WeAllocate: A Resource Optimizer

Created for IMAN Food and Wellness Center

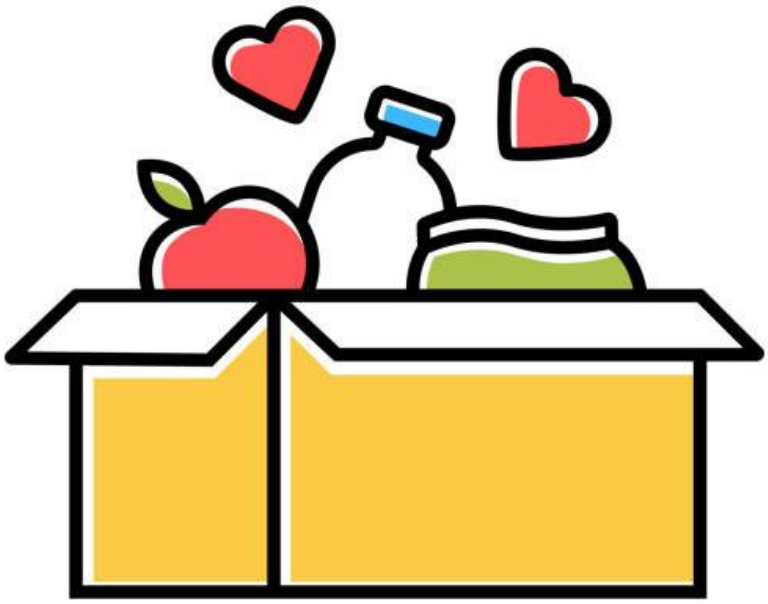

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Table of Contents

I Project Description

1 Project Overview

The "WeAllocate" application is a resource allocation optimizer designed to harness the power of machine learning for the betterment of community services. It aims to predict the demand and supply patterns of various food items in local and regional food banks. By doing so, it offers optimized distribution strategies, ensuring maximum reach and efficiency in food allocation. The primary beneficiaries of this tool are local food banks and regional food bank organizations. With this solution, food banks can significantly enhance their distribution processes, ensuring that as many people as possible benefit from the available resources, all while minimizing wastage. This application will be partnered with IMAN: Food and Wellness center based out of Chicago, IL. To accomplish this, machine learning can significantly optimize the resource allocation process for food banks by analyzing historical data, current trends, and other relevant factors.

2 The Purpose of the Project

The primary motivation behind "WeAllocate" is to address the ever-present challenges faced by food banks: unpredictable demand, potential wastage of perishable items, and the need to maximize the impact of available resources. Food banks play a crucial role in supporting communities, especially during times of economic uncertainty or crises. However, they often operate with limited resources and rely heavily on donations, making it imperative to distribute food as efficiently and effectively as possible. By partnering with IMAN, the project seeks to pioneer a new age for resource management within charitable food distribution systems, making them more resilient, efficient, and impactful.

2a The User Business or Background of the Project Effort

Content:

IMAN (Inner-City Muslim Action Network) is a community organization that fosters health, wellness, and healing in the inner-city by organizing for social change, cultivating the arts, and operating a holistic health center. One of their key offerings is the Food and Wellness Center in Chicago, which provides essential food resources and wellness services to the community.

In the city of Chicago, where socio-economic disparities are evident, the Food and Wellness Center plays a pivotal role in ensuring that underserved communities have consistent access to nutritious food. However, like many community-driven initiatives, they face challenges in resource allocation, demand prediction, and efficient distribution.

Enter "WeAllocate", a cutting-edge application designed to revolutionize the way IMAN operates their food bank. WeAllocate seeks to partner with IMAN's Food and Wellness Center to optimize their resource allocation through predictive analytics, ensuring that every individual who approaches them leaves with their needs met and continues to be met.

