, SNAP reduces the economic strain caused by food insecurity for low-income

individuals. In 2016, the SNAP program helped keep 7.3 million people above the poverty line (“Chart Book”, 2019). This not only improves the quality of life for the impacted individuals, but it uplifts the economy as well. It provides an economic stimulus where those facing food insecurity have the ability to spend more on commodities other than food (“Chart Book”, 2019). Those millions of participants can take better care of themselves and their children by meeting their basic nutritional needs.

Feeding America is a network of nonprofit organizations across the country that prides itself in making up the largest hunger-relief operation in the US. Their established locations seek to educate the population about food insecurity and fight hunger with 200 food banks and 60,000 food pantries (Feeding America, n.d.b). Worcester County Food Bank (WCFB) is a division of Feeding America serving the community of Worcester County; it is one of three Feeding America food banks in Massachusetts. WCFB recognizes the need for food assistance in this area. The people that WCFB service range from parents, children, seniors, veterans, college students, and more. In 2019, WCFB served 75,000 people with access to their pantries and meal programs. WCFB reported successful distribution of approximately 6.1 million pounds of donated food in that year (“Impact Report”, 2019).

Organizations that address food issues in college students help promote social and overall well-being and also improve graduation and college retention rates (Goldrick-Rab et al., 2018). SNAP benefits are eligible for those that meet specific criteria; however, students who are ineligible still need help. Many universities, including University of Massachusetts Amherst and University of New Hampshire, offer assistance programs to tackle food insecurity (University of Mass, n.d.; University of New Hampshire, n.d.). These programs offer free meal swipes or student access to an on-campus food pantry. With increased opportunities for

success, students can thrive in school where they otherwise may have struggled unassisted.



Figure 6. Mr. Amevor and his Doughcart.

What is DoughBoyz?

DoughBoyz, founded by Worcester Polytechnic Institute alum Justin Amevor, is an aspiring benefit corporation that wishes to harness enterprise for the public good. Benefit corporations are known for their focus on sustainability and charity, functioning as for-profit and nonprofit at once. DoughBoyz combines an event catering and mobile breakfast food truck business with a strong commitment to sustainability and addressing food insecurity, especially among college students, within the greater Worcester, MA community. The “Doughcart”, featured in Figure 6, is electric powered and is the signature means to serve hot meals near underserved neighborhoods. The truck will ensure that both students on campus and disadvantaged citizens are able to have a sustainable source of food. The DoughBoyz website (Figure 7) can be accessed at www.DoughBoyz.org. As of November 2021, the webpage features static information and limited functionalities.

Benefits of an Effective Website

Websites are part of a larger social media and marketing strategy. They spread awareness, help market, advocate, and sell goods. In the 21st century, an essential element to the growth and success of companies is having a

professional and appealing online presence. In order to make a website stand out to users and be actively indexed by search engines, designers need to consider both artistic and technical aspects. The most important characteristics of a website are user friendliness, professionalism, effective website maintenance, and quality control (Thelwall, 2013; Huang & Ku, 2016). Good technical practices such as Search Engine Optimizations (SEOs) can greatly increase the exposure rate on the internet by the search engine.

Websites act as a key element that benefit a business’s credibility and growth. The company’s online presence has the potential to be a user’s introduction to the corporation and its services. The quality of one’s website effectively increases user presence and enhances the experience of external stakeholders. Competition online continues to grow, and having an impressive and attractive website is a substantial advantage to a brand’s success (Salehi et al., 2012). Efficient and quality web design results in gaining consumer loyalty and trust (Winnie, 2014). When a corporation builds a strong foundation of trust with external collaborators, the result is contribution from said parties.

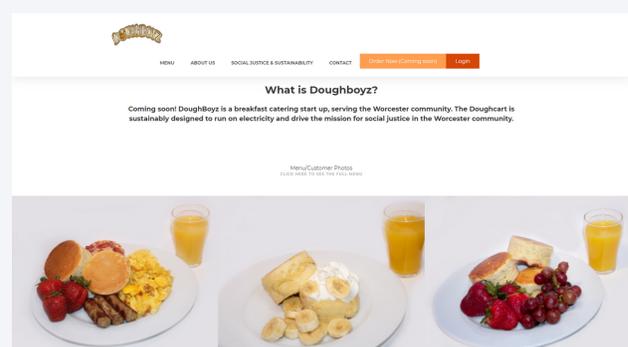


Figure 7. A screenshot of the original DoughBoyz website.

The operational effectiveness of a website influences how reliable and safe the website appears to the user. When a website has many technical issues the user may feel frustrated or unsure of its reliability. This unfortunately has

the potential to compromise the company's integrity. Technical issues may arise from cyber-attacks that render a computer or network incapable of providing normal services (Douligeris & Mitrokotsa, 2003). There are numerous methods for reducing attacks which cause such issues. By improving the operational effectiveness of the a website, it will make the users more trusting and eager to use the website.

Because modern day information is driven by an internet-based experience, it is essential for businesses to showcase their reputability online. Various factors influence the success of a website from a developer to marketing to user standpoint. DoughBoyz wished to improve its online presence and focus its efforts so it can grow more purposefully.

Project Goal

As a result, we worked with Mr. Amevor to identify and apply a series of general improvements to the DoughBoyz website. While the core of our project focused on improving the functionality of the Doughboyz website, the design was informed by a larger effort to better refine Doughboyz' overall online narrative. The project aimed to ultimately yield a renovated website for DoughBoyz to establish its growth to previous and potential stakeholders, including customers, donors, and more.

