

Software Engineering: Requirements Documentation

Section 1: Informative Documentation

I. Name, Place and Date

- a. Disaster Aid Distribution
- b. Mayaguez, Puerto Rico
- c. January 2020 to May 2020

II. Partners

- a. Developers
- b. Clients

III. Current Situation

Due to the high demand and traffic of donations, many of these articles are getting misplaced or are not distributed properly to the places where they are needed. A high volume of articles is arriving at places where they are not needed and vice versa, some supplies are not arriving at the places where they are needed. People have taken the task of personally delivering the donations due to the inefficiency of the government in disaster aid.

IV. Needs and Ideas

a. Needs

Need for improvement in communication between parties: As mentioned before, there is a need to significantly improve the communication between victims and donors, such as to provide accuracy, speed, and overall effectiveness in aid distribution.

b. Ideas

Need for improvement in communication between parties: The idea is to provide simple user-friendly communication between those affected and those who wish to provide aid. To do so means developing an app that provides transparency between these two parties, including location and inventory of what can be provided. The system should be able to store, display, and update itself to provide real-time data. It also should provide easy navigation in order to search for specific locations or articles of necessities.

V. Concepts and Facilities

- a. Providing efficient relief supplies to locations in need.
- b. The system will serve as a supply optimization system.
- c. The use of this system will fulfill the need for undersupplied areas to receive supplies from over-supplied areas.
- d. This system will provide general knowledge of areas with the need for emergency supplies.

VI. Scope and span

a. Scope

The issue is to understand the victims needs such as health, food and other necessities they might encounter. Moreover, receive and update all the donations that a donor can give along with the necessities that the victims are facing.

b. Span

To build a plan of emergency breaking down the category of the needs, to provide efficient inventory management and location for the affected people along with the donors to secure the transaction of these exchanges successfully.

VII. Assumptions and Dependencies

a. Assumptions:

For the development of the app the following assumptions are expected to be fulfilled: that there is a mutually accepted domain description between the stakeholders, that the developers have access to professionals possessing the necessary knowledge about the requirements

b. Dependencies:

Some dependencies include that the users (affected people and donors) of the developed app adopt the idea of using the app during the supply distribution process and the fulfillment of the assumptions.

VIII. Implicit/Derivative Goals

At the end of development, it is expected that the project helps facilitate the distribution of aid, not just help in reaching the people who need them but also to get what they need. This should greatly reduce the waste of supplies in terms of storage and errors that can be eliminated by clear communication.

IX. Synopsis

The system gives users in need of some resource the opportunity to request it, in addition to allowing other users to see these needs and supply them. In this way, both users with the desire to supply a need and users in need can find out where the need is occurring, what resources are in need, and what resources have already been donated to supply it.

X. Standards Compliance

If our goal is to enable food as a type of resource, the system must comply with the guidelines of the United States Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA). When collecting information about users, our system must provide a privacy policy that complies with the requirements of the established Law number 39 of January 24, 2012 of Puerto Rico.

XI. Contracts, with Design Brief

The product will contain as follows:

- A back-end service that manages business logic.
 - The backend service will contain a database and components to communicate and manage data between the user and the application.
 - The user will not have direct access to this service
- A front-end service that permits users to create accounts, requests, donations.
 - The front-end service will contain the application views and the communication components to communicate data to the back-end service.
 - The user will be able to access and interact with this service via the world wide web using a web browser such as Google Chrome or Mozilla Firefox

The backend service will have an uptime percentage of 99% while the frontend service will have an uptime percentage of 99.99%.

The request speed for the backend service will be under 200 ms at most times and 500 ms under peak times. The frontend service will be under 100 ms at most times and 200 ms for peak times.

The project will be done pro-bono to help people with limited resources.

The project team is not responsible for the delivery process of any donation. This includes picking up items, transporting them, receiving them or any other aspect related to the delivery aspect of a donation. The application merely serves as a means by which to simplify communication between the requesting and donating parties.

The project team will not be responsible in case of goods that do not reach their destination or are damaged before arrival.

XII. The Team

a. Management

i. Plan

The team was divided into small teams to work with the tasks in the backlog. Also, the team had updates meetings once a week to show progress in their implementation. The repository in GitHub was controlled by pull request to avoid the addition of code with errors to the master branch.

ii. Process

Each sub-team needed to show progress in the updates meetings and keep the communication with the whole team. Also, each team created a pull request before merging branches.

iii. People

The use of tools like Microsoft Teams, Trello, and Google Meet was used to keep an organize team and good communication.

iv. Power

The use of a vote system was used to make decisions.

b. Developers

- i. Team 1: Database system
- ii. Team 2: Frontend design
- iii. Team 3: Backend system for Requests
- iv. Team 4: Backend system for Donations

c. Client staff

- i. Victims
- ii. Donors
- iii. Nonprofit agencies
- iv. Government

d. Consultants

The team did not use the services of a professional consultant.