Motivation:

The driving force of the WeAllocate project lies in the understanding that food banks often grapple with operational challenges. Predicting demand, minimizing wastage, and ensuring equitable distribution are complex tasks that require a blend of ground-level understanding and technological intervention. The WeAllocate application promises to bridge this gap, providing IMAN with a tool that not only streamlines their operations but also amplifies their community impact.

Considerations:

The challenges faced by IMAN's Food and Wellness Center are not unique but are indeed pressing. In a city where many depend on community services for their daily meals, any inefficiency or wastage has dire consequences. The question isn't just about whether there's a problem; it's about the magnitude of its impact on real lives. The need for a solution like WeAllocate is evident. By partnering with IMAN, WeAllocate isn't just providing a technological solution; it's bolstering a community lifeline, ensuring that the noble mission of IMAN - to serve, heal, and uplift - is realized to its fullest potential.

2b Goals of the Project

Content:

The primary goal of the WeAllocate project, from IMAN's perspective, is to enhance the efficiency and reach of their Food and Wellness Center. IMAN strives to ensure that every individual in the community has consistent access to nutritious food and wellness services. WeAllocate aims to empower IMAN with predictive insights to optimize resource allocation, thereby maximizing their impact and ensuring no individual in need is turned away.

Motivation:

As the project progresses, it's essential to keep the core goal at the forefront: improving the lives of the community members served by IMAN. While the development of the WeAllocate software is a significant aspect, it is merely a tool to achieve the larger objective of community betterment. The software's success will be measured not just by its technical prowess but by its tangible impact on IMAN's operations and, by extension, the lives of those it serves.

To ensure the project remains aligned with its goals, meeting sessions should be conducted with both the development team and IMAN's representatives. These sessions will serve as checkpoints, ensuring that the growth of "WeAllocate" aligns with IMAN's mission and objectives.

Examples:

We want to ensure that every individual who is facing food insecurity is able to get the help they need.

We aspire to minimize wastage at the Food and Wellness Center, ensuring that resources are utilized optimally and benefit the maximum number of community members

We aim to streamline the food distribution so that we can continue operating for the best of our community

2c Measurement

Regular assessments will be carried out to ensure that the WeAllocate system aligns with IMAN's operational objectives and delivers tangible benefits. Adjustments will be made as necessary based on the insights gathered from these evaluations.

These will include but not be limited to:

Resource Utilization: Assess the effectiveness of WeAllocate in reducing food wastage at the center. The goal is to ensure optimal use of available resources, minimizing unnecessary losses.

Beneficiary Outreach: Examine the reach and efficiency of the center post-WeAllocate integration. The objective is to serve a broader segment of the community effectively.

Beneficiary Feedback: Periodic feedback will be collected from beneficiaries to gauge satisfaction levels. This will provide insights into the system's success in meeting individual needs.

Operational Streamlining: Evaluate the operational efficiency brought about by WeAllocate. The center should see expedited resource allocation processes, ensuring timely service to beneficiaries.

Return Beneficiaries: Track the frequency of returning beneficiaries as an indicator of the center's effectiveness in meeting community needs.

Inventory Management: Monitor inventory turnover to understand the agility of operations post-WeAllocate integration. The aim is to ensure a responsive and dynamic inventory system that aligns with demand patterns.

3 The Scope of the Work

Within the broader purpose of community support and wellness facilitated by IMAN's Food and Wellness Center of Chicago, the specific "work" addressed by the WeAllocate application is "optimizing food resource allocation and distribution." It narrows its focus to ensuring that food resources are effectively distributed to meet community demands. In this context, WeAllocate will function within the environment of food inventory management, demand prediction, and distribution at IMAN's Food and Wellness Center. We want our software to predict food demand based in data, demographics and other outside factors. Manage and optimize food inventory. Provide inventory information that also allows IMAN to manage distribution and update demands. Finally, we want to generate analytics for assessing impact, identifying trends and allowing the food bank to make more informed decisions.