Methodology: The Five-Step Systematic Plan

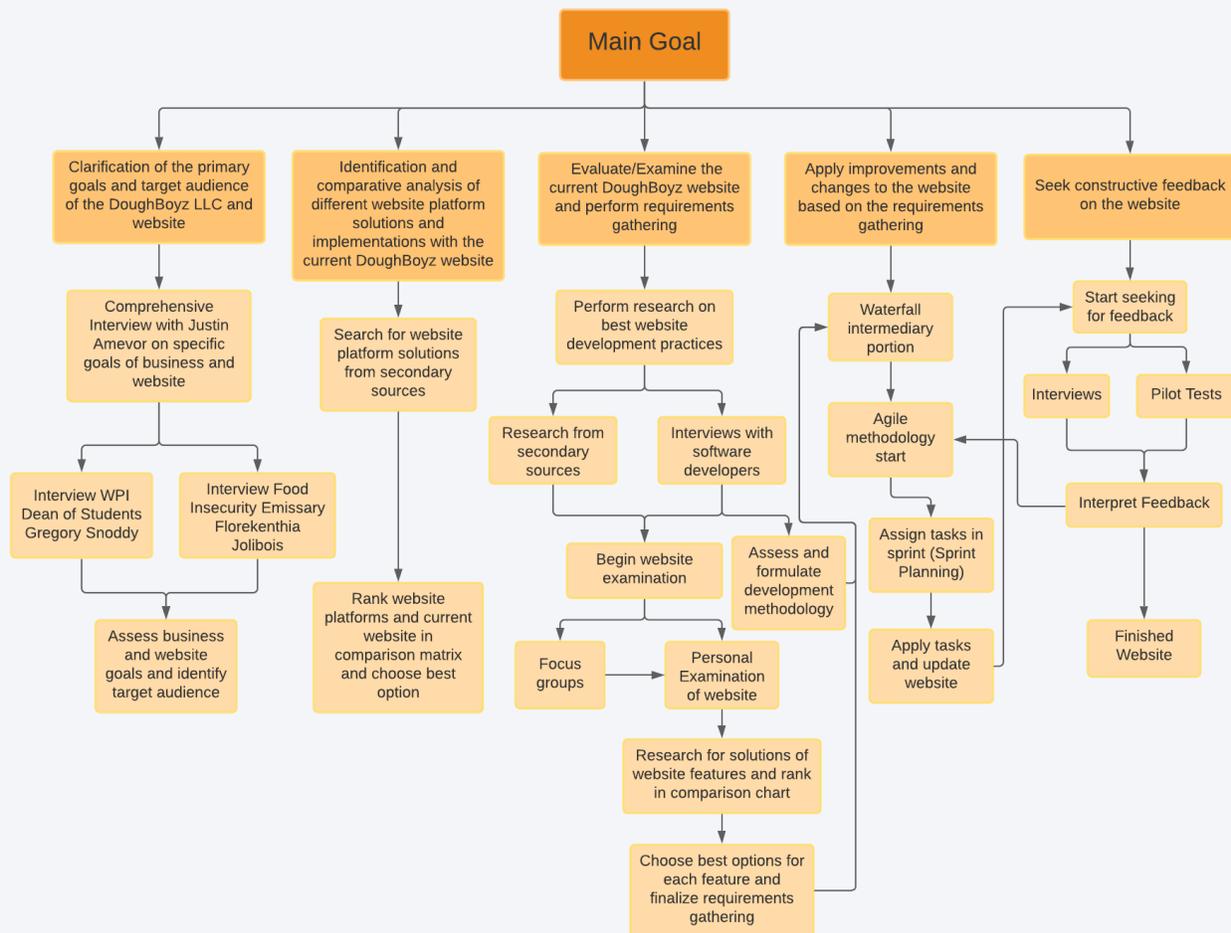


Figure 8. Methods Graphic for website improvement & refinement

The goal of our project was to help Justin Amevor identify the best way to grow his mission driven company, DoughBoyz, and apply improvements for his website to support his growth. Our team developed five objectives to accomplish this goal (shown in Figure 8 above). We discuss each objective in more detail in the following sections. We followed informed consent protocols for all participants in our research. Our research methods were approved by the Worcester Polytechnic Institutional Review Board. Please see Appendix C for the informed consent protocol.

Objective 1: Clarify the primary goals and target audience of DoughBoyz and website

The first objective of the project involved clarifying the primary goals and target audience

of the DoughBoyz Corporation and the website. This procedure was important as our team was able to obtain a clear understanding of what Mr. Amevor envisions in terms of the purpose of his business and website. This in turn allowed the team to narrow down on the most appropriate solutions and areas of improvement for the website based on the clarified goals and purposes. Our first step in completing this objective involved scheduling a comprehensive interview with Mr. Amevor on the topic of the specific goals of his business and the website. The interview consisted of the introductory question of: “Could you clarify the main goals of your website and business” after which the team asked additional specific questions and assessed based on the response to the initial question in terms of the specific functional features with

Objective 3: Examine/Evaluate the DoughBoyz website and perform of requirements gathering

The third objective of the project consisted of performing a series of examinations on the current DoughBoyz website as well as requirements gathering for specific website features pertaining to the chosen website platform in Objective 2 and for the methodology to be used to apply the features and changes to the website. In terms of the website examination, our team employed several different methods.

In order to assess areas for improvement of the DoughBoyz website, we analyzed the content of the website, facilitated a focus group, and conducted interviews. Before analyzing the website, our team performed research on best website development practices by seeking secondary scholarly sources on web development topics including: user interface design, search engine optimizations, and technical frontend and backend website features, as well as conducting interviews with different software developers. Our team interviewed two software developers: independent web developer John Masone, who created WhatsMyIP.org, for insight on some of the researched website features and topics (J. Masone, personal communication, October 2021), and the Director of Engineering at MBSi Corp, Oleg Simakoff, a web-based software developer with 30+ years of experience working on team-based software development projects, for some background on effective team-based software development methodologies that our team utilized in the future project stages (O. Simakoff, personal communication, October 26, 2021). The specific interview questions for these two interviews can be found in Appendix D-G.

Our team carried out feature evaluation of the website in order to identify any features that were in potential need of proper implementations. We then categorized the

gathered set of features into two different sections: the high- and low-level features. The high-level features consisted of complex, multi-function features that a typical website user would interact with which included login services, payment systems, etc. The low-level features consisted of technical aspects that were not necessarily accessible by the user but were nevertheless imperative for the website; these included: HTML and CSS fixes, website performance improvements, search engine optimizations, code styling, etc. After identifying the high and low-level features, we then researched for existing solutions of the features and then compared each solution in comparison matrices. We based the criteria for these matrices on research that we have gathered in terms of best website development practices and much like with choosing the go-to website platform we also listed the top three options for each feature and chose the best option based on the ease of implementation, time constraints, and the amount of required effort.

In addition to interviews, the team facilitated two focus groups with 4 WPI students to gather user feedback about the DoughBoyz website prior to any modifications. A focus group involves assigning a formulated set of questions to a group of similar individuals after which the qualitative responses are evaluated by the team (O.Nyuma et al., 2018). We held focus groups with WPI students, which constitutes a portion of the website's audience. The team facilitated focus groups to get user feedback on the website before any changes or implementations were made. This feedback helped the team identify any additional user-based or client side enhancements that can benefit the website. With the current website assessed and evaluated, our team then proceeded to apply the changes to the website based on the chosen feature solutions and using the development methodology from Mr. Simakoff (O. Simakoff, personal communication, October 26, 2021).