Section 2: Prescriptive Documentation

❖ Stakeholders

- Victims: The Puerto Ricans that are being or have been affected by these constant earthquakes are going to be able to let donors know which things are necessary and where, therefore the people will receive exactly what they are lacking. The software will also organize the supplies and make sure everything is efficiently delivered. We can get access to a small group of this stakeholder by contacting the people through the software.
 - The victims have the following kinds of functions:
 - Use the software to ask for specific articles.
- Donors: The donors are those who wish to help the affected people but are wary of doing it due to the number of incidents in which the donations are not delivered at all. The software will allow the donors to register their donations and being requested by affected people. Also, the donor will be able to contact the affected people to deliver the donation. We can get access to a small group of this stakeholder by contacting the donors through the software.

- The donors have the following kinds of functions:
 - Use the software to register donations.
 - Use the software to accept requests done by affected people.
 - Can view the locations by the level of priority.
- Government: In a way, the government can be considered as a competition because they have programs where first aid articles are distributed. We can learn from them which methods of distribution are more effective and they might be interested in the software in the future. We don't have access to these stakeholders because we don't have complete access to the government, but we can select a small group of people dedicated to aid distribution.
 - The government has the following kinds of functions:
 - Use the software to request for specific articles.
 - See the locations where donations are needed by the level of priority.
- Non-Profit Organizations: These are the organizations that donate their time, money, or articles to people in need. We don't have access to these stakeholders because we can't get complete access to these organizations, but we can select a small group of people that we can talk to.
 - Non-Profit Organizations have the following kinds of functions:
 - Use the software to request for specific articles.
 - See the locations where donations are needed by the level of priority.
- Community Leaders: These are the leaders in small communities on the Island that are either looking for donations or are looking to make their own donations. We do not have access to these stakeholders because we can't get complete access to them, but we can select a small group of people that we can talk to.
 - Community Leaders have the following kinds of functions:
 - Use the software to ask for specific articles.
 - See the locations where donations are needed by the level of priority.
- Support Staff: Those who can be contacted by the donors or affected people in case they have difficulties and need assistance using the software. We have access to these stakeholders.
 - The support staff have the following kinds of functions:
 - Keep in touch with the users that might be in the need of assistance when navigating the software.
- Maintenance Staff: Those who are responsible for keeping the system updated so it does not become obsolete. We have access to these stakeholders.
 - The maintenance staff have the following kinds of functions:
 - Keep the software updated with new material and new technologies.
 - Make sure that resources are available for distribution.

❖ The Acquisition Process

- Studies
 - Study of Requirement Documents:

- There is little documentation on this domain topic to describe requirements of such domain. There is a similar application, Suministrospr.com, that shares a similar domain, which covers the distribution of supplies only has partial documentation available for review.
- Upon research, it was found that the project has a similar scope to the Disaster Aid Distribution. The focus of their requirements is situated in aiding southern communities of Puerto Rico due to the earthquakes earlier in the year. The people of interest are the victims of this natural disaster, especially those that lost their homes, their jobs or are facing problems relating to the catastrophe.
- The requirements can be improved in terms of organization and communication. The structure that is implemented for the interface can be intimidating for a newcomer.

➤ Interviews

- After initially walking the interviewee through the questionnaire, the following questions were asked in order to build rapport between the stakeholder, a donor in this case, and the requirements engineer. The questions were:

- Question: Please list, by naming them, the entities that you meet in your daily work, whether frequently, sometimes, or rarely.

Answer: In the daily work I do I help the people affected and bring my donations. I mainly work with other donors, victims of the disaster, non-profit organizations, and all the donations themselves. In order to give an organized help, I coordinate with other donors and non-profit organizations so we can deliver the supplies that are needed.

- Question: Tell us about what we call the functions of your work, the interactions you have with entities.

Answer: I communicate with other donors, often by phone or social media, and non-profit organizations to identify and organize the donations and deliver them to the victims that need them.

- Question: Tell us about what we call the behaviors of your work, the tasks that can be described as a sequences of behaviors that involve some of the entities you mentioned as well as events that cause your work to shift in different directions, etc.

Answer: Some task might be to buy the supplies, collect donations, analyze what are the supplies that are most needed and where to deliver them. The job hat I perform the most in my daily work is

analyzing what supplies are needed the most so I can give the most efficient help.

- Question: What are the biggest challenges presented on a daily basis? For example, if there is a lack of specific donations needed in a sector, if not enough people are making donations meet the demand, and so on.

Answer: The biggest challenge in my daily work life is how to distribute the help, the organization, and transportations. These tasks require a lot of analysis and the organization of different unrelated parties that join up for a good cause.