3a The Current Situation

Content:

Currently, IMAN's Food and Wellness Center manages its food resource allocation through a combination of manual processes and some digital tools. Staff and volunteers assess inventory levels, monitor expiration dates, and gauge community demand based on historical trends, immediate past experiences, and direct feedback from beneficiaries. The distribution process involves manually categorizing food items, prioritizing them based on need and perishability, and then allocating them to beneficiaries as they arrive or through scheduled distributions. There is some level of digitization, such as basic inventory tracking spreadsheets or databases, the majority of decision-making is reliant on human judgment. This involves a significant amount of time, effort, and relies heavily on the expertise of the individuals involved. Moreover, without sophisticated predictive tools, the center might face challenges in anticipating sudden spikes in demand or efficiently handling excess supply. Furthermore, it is also susceptible to the inevitable human error

Motivation:

Understanding this current setup is important for several reasons. Firstly, it provides a baseline against which the improvements brought about by WeAllocate can be measured. Secondly, it offers insights into potential challenges that might be encountered during the implementation of the new system. Users accustomed to manual methods might require training or might have concerns about the new processes. Recognizing the intricacies of the existing system ensures that the transition to WeAllocate is smooth, addressing both the operational challenges and the concerns of the staff and volunteers who will use it.

3b The Context of the Work

Content:

The WeAllocate application is designed to seamlessly integrate into IMAN's Food and Wellness Center's existing workflow. Its primary function is optimizing food resource allocation and distribution. The work context diagram would typically showcase the WeAllocate system at the center, with various external entities it interacts with.

External Entities:

Inventory Management System: Existing databases or systems that track food items, their quantities, and expiration dates.

Beneficiary Feedback Portal: A system or method where beneficiaries provide feedback, which can help in refining predictions and allocations.

Donor Systems: Platforms or methods through which donations (both monetary and in-kind) are received.

Community Events Calendar: Local events can influence demand. Integration with such a calendar can provide predictive insights.

Staff and Volunteer Input Portal: A platform for staff and volunteers to input observations, anomalies, or urgent requirements.

Motivation:

By defining these boundaries and interactions, we ensure that WeAllocate is not developed in isolation but is tailored to fit its operational environment. The interactions with adjacent systems ensure that WeAllocate has all the necessary data for its algorithms and predictions, making it a holistic solution.

Considerations:

Beneficiaries: The primary end-users of the resources allocated by WeAllocate. Their needs can vary based on individual circumstances, seasonality, and community events. Understanding their consumption patterns, preferences, and feedback is crucial for optimizing resource allocation.

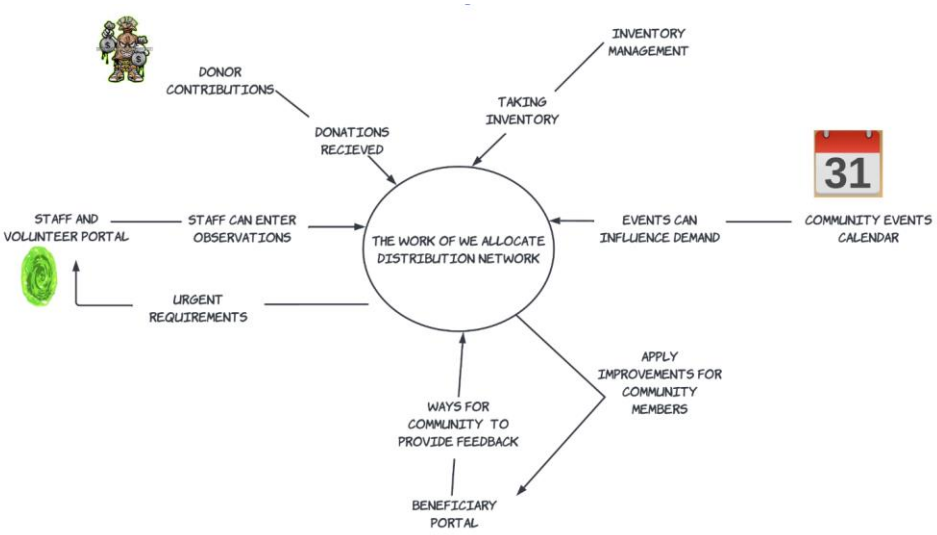
Staff and Volunteers: directly interacting with beneficiaries and handling the day-to-day operations of the Food and Wellness Center. Their insights, observations, and feedback are needed for refining the WeAllocate system. They can also identify anomalies or urgent requirements that might not be immediately evident from data alone.