Objective 4: Apply of improvements to the website based on feedback from Objectives 2 and 3

Upon the successful completion of the requirements gathering, the team applied the development methodology from Objective 3 (O. Simakoff, personal communication, October 26, 2021) to implement the enhancements and features. The development methodology was based on a hybrid of the waterfall and agile methodologies and was thereby split into two primary parts (see Appendix H in Supplemental materials for Gantt Chart). The waterfall portion of the methodology intended to last 1 week after which the cyclic repeating agile methodology was applied and continued for around 4 weeks.

The first part constituted the sequential, linear waterfall portion and was used as an intermediary time period to get the team to adjust and become accustomed to the website development setting before the team began using the more work-intensive agile portion.

The second part of the development methodology constituted the agile portion and was represented by a continuous process of repeating a set of four steps, the three latter of

which are explained in detail later. Each iteration of the steps, referred to as a 'sprint', spanned one week. In the first preliminary step of the agile methodology, our team allocated a list of tasks to be revised in a product backlog; the team then properly sorted the backlog (Figure 9) with the highest priority features placed at the top and estimated in terms of effort-hours using planning poker as per the agile methodology tradition. After the team completed the preliminary step of the methodology, we proceeded to complete the backlog tasks.

The primary improvements portion was completed in three repeating procedures. The first primary procedure consisted of applying the main set of implementations for the features to the website. Based on the chosen website platform from Objective 2, the team determined whether it was reasonable to either stick with the current website design or create an entirely new foundation on which to rebuild all the other existing features along with the requested improvements and fixes. If the current website base was sufficient, the team would have begun to apply the requested website revisions, both high and low-level features, in an order based on

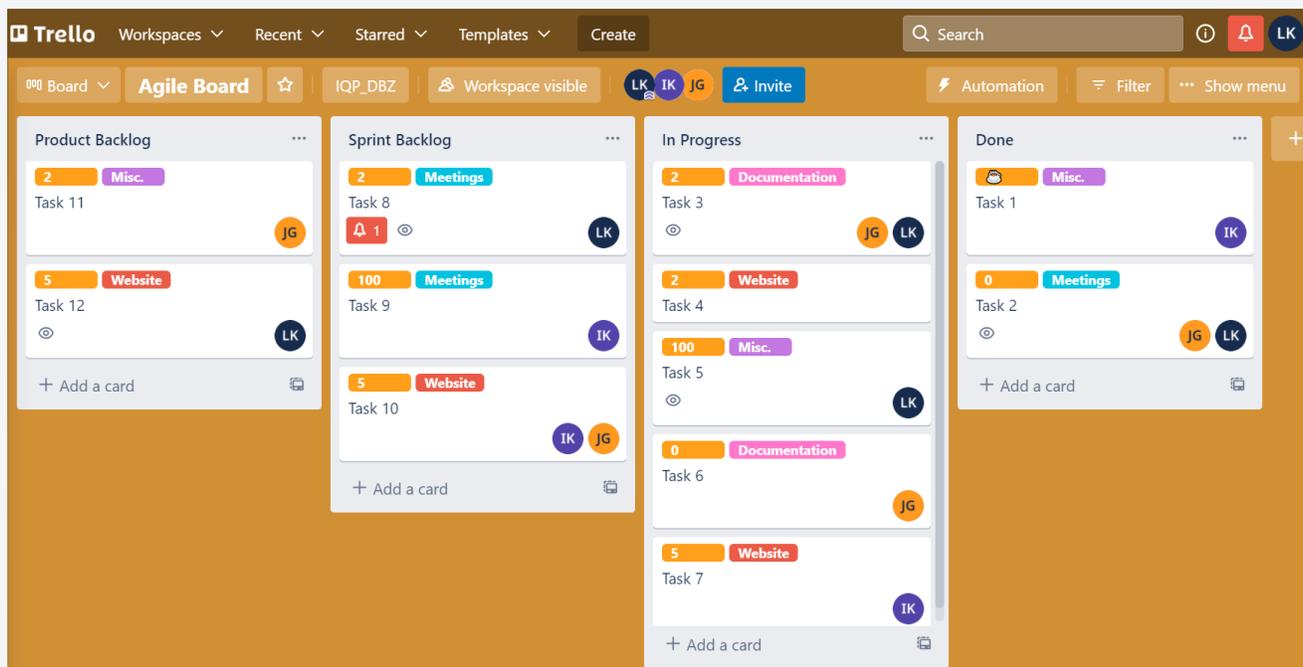


Figure 9. Example of the team's preparation and organization for agile sprints using Trello.

what each team member felt comfortable in doing. If the current website base was in need of renovations, the team would have started laying out and creating a new website base. This was to be completed in three intervals: the first involved creating the website 'skeleton' (i.e., the most barebones version of the website, consisting only of the HTML document(s)). The second phase consisted of all the working website features and functions (i.e. the JavaScript functions, libraries, and the website backend), both high and low-level features with the exception of styling; finally, the last phase was created and contained all of the styling on the website (i.e. the CSS of the website or the aesthetically appealing features). The second primary procedure involved performing debugging and quality checks on the implemented features to ensure that everything worked properly. The tests included both load testing and regression testing. The third and final primary procedure involved sharing the revised website to the sponsor and users for feedback and suggestions.

Objective 5: Seek constructive feedback on the website

The last objective of the project involved seeking constructive feedback on the website from Mr. Amevor as well as from general users. This objective was imperative as it ensured that all the changes made to the website are approved and accepted by Mr. Amevor and are considered satisfactory over the old website by the public. To acquire more feedback on the modified model of the website, the team reached out to marketing experts and previous and potential users of the site. Our team interviewed Purvi Shah, a Business and Marketing professor at WPI. The team also presented the modified model website to Amy Lawton and Samantha Stanley, previous customers of the DoughBoys catering service. In addition to this, the team performed pilot tests with a group of users. We conducted these meetings using the same

format as focus groups mentioned previously. The team held weekly interviews with Mr. Amevor as part of sprint reviews both on Zoom and in-person depending on the availability of Mr. Amevor. During the interviews, we showcased the changes and features implemented during each sprint and requested Mr. Amevor to provide constructive feedback. If Mr. Amevor requested changes, we would take note of the feature in question and queue it to the next product backlog for the next sprint. Besides the weekly interviews, we also performed small pilot tests of the website with different test users to make sure all of the features are in working condition.

Expressing the DoughBoyz Dual Mission with Website Design

Introduction

Justin Amevor, a Worcester Polytechnic Institute graduate, is a native Worcesterite who cares deeply about his community. Mr. Amevor started selling breakfast foods his freshman year from his dorm room. The history of DoughBoyz, as displayed on the website, is featured in Figure 10. His vision and business have evolved and now include a dual mission: a charitable side, where Amevor offers free community breakfasts for food insecure individuals, and an entrepreneurial side, where he profits off of selling breakfast items. While Amevor's vision is bold and vast, we worked together to hone in

features had to be compatible with Clover. Additionally, the DoughCart is not fully functional, so the business is not ready to take individual orders. This meant that taking individual orders was not the focus, instead the primary focus of the website would be on catering. Amevor was also partnered with another student project team from the University of New Hampshire (UNH). Their primary focus was analyzing and developing the DoughBoyz social media platform. Upon contact with this team, we decided to work with them throughout our project to incorporate social media into the website.