Donors: Entities or individuals donating food items or funds to IMAN's Food and Wellness Center. They might require reports or insights on how their donations are utilized, which WeAllocate can potentially provide. Understanding donation patterns can also aid in predicting future resources.

Community Events: Local events, holidays, or community gatherings can influence demand. It's essential to factor in these events when predicting resource requirements.

Inventory Management: IMAN's Food and Wellness Center might be using existing systems for inventory management, feedback collection, or donor management. Ensuring seamless integration with these systems is crucial for the holistic functioning of WeAllocate.

WeAllocate can be developed and refined to best suit and meet the objectives of IMAN's Food and Wellness Center.



3c Work Partitioning

Business Event List

Event Name	Input and Output	Summary
1. Food donations from doners	Doner Contribution (IN)	Receive food donation from donators
2. Track inventory	Inventory Management (in)	Uses data from achieved form the inventory to feed the machine learning algorithm
3. Community Calanders	Community events (in)	These events can influence the demand on which can be used as one of the aspects for the ML algorithm
4. Volunteers & staff observation	Feedback data (in)	Volunteers & staff at station can submit feedback to ML algorithm on whether or not the resources were enough at the even
	Urgent Requirements (out)	Any immediate changes the algorithm picks up will have to be enacted by staff and volunteers
5. Beneficiary feedback	Beneficiary portal (in)	People who took the donation can send in feedback on portions that they receive are enough and take in their input what other location IMAN can hold their donation centers.

3d Competing Products

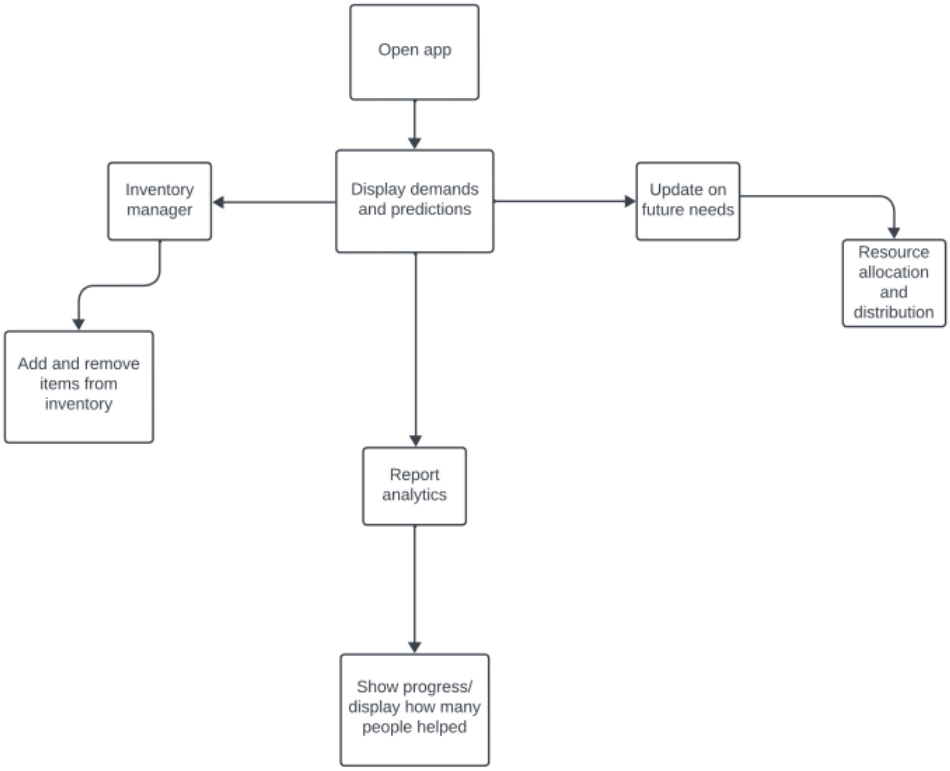
Several inventory management and predictive analytics tools are available that could serve organizations like IMAN's Food and Wellness Center. However, these generic solutions often fall short in addressing the unique demands of food banks. They may lack features for predicting demand based on community changes, might not integrate efficiently with IMAN's existing workflow, and could be a templated solution meeting needs but not exceeding them. The tailored approach of WeAllocate is offered as a specific solution designed to fill and exceed needs with features like beneficiary feedback, community event tracking, and precise integration capabilities.

Our solution is not just another tent to be pitched but instead a foundational pillar for IMAN.

4 The Scope of the Product

This application is a machine learning powered tool which utilizes machine learning algorithms and predicts supply and demand for various sources. This product consists of an optimized distribution strategy that will recommend the best distribution strategy and aim for maximum reach and efficiency in food allocation.

4a Scenario Diagram(s)



4b Product Scenario List

1. *Special food in demand*
2. *A lot of food was taken from the food bank and the inventory dropped*
3. *Food is expiring*
4. *A certain spot requires a lot of an item, and the inventory needs to be updated*

4c Individual Product Scenarios

1. In the fall, there are certain food more popular than others. Trail mix is a popular item for people to go pick up and the learning algorithm picked it up and it can now update the IMAN food bank accurately to predict when they will be out of that food based on the trend. Because we can accurately predict when the trail mix will be popular, the IMAN food bank can accurately predict when they will need more.

2. At the IMAN food bank, People took a lot of food from the food bank and their stock is running low. Our program's interface can identify this trend and alert the people at the food bank to restock because the trend calculates that a lot of food will be taken within the next couple of days.

3. When food is inputted into the system, the user at the food bank has to give it an expiration date. This means that it will need to be given out quickly or else it will expire. In the case that it expires, the food bank must remove it from the stock.

4. A certain organization that makes meals during the thanksgiving period required a lot of frozen and canned food. Due to the high demand of these two predicts, the software's inventory is updated and can give a more accurate prediction of how long the supply will last.

5 Stakeholders

5a The Client

Content:

IMAN: Food and Wellness Center of Chicago

IMAN, as the primary client, invests in the WeAllocate system with the aspiration to enhance their food resource allocation efficiency. Their intent is to serve the community better, reduce wastage, and ensure that their beneficiaries receive optimal support.

Though the WeAllocate system is technically for IMAN's internal use, its benefits directly impact the larger community. Therefore, while IMAN is the client, their feedback and satisfaction with the system will also be influenced by the community's experiences.

5b The Customer

The Customer will be the IMAM food bank. This app will allow them to be more efficient and run their operation better. We are only targeting this specific food bank in Chicago but there are many other around the U.S that could benefit from a software like this.

5c Hands-On Users of the Product

Food Bank Managers

User role: Oversee the operations, inventory management, and distribution processes at the center..

Other user characteristics: Decision-making skills, community engagement experience, leadership abilities.

Volunteers

Role: Assist with inventory checks, food distribution, and beneficiary interactions.

Other user characteristics: Community empathy, collaborative spirit, adaptability to varying tasks.

Beneficiaries

Role: Receive food allocations, provide feedback on preferences and needs.

Other user characteristics: Diverse backgrounds, varying levels of technological literacy, different nutritional needs.