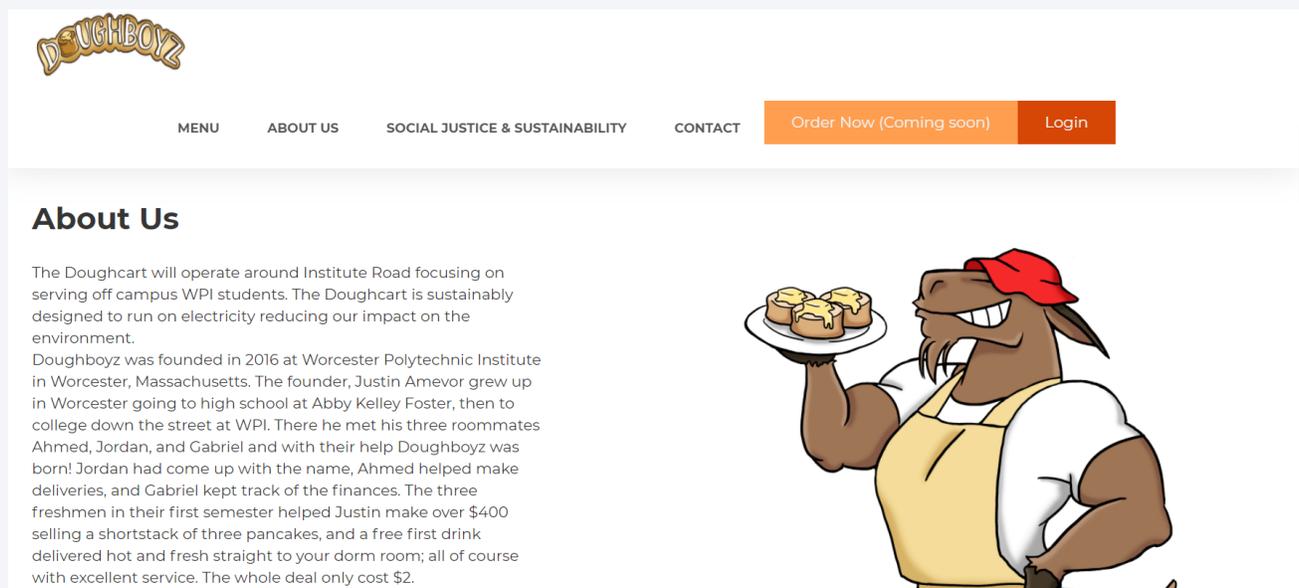


Figure 10. The original DoughBoyz' index page displaying a descriptive About Us section

on DoughBoyz' immediate goals for its website within its longer term vision.

In addition to learning more about the DoughBoyz mission, the team acquired a better understanding of the abilities and limitations of DoughBoyz as of November 2021. Amevor mentioned that, while he had catered events before, DoughBoyz' operations were reliant on grants. The DoughBoyz business is limited by its capital, meaning that the team needed to make cost-effective decisions. Furthermore, Amevor disclosed that the DoughCart utilized Clover as its payment system, meaning that website

Identifying the Target Audience

One of the problems the team encountered was ambiguity of the target audience. **Having a clear target audience would refine the business's message and appeal to the right users.** Purvi Shah stressed that websites representing businesses need a clear target audience to be successful (P. Shah, personal communication, December 2021). Persuasive and marketing efforts made should cater to a specific kind of user. Mr. Amevor expressed his interest in ending food insecurity everywhere as well as wanting people to order his breakfast

options from his website; these goals made identifying the target audience challenging and vague. After mind mapping with our sponsor, Mr. Amevor came to the conclusion that it would be most practical for his website's target audience to be potential clients for his catering services but to also accommodate food insecure WPI students. In collaboration with Mr. Amevor, we concluded that catering clients and food insecure WPI students made the most sense as an initial focus as the DoughCart is not current operational. Potential clients of his catering services would ideally come to the site to learn and empathize about the dual mission business and book for catering. Initially, the audience of food insecure WPI students came about after speaking with Worcester Polytechnic Institute Dean of Students Gregory Snoddy (G. Snoddy, personal communication, November 2021). For food insecure WPI students, the website would act as an informational hub for DoughBoyz events and DoughClub information and resources. The DoughClub, an affiliate of DoughBoyz, is a student-run organization that functions on college campuses.

The team found that the most important features to include in a dual mission website are a login system with a profile page, a centralized news hub page, a submission inquiry system, an anti-spam system, and a visually appealing multiple page format.

After analyzing benefit corporation websites like Ben & Jerrys and Toms, we took inspiration from content that successfully demonstrates a dual mission. The team also developed this list of features based on what Mr. Amevor wished to be included on the website. Additionally, we added features with the target audience and user experience in mind. Amevor and the team chose to leave room for improvements, keeping in mind that his website will change as his business grows. The team presented Mr. Amevor with a flexible model so that he can modify as he pleases. Please see Appendix B for a

comprehensive illustration of newly implemented website features.

Website Alternatives

To begin, we performed a comparative analysis on different website builder platforms to determine which features and platforms met DoughBoyz' needs. With experience in computer science, Mr. Amevor created the DoughBoyz website using Google FireBase. Amevor's background in coding allows him to modify the website as needed. This preliminary, self-created website (displayed in Figure 12) was used primarily as an informational hub for his business and social mission. Using the established website foundation as a springboard, we explored different website platform options to see whether any template might work better for DoughBoyz' needs. The team conducted participatory observation on seven website builders and conducted a comparative analysis of their features, costs, and applicability for DoughBoyz (see Table 2) (Google Sites, n.d.; Magento, n.d.; Odo, n.d.; Shopify, n.d.; Squarespace, n.d.; Wix, n.d.; Wordpress, n.d.). We highlighted each feature availability based on Mr. Amevor's established purpose for the DoughBoyz website.