Understanding the diverse user base is essential for tailoring WeAllocate's features to their needs. Ensuring usability and accessibility for all users, from managers to beneficiaries, is vital for the system's overall success and efficacy.

5d Maintenance Users and Service Technicians

For the WeAllocate system, there are dedicated maintenance users which comprise System Administrators, who are responsible for the system's overall health, backend configurations, user access management, and timely updates. Database Managers are crucial because they will be ensuring data integrity, conducting regular backups, managing data updates, and overseeing the entirety of information stored within WeAllocate. Additionally, Technical Support Staff form an integral part, assisting in troubleshooting, addressing technical issues, and providing support to primary users like Food Bank Managers and Volunteers. Their interactions and responsibilities, while different from the primary users, are foundational to the system's robustness, security, and efficiency.

5e Other Stakeholders

Sponsor: Includes higher value donor

Role: Financial backing and guiding the project's direction.

Influence: High

Legal Experts: IMAN's Legal Counsel

Role: Ensure compliance with relevant laws and regulations.

Influence: High

5f User Participation

Food Bank Managers: Their deep understanding of day-to-day operations and challenges will be vital.

Contribution expected: Providing business knowledge, offering feedback on feature prototypes, and detailing usability requirements.

Volunteers: Their on-ground experiences will provide invaluable insights into real-world scenarios and challenges.

Contribution expected: Sharing experiences, testing initial user interfaces, and offering feedback on system usability.

System Administrators and Technical Support Staff: Their understanding of the technical infrastructure and potential challenges will help in refining the system's backend.

Contribution expected: Offering technical insights, assisting in system integration planning, and validating technical requirements.

5g Priorities Assigned to Users

Key Users:

Food Bank Managers: They are at the forefront of operations and make critical decisions based on the insights and recommendations from WeAllocate. Their requirements, feedback, and satisfaction with the system are paramount for the tool's success and adoption.

System Administrators: Ensuring the system's smooth operation, their role is crucial to the tool's overall functionality, security, and integration with other systems.

Secondary Users:

Volunteers: While they play a significant role in on-ground operations and provide valuable feedback, the system primarily serves to assist the decision-making process led by the Food Bank Managers. However, their ease of use and feedback still carry substantial weight.

Technical Support Staff: Their interactions with the system will be more on the troubleshooting and support front, making their priorities secondary to those actively using the system for operations.

Unimportant Users:

Casual Observers: These might include visitors, potential donors, or other external entities who might get a demonstration of the system but won't interact with it daily. Their requirements or feedback, while appreciated, won't be the driving factor in design decisions.

6 Mandated Constraints

6a Solution Constraints

Description: The WeAllocate system will be a cloud-based application accessible via web browsers.

Rationale: IMAN does not have high power hardware so a cloud-based system ensures universal access and centralized data storage, without the need for physical installations.

Fit Criterion: The application should be accessible from any modern web browser (like Chrome, Firefox, Safari) without the need for additional plugins or software installations.

Description: WeAllocate will feature a user-friendly dashboard with interactive data visualization capabilities.

Rationale: The diverse user base of IMAN, ranging from administrators to volunteers, requires an intuitive interface to quickly understand and act upon allocation data.

Fit Criterion: Users should be able to understand and navigate the dashboard with minimal training, and the system should support graphical representations like charts and graphs.

Description: WeAllocate will incorporate role-based access controls.

Rationale: Different stakeholders like administrators, volunteers, and managers have varied access needs. Implementing role-based access ensures that each user only accesses the information and functionalities relevant to their role.

Fit Criterion: The system should allow the creation of distinct user roles, each with customizable permissions. An administrator should be able to assign and modify these roles.

Description: WeAllocate will be designed with scalability in mind.

Rationale: As IMAN grows and the number of resources and allocations increases, the system should be able to handle the increased load without performance degradation.

Fit Criterion: The application should demonstrate consistent performance even with a 50% increase in simultaneous users or data volume.

6b Implementation Environment of the Current System

WeAllocate is designed to operate in a digital environment, predominantly on servers and workstations running whichever system IMAN has setup. It will also have mobile interfaces optimized for both Android and iOS platforms for team members to be able to use. These can be webapps to make transition smoother.

6c Partner or Collaborative Applications

Inventory System: WeAllocate will connect to this system to know about the food stock and its details.

Events Calendar: WeAllocate will check this calendar to know about big events that might increase the number of visitors.

Feedback Tools: If IMAN uses tools like Google Forms to get feedback, WeAllocate should be able to read that feedback.

Donor Systems: WeAllocate will connect to these systems to know about incoming donations.

Microsoft Excel: WeAllocate should be able to use Excel files for easy data handling.

6d Off-the-Shelf Software

Database Management Systems: Tools like PostgreSQL or MySQL will be essential for managing and storing the vast amounts of data WeAllocate will handle.

Cloud Services: Amazon Web Services (AWS) or Google Cloud Platform (GCP) are required for hosting the application and ensuring seamless and scalable performance.

Data Analytics Tools: Integrations with platforms like Tableau or Power BI will be beneficial for generating insights and reports from the collected data.

6e Anticipated Workplace Environment

Busy and Crowded: Food banks often experience a high influx of beneficiaries, volunteers, and staff, leading to a bustling environment.

Varied Tech Proficiency: The environment will have a mix of users, from tech-savvy staff to volunteers who might not be as familiar with digital tools.

Multiple Access Points: The tool might be accessed from both back-office setups (computers) and on-the-floor mobile devices or tablets.

Noise Levels: Given the flow of beneficiaries and operational activities, noise levels can be relatively high, making auditory notifications less effective.

Connectivity Issues: Some areas within the facility might have weaker Wi-Fi signals or connectivity challenges.

6f Schedule Constraints

Given the urgency to enhance food distribution efficiency, WeAllocate aims to be operational before the winter season, when demand spikes. Specific milestones will be set to ensure timely delivery.

Pre-Holiday Season Release: WeAllocate should be fully functional to cater to the increased demand and activities during the holiday season.

Beta Testing: A preliminary version should be available for testing allowing a time window for feedback and improvements before the final release.

Training Sessions: Designated training sessions for staff and volunteers are scheduled. The basic functionalities of WeAllocate need to be ready by this time for effective training.

6g Budget Constraints

Funding for WeAllocate is limited to the budget allocated by IMAN and potential grants. Development choices will be made to ensure the best possible solution within this budget. Fundraising may be needed to meet further needs as well as Maintenace. This includes software development, testing, user training, and support.

7 Naming Conventions and Definitions

7a Definitions of Key Terms

Allocation Algorithm: The specific machine learning method used by WeAllocate to distribute resources within the IMAN food bank.

Dashboard: The user interface of WeAllocate that presents data, allocation results, and system functionalities in an organized manner.

Database: A structured collection of data in WeAllocate, storing information about resources, allocations, users.

IMAN: Abbreviation for "Inner-City Muslim Action Network" The organization for which WeAllocate is being developed to manage and optimize the allocation of its resources.

Resource: Any tangible or intangible item managed by IMAN, such as food items or volunteer hours, that requires allocation via WeAllocate.

System Admin: A user role within WeAllocate with elevated privileges, responsible for system setup, user management, and overall system maintenance.

User Profile: A digital record within WeAllocate that contains data about a specific user, such as user ID, name, contact information, role, and preferences.

WeAllocate: The proposed software system designed to automate and optimize the allocation of resources within the IMAN food bank, ensuring efficient distribution and waste reduction.

7b UML and Other Notation Used in This Document

In the context diagram, there are some images to go along with the entities of this system.