Given Mr. Amevor's wish list of planned features to include on the website, the scope of his business, and the time and expertise constraints of the project, we placed the most emphasis for each website platform based on the following qualities: the compatibility of the features Mr. Amevor wanted to include on the website, the pricing of the website platform, and the amount of additional work required to apply the website revisions. Based on our analysis of these website builder platforms, the team found that the current website solution provided the greatest amount of flexibility in terms of applying changes and features to the website. In contrast, the other website builder solutions' editing and compatibility capabilities were at most times limited while also being more expensive and time consuming since the website

Table 2. Website Platform Preference Comparative Matrix (see Appendix H for clarification of colors)

	Homemade (current)	Shopify	Wix	Wordpress	Squarespace	Google Sites	Oodo	Magento
Login system	✓	✓	✓	✓	✓	✓	X	
Clover access	✓	✓	X	✓	✓	✓	X	✓
Content management	✓	✓	✓	✓	✓	✓	✓	
Primary languages	HTML, Python (backend), JS, CSS	Backend: Ruby (but can support JS) (Frontend: Liquid (HTML + CSS))	Javascript (Node.js)	PHP	Javascript	Javascript	Python	PHP
Editing	Django Admin Panel	WYSIWYG	WYSIWYG	WYSIWYG	WYSIWYG	WYSIWYG	WYSIWYG	
Survey system (Catering)	✓	✓	✓	✓	✓	✓	✓	
External links	✓	✓	✓	✓	✓	✓	✓	
Customer Support	X	✓	✓	✓	✓	✓	✓	✓
Mobile Site	✓	✓	✓	✓	✓	✓	✓	
Pricing	0-20 USD/month	29-299 USD/month	23-49 USD/month	25-45 USD/month	18-40 USD/month	Free	Free with limited features	
Restart?	X	✓	✓	✓	✓	✓	✓	✓
Spam prevention	✓	✓	✓	✓	✓	✓✓	✓✓	
Source code access	✓	✓	X	✓	X	✓		

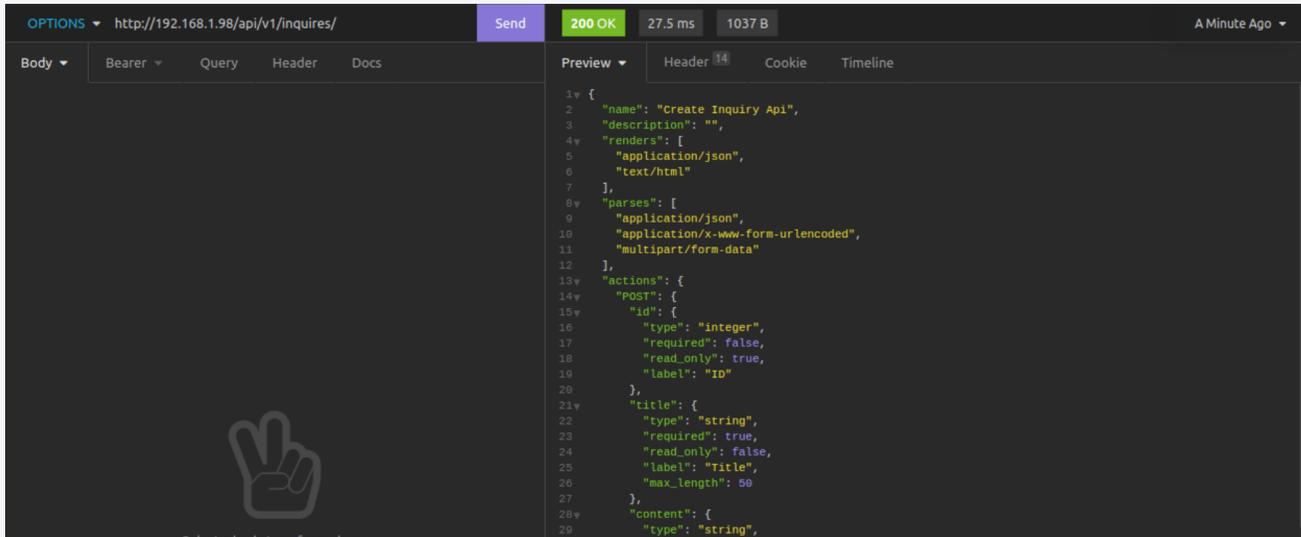
builders would have required the team to restart the website from scratch (Table 2). Squarespace’s features were most favorable compared to others’; however, this option was not within our sponsor’s budget. Due to the flexibility and independence of applying changes, the homemade website solution also opened more opportunities for collaborative editing on the website using the version control software GitHub. For definitions of and more information on technical website language, please see Appendix I.

Separation of Frontend and Backend

The best method for dealing with website downtime is to minimize the impact of internal failures. Website downtimes are unavoidable because of the multitude of errors that can stop a server from working. End users will always experience one thing: the inability to access the website normally. The separation of a website into a frontend and backend portion can greatly increase the uptime of the server and minimize the impact of failure of the most volatile server components. In analyzing whether to keep the homemade web source over using a website template builder, the team discussed the advantages of either option. Websites can be created with the website builders consisting of a

uniform structure where a server processes both the data-processing background (backend) and the user-interactive (frontend) processes of the website. We found this structural layout beneficial since the logic processing and presentation components can rapidly develop together. However, when handling document rendering on a server dynamically, a failure in the logic can often cause the website to completely shut down, since the dynamic document rendering shares operations with logic processing components. To address this issue, we decided to make the website’s presentation component (frontend) and the data storage/logic processing component (backend) completely separate. This means that the frontend and backend run independently. A sample of the backend is shown in Figure 11. The advantage of a separate structure is that the outage of the backend server does not affect user presentation.