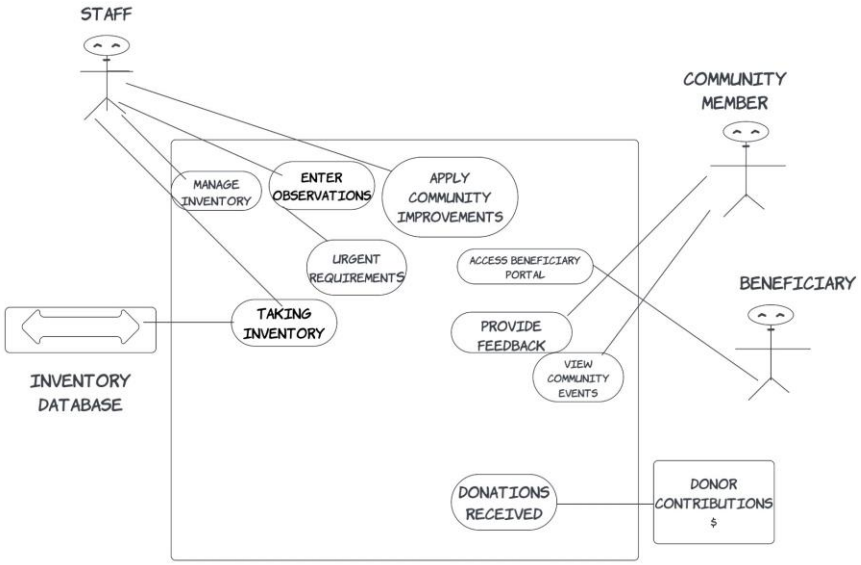
 represents Donor contributions

 represents the staff and volunteer portal

 represents inventory management

 represents the community calendar

USE CASE DIAGRAM



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7c Data Dictionary for Any Included Models

Since there are many elements, there will be numerous data properties to keep track of, that have unique identifiers.

Inventory:

Item

Name

Expiration date

Quantity

Category

Average Demand

Quantity Available

8 Relevant Facts and Assumptions

8a Facts

Beneficiary Demographics: IMAN's Food and Wellness Center primarily serves the inner-city communities of Chicago, addressing the needs of diverse populations including marginalized groups, low-income families, and individuals from various ethnic backgrounds.

Center's Operations: The Food and Wellness Center operates six days a week, providing both fresh produce and non-perishable food items to beneficiaries. It also offers wellness services and community outreach programs.

Community Engagement: IMAN's Food and Wellness Center, beyond just food distribution, engages with the community through health workshops, nutritional education sessions, and community-building events.

Collaborations: The center collaborates with local farmers, businesses, and other organizations for food sourcing and community programs, ensuring a sustainable supply chain and broader community engagement.

Volunteer Participation: The center's operations are significantly supported by community volunteers. Monthly, they witness active participation from local community members, students, and other individuals who offer their time and expertise.

Existing Infrastructure: IMAN's Food and Wellness Center has a physical infrastructure comprising storage facilities, refrigeration units, and community spaces where beneficiaries and volunteers interact.

8b Assumptions

Technological Proficiency: It's assumed that the primary users of WeAllocate, including volunteers and staff at IMAN's Food and Wellness Center, have basic computer literacy and can navigate through the application with minimal training.

Infrastructure: The center has stable internet connectivity and devices (like computers or tablets) that can run WeAllocate efficiently.

Data Availability: Existing data related to food inventory, beneficiaries, and other relevant metrics are available in a digital format, ready for integration into WeAllocate.

Volunteer Availability: Volunteers will be available for training sessions on how to use the WeAllocate system and will commit to using the system consistently.

Ongoing Support: IMAN has a dedicated team or individual who will act as a point of contact for any software-related issues, feedback, or updates.

Integration with External Systems: WeAllocate can integrate with any existing systems or software that the center might be using, like donor management systems or volunteer coordination tools.

Resource Commitment: The center will allocate necessary resources, both in terms of time and finances, for the successful deployment and adoption of WeAllocate.

Community Engagement: The community will positively receive the introduction of a digital system, understanding it as a move towards efficiency and better service.