The team faced the issue of storing the backend. Because of its stability, open source license, and ease of use, we used the Django REST Framework as our backend provider. However, Google FireBase, Amevor’s original cloud service where he created and stored the website, is unable to store the Django backend instance. Using comparative analysis of cloud services, the team searched for the most flexible



```

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3   "description": "",
4   "renderers": [
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6     "text/html"
7   ],
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29        "type": "string",

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Figure 11. The response of an Option request to the inquiry API (user request to the backend).

and least-costly option for storage. We discovered that Google Cloud free tier is the best storage provider option for the website backend as we presented it. After evaluating website alternatives to see which would best fit Mr. Amevor's interests, **we found that a self-coded website is the best option for a startup business owner with coding experience and limited capital.**

User Interface Design

The team helped our sponsor develop a story of DoughBoyz by renovating the website layout and design. In order to do this, we used feedback from our focus group participants, interviews with software engineers and marketing experts, assessments from a previous customer, and evidence from literature. The number one concern when it came to consumer feedback, especially in focus groups, related to overall aesthetics. **Users prioritize how effective user interface design is when judging a website.** User interface (UI) design harnesses visual appeal, functionality, and interaction design in order to simplify user experiences. Effectiveness is characterized by the influence it holds on a user, whether they approve of the website and choose to stay. John Masone stressed the importance of the user experience and how the layout affects user time

on a website (J. Masone, personal communication, October 2021). A confusing and frustrating encounter on a website will discourage user interaction. We found that visual appeal and ease of interaction greatly influences customer evaluation of a website. Six out of seven focus group users who reviewed the original website commented on the website's UI design. We learned that visual appeal affects the level of trust that both female and male users respond with (Pengnate & Sarathy, 2017). Harboring trust in consumers is essential as 94% of users refuse to act on poorly designed sites (Sillence, Briggs, Fishwick & Harris, 2004). Additionally, organizations that take in donations need to account for donor appeal when designing their websites. Researchers from the National Taipei University discovered that intention to donate was associated with dimensions of usefulness and dynamism; they described usefulness as indispensable, useful, civic-minded, and dynamism as modern and innovative (Huang & Ku, 2016). Based on these findings, **we emphasized the website's appearance and usability during our design process.** Analysis from previous customers corroborated our finding. When shown the updated website, Amy Lawton and Samantha Stanley found that the new appearance was appealing and

enhanced the message of DoughBoyz (Lawton & Stanley, personal communication, December 2021). The two agreed that, should they wish to order catering again, they would order from this business because they felt that there was a deeper meaning that they would like to support. Overall, previous customers of DoughBoyz catering were impressed with the changes.

When designing, the team considered how colors were displayed on the website. Psychologically, contrasting colors attract the user's eyes and induce user interaction (Imtiaz,

screen without creating clutter. This restaurant website was built off a Squarespace platform and effectively used the space it had in a visually appealing manner. Ultimately, we chose to increase the website's warmth by changing the background color from white to beige. The warmth of a website impacts its overall atmosphere, thus affecting how a user responds. Users who do not feel welcome to the atmosphere are more likely to leave (Loupiac & Goudey, 2020). The beige made the website appear more welcoming and visually appealing.



Figure 12. The new front page of the DoughBoyz website, featuring a colorful slideshow panel of news.

2016). We presented this information to our sponsor and worked on displaying the color palette on the website. We included more contrasting colors, like green or blue as shown in Figure 12 and Figure 14, from the original color scheme which is based on the brand logo. Likewise, we took the background of the website into consideration. An excess of white space detracts users from the message a business is trying to tell and makes the website appear empty and bare (Imtiaz, 2016). The team faced the challenge of trying to fill up excess white space with information and photos without making the website appear cluttered and messy. Taking inspiration from the boxed layout in www.jonesbbqkc.com, we created a layout which effectively placed information on the

In addition to the adaptations made on the color, our team found research to support the inclusion of photos throughout the website. **Food businesses have interactive photos presented throughout the website to clarify the image of the brand and make it more visually appealing.** Consumers feel more connected to a brand and have a better understanding of its operations when websites display welcoming photos (Daries et al., 2018). In our focus group, all our participants agreed that seeing more pictures, particularly those of the food and people interacting with the food, would strengthen the website's atmosphere. We recommended Amevor take photos of DoughBoyz in action, and, with his approval, we incorporated these photos throughout the

website in an appropriate manner to complement the layout and writing on the pages. Once viewing the updated website, previous customers also appreciated the inclusion of friendly photos on the welcoming page (Lawton & Stanley, personal communication, December 2021).

Aside from visual appeal, the team concentrated on enhancing the user experience when interacting with the website. The original

pages offered a clearer message (Lawton & Stanley, personal communication, December 2021). The team incorporated multiple pages into the website by bringing the sections previously on the site (About Us and Menu/Catering) into new pages while also adding new sections (Newsroom and Accounts). The implementation of these new pages is shown in Figure 13, where the navigation bar contains updated selections.

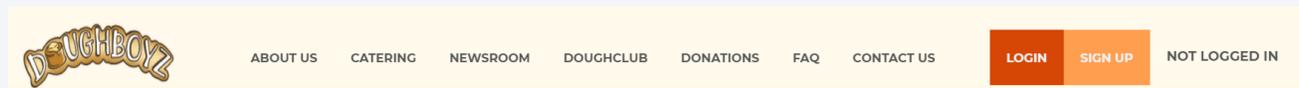


Figure 13. Display of updated navigation bar as seen on the index page in the new website build.

DoughBoyz website hosted the entirety of its information on a single scrolling page. We decided the best representation of material is showcased through multiple pages. **Consumers prefer a multiple page application because it improves SEOs and organizes information more steadily.** In an interview, marketing expert Purvi Shah recommended that the website have multiple pages, explaining that having an improved SEO will help market the website online to reach more users (P. Shah, personal communication, December 2021). Multiple pages also allow for separated sections of information which increase the exposure rate by search engines thus increasing user interaction with the website (Herrero, 2018). When shown the original DoughBoyz website, four of seven focus group participants commented on their distaste for a single-page layout, expressing their interest in multiple pages. One participant was confused by the mechanic of clicking on a tab that brought the user lower on the page rather than to a separate page. Another participant presented apple.com for comparison and to demonstrate the potential of multiple pages. Upon previewing the DoughBoyz multi-page prototype, all seven participants responded positively. Both Lawton and Stanley agreed, stating that the single page application was overwhelming and multiple

When adjusting for new sections and pages, the team further considered how sections should be designed visually and functionally. **An online business must have visually appealing icons and live hyperlinks on their website.** Interaction with buttons generates a sensation of pleasure in users' brains, creating an appeal to clicking buttons and swiping (Imtiaz, 2016). We incorporated this concept by placing emphasis on the features that incentivize more user interactions. During the initial focus groups, participants shared their interest in seeing more interactive photos on the website. Using this feedback as starting ground, the team consulted the UNH team developing DoughBoyz' social media and concluded that to incorporate more pictures we could integrate social media (Barton-Schwartz, R., Ferrari, J., Gurung, A., Munick, G., & Zubricki, A., personal communication, October 2021). This would increase user interaction within a page and create accessibility to other DoughBoyz platforms, such as Facebook or Instagram. We worked with the UNH team developing DoughBoyz' social media to ensure that all aspects of the business were accessible. A case study of 980 Michelin-starred restaurants found that high quality restaurants tend to provide access to different social media networks along with images and videos within their websites

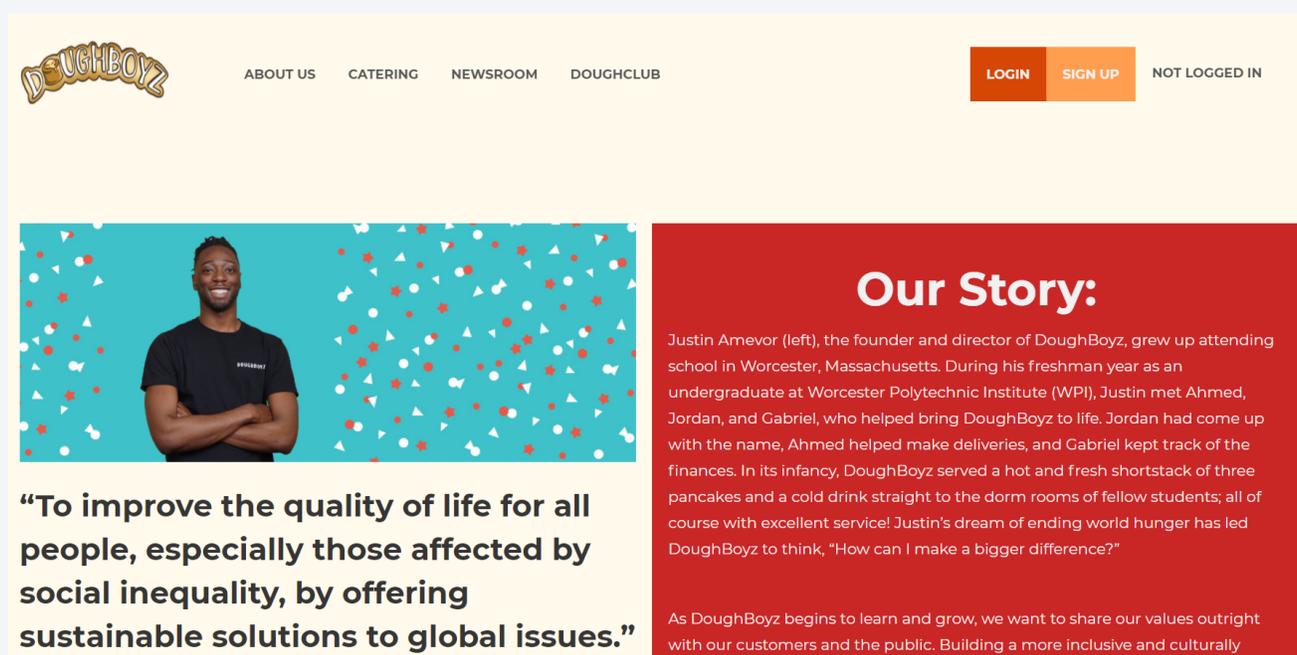


Figure 14. The new About Us page for DoughBoyz.

(Daries et al., 2018).

In addition to visual reconstruction, the team reconstructed how the website supplied information. According to Daries et al., high quality restaurants fully inform customers of the quality restaurants fully inform customers of the gastronomic destination which they are choosing (2018). Shah agreed, explaining that information must be persuasive, concise, and whole (P. Shah, personal communication, December 2021). Wording cannot be negative, nor can it be cluttered at the risk of confusing the audience. Therefore, it is essential that the textual information on the website is relevant and up to date. Moreover, consumers may lower their opinions if they feel that information on a website is incomplete (Loupiac & Goudey, 2020). We addressed this matter in conjunction with formatting the sections. Material had to be separated in a logical sense so that customers could easily understand where to go for what content. DoughBoyz supplies most of their information in the sections Catering and About Us. The original website featured a brief menu of items that did not reflect the DoughBoyz menu at the time of our project. We moved this feature into a separate Catering page, updated its items,

and included supplementary prompts for customers such as allergen information and FAQ distinct to catering. The About Us was originally displayed on the front page and consisted of two short paragraphs about the history of the business followed by relevant subsections. We brought this information into another separate page titled About Us, as shown in Figure 14, which streamlines the business' description into one specified area, using Toms at www.toms.com/us/impact.html as inspiration. The team ensured that the pages covered all dimensions of information for customers.

In addition to supplying information about the business from previous sections, the team constructed a new section for external content. At the beginning of the project, our sponsor communicated to us the desire for DoughBoyz to be accessible to all. We learned from the interview with Dean Gregory Snoddy that there was a project on campus dedicated to assisting food insecure students at WPI (G. Snoddy, personal communication, November 2021). After discussion with our sponsor, the five of us came up with the idea of a DoughClub page to centralize resources for curious or struggling students. Another page would be dedicated to a

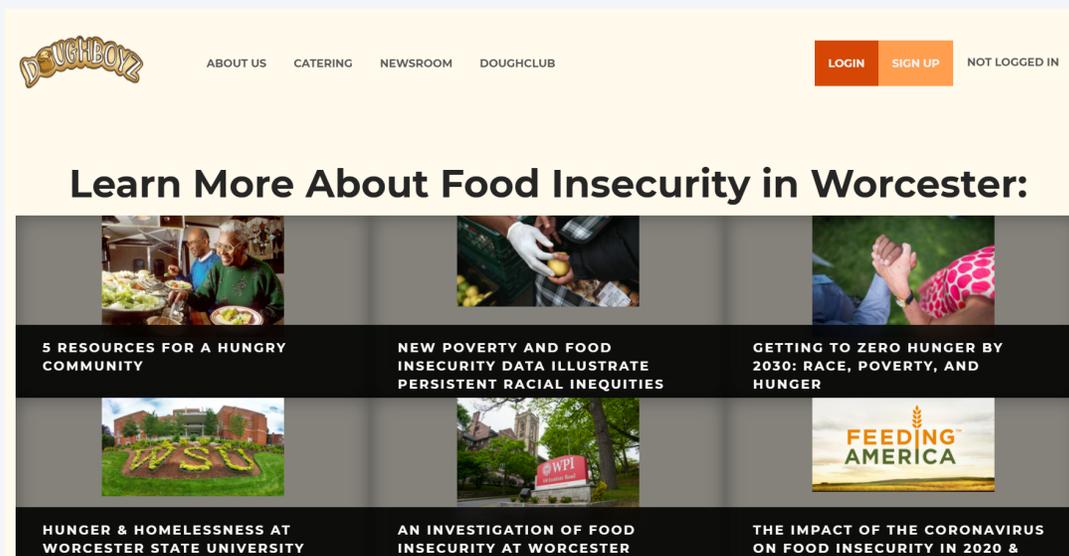


Figure 15. Section in the Newsroom page featuring published articles.

Newsroom page, a page displaying information about food insecurity locally in Worcester. To do this the team chose scholarly articles and publications from reputable organizations, displayed in Figure 15, to build the audience's understanding on food insecurity and its surrounding issues. For design of layout, the team took inspiration from resource hubs found on the Ben & Jerry's website at <https://www.benjerry.com/whats-new#> and <https://www.benjerry.com/whats-new/2016/ben-and-jerry-arrested>. In the website backend, we produced a flexible administrative panel that allows Mr. Amevor to edit the article inventory, adding and deleting as necessary.

Technical Revisions

We designed the new website system to allow users to create a personal account for features like inquiry submissions and catering. We implemented this feature, completing work Mr. Amevor had begun previously. The team dedicated two sprints to accomplish this task because the login system was significant to the DoughBoyz brand and to Mr. Amevor. A user who can create a personal identity through a brand is more likely to connect and enjoy the business, where login systems will allow for creation of membership deals. We found that

there is emphasis on creating user identity through website design in order to promote user retention and interaction. Historically, successful E-Commerce sites have allowed users to create a sense of identity and community (Curty & Zhang, 2013). Creating sales and discounts motivates consumers and encourages them to interact with the site more as well (Imtiaz, 2016). Instead of conventionally keeping user activity sessions, our website system used a token-based system to identify the currently logged-in user. A token is a long, randomized key that gets interpreted by the server and identifies the user that is creating a request. Upon a successful login, the user receives two such token keys for authentication, one being the 'access' token and the other being the 'refresh' token. The access token is a temporary token directly used by the server to identify the user. In our model, the user and the frontend need to present that token to the backend to access the majority of the website's features that require user input. The refresh token is a long-lasting token whose purpose is to retrieve a new access token. Since the access token only lasts for a short period of time, the frontend requests a new access token with the refresh token every time the user refreshes the webpage. Though it is difficult to have a session-based login system on a web application where

the frontend and backend are separate, we were able to create an implementation of this system using a different method. We separated all of the account management and background website processes on a backend system while keeping the user-interactive website portion and logic on a frontend system (frontend visual content shown in Figure 16).

Implementing a stalwart spam prevention system for the website allowed the team to establish a solid form of protection against potentially malicious users. **The HoneyPot is the most affordable and simplest option for business owners who are looking for a spam prevention solution.** The HoneyPot solution consists of a hidden input field that is not meant to be accessed by a regular user. If submitted or filled out, usually by an automated program referred to as a 'bot', the system prevents the malicious user from purposely submitting many requests to slow down or inhibit the website functionality at the peril of other users. The functionality at the peril of other users. The HoneyPot solution was the recommended go-to solution suggested by Mr. Masone (J. Masone, personal communication, October 2021). Although the HoneyPot implementation was not as sophisticated as some of the other options explored by our team, the team found it to be the most viable solution for the website. Due to the simple, free, and abstract nature of the HoneyPot solution, it can be properly implemented in virtually any frontend and backend environment. This is unlike some of the third-party implementations such as Akismet and Re/Hcaptcha, whose application programming interfaces (APIs) are food

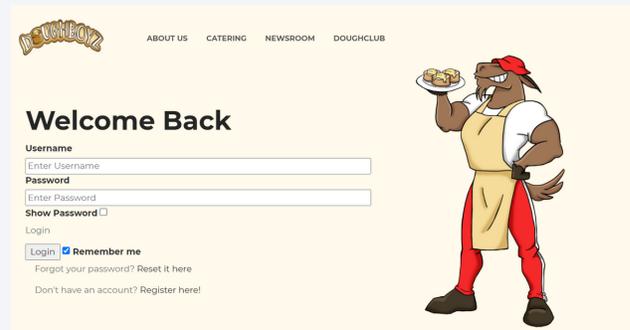


Figure 16. A new page featuring the login system.

ordering platform in Mr. Amevor’s vision.

An integral part of the project was designing a proper system for catering as it constituted one of the website’s primary goals of being a food ordering platform in Mr. Amevor’s vision. **Linking a Google Form to a website’s catering request form is best for a business that prioritizes cost and protection.** When exploring solutions for catering systems, our team placed heavy emphasis on the ease of implementation and security of the system since it could potentially involve monetary transactions. Any problems involving technical errors with the implementation and or flaws in the system’s security could have very dire consequences on the business. Given this criteria, we found that the Google Forms solution was most ideal since it was much easier to implement and incorporate over a personal catering implementation. This solution also has sophisticated security services in the form of Recaptcha as opposed to none for the personal implementations. In addition, the Google Forms solution is free and does not have any features that require a premium tier of the service, putting the solution on par with the personal implementations in terms of pricing (Table 3).

Table 3. Catering Request Form Comparative Matrix (see Appendix H for clarification of colors)

	Google Forms	Account Based Submission	Guest Based Submission	3rd-party misc. form
Pricing	Free	Free	Free	Depends on service (but most likely paid)
Ease of Implementation	Trivial	Difficult for a solid implementation	Somewhat difficult	Most likely easy
Security (spam prevention, etc.)	Recaptcha (plus other Google security services)	Personal implementation required (very difficult)	Personal implementation required (extremely difficult)	Depends on service
Compatibility (inter-device)	Most likely compatible	Personal implementation	Personal implementation	Depends on service
Customization	Very customizable	Unlimited	Unlimited	Depends on service

Conclusion

Food insecurity ravages the United States including the Worcester community. Many organizations, DoughBoyz included, have sought to tackle this issue. While being an aspiring benefit corporation, DoughBoyz operates with a dual mission: one of sales and one of philanthropy. As of 2021, it is still a young enterprise that will transform and grow as it matures. In analyzing the business as it stood in the beginning of our project, we discovered that directing the focus of the website into promoting the catering side of DoughBoyz would be the best choice for Justin Amevor, the founder and director of the business. In this way, DoughBoyz can steadily build up its marketing and reputability, supplemented with charitable acts for those who face food insecurity as the business forms a solid foundation.

Recommendations

While still a young business in 2021, DoughBoyz possesses a great deal of potential. Our team recommends that DoughBoyz grows its website alongside the growth of its business. We recommend that DoughBoyz:

1. Seeks future collaborations with Interactive Qualifying Projects at Worcester Polytechnic Institute. These opportunities may allow for centralized focus on specific areas for growth, such as our team addressing the website, but may also assist Mr. Amevor in a clearer direction for success.
2. Converts its website into a platform which can receive individual ordering. This should occur when the business has the capability to accept individual customers as opposed to exclusively catering events. This step may include implementing:
 - a. An Order Now feature
 - b. Complete Clover integration for payments
3. Implements localization (multi-language feature) to the website. This feature increases dialogue with users and opens communication to a larger audience. As more people are able to understand the website, more users will be registered on the website and increase business profits.
4. Further develops its account network for more user interaction. This may include incorporating a fully functional subscription service that is linked to the accounts.
5. Considers marketing the website. With advertising and SEOs, DoughBoyz can increase foot traffic on the website, increasing the audience. Examples of advertising include hosting contents within the website, branding the DoughCart with the website domain, and posting informative flyers locally.

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