- Question: Do you think there could be a better distribution of necessities? Are you willing to work with us to improve your work by using our system?

Answer: I would like to know exactly how many people are affected and where. I think the distribution must be better designed, prioritizing according to need, which can be improved, maybe even by you.

➤ Questionnaires

- Questionnaire about the business:
 - What does your business do?
 - What is your mission and vision?
 - Which of your staff members is responsible for ensuring that this project is completed to specifications?
 - What product or service are you selling?
- Questionnaire about the software:
 - What type of software are you looking to have developed?
 - Who will be leading the training for the new software?
 - What features do you like about your current system?
 - What features don't you like about your current system?
 - What features might enhance the current system?
 - What are the basic, crucial needs of the new system?
 - How will you use these features?
- Questionnaire about using the software:
 - Which of your staff will be using this software the most?
 - What operating system with the software be used with?

➤ Indexed Description Units

- Critical areas - any areas where an emergency is declared and where donations should be prioritized.

- Supply - any essential item victims need in a natural disaster situation. These can be any of the following products: food, blankets, technology, medicine, clothes, batteries, or tools. These items are to be fulfilled by the donor who has accepted a request created by a victim or affected person.
- User - A user can have one of two functioning roles derived from stakeholders, supplier (donor) or victim (affected person). A supplier creates a list of the items that they have available. A victim can post what is needed in their community and browse what suppliers have available in order to request such items.

➤ Entities

- Resources – the basic entity that donors and victims will trade. This can be any item that a donor wishes to donate, or a victim wishes to request. Examples of these may be water, batteries, canned goods, etc.
- User – someone who will use Disaster Aid Distribution to either donate or request a resource.
 - Donor – a type of user who chooses to make their resources available to victims.
 - Victims – a type of user who requests a resource in need.
- Locations – The physical location to which each user is related to. For Disaster Aid Distribution, these locations will be mainly the city inputted by the user as part of their address.

➤ Function

- Donate – A non-victim user gives an item that they wish to make available for victims to claim, specifying the type of item, quantity, and location
- Request – A victim asks for an item that they need, specifying the type of item, quantity, and their location, hoping that someone who has that item will see their request and chose to fulfill it.

➤ Events

- Request made – the Victim has made a request where they list the resources they need.
- Received donation – the Victim is having received a donation made by the Donor
- Sent donation – the Donor has given an amount of a resource to the system so that a donator can receive it.

➤ Behaviors

- Seeking donations – Describes a victim requesting a resource. This does not necessarily mean the event in which the victim is receiving the item, rather one where they openly ask for an item hoping someone will accept the request. If from the available resources
- Donating – When a donator has an amount of resource(s) that he would like to donate, he verifies the list of actual requests match for any of his

resources, and if so, he chooses to send a victim the specified amount of a resource.

➤ Requirements

- Donors must have available resources in order to be able to donate.
- Victims need to be able to specify their current location or critical area.
- At least one victim or user representative is needed in order to make a request.
- At least one donor must deliver supplies to a victim in order to mark a request as done and that the donation was received.

❖ Terminology

- **Donations** - Donation is the aid given by Donors to benefit the Victims. A donation may take various forms, these may include food, clothes, water, hygiene products, and others.
- **Donor** - Donor is a person who supplies resources voluntarily to the people in need of aid.
- **Requests** - Items needed by victim/requester. Must include information like name, quantity, and location of supplies needed.
- **Victim** - Victim is a person that is going through hardship that puts them in need of emergency supplies and aid. They also request the help/donation they need.
- **Requester** – is the person/victim that fills up the request with the aid they need.
- **Aid(s)** – Supplies or workforce provided to the victims affected by natural disasters.
- **Natural Disasters** – Natural phenomena that results in catastrophic effects on citizens residing in the affected area.
- **Hardships** – Challenges the victims face due to the aftermath of natural disasters.
- **Locations** - Locations are the places where the Victims who need donations are located.
- **Resource** - Resources are the items of first necessity in a disaster event that are gathered by the Donors with the goal of being distributed to the Victims.

❖ Facets

- Business process Re-engineering

▪ Sanctity of the intrinsic

- From the view of *donors*, the application consists of request donations from the affected groups with specific needs, directions, and a live updated platform for the donors to efficiently distribute the donations.
- From the view of *victims*, the process consists of the platform and making requests. A platform that responds to the requests made by the people for specific needs. Is a direct connection between the platform, request, and the answer by the donors?

▪ Support technology

- The platform satisfies the needs of affected people facilitating supplies and resources through the donations received. A characteristic of support technology that is present in this whole process is how efficient the platform actualizes the amount of supplies that is available for future donations after one request has been answered. Before a platform like this one existed, it was very possible to encounter problems in the organization and trace of how many supplies are available; this solves that problem and many more.
- Another characteristic of support technology that is present is how easily an affected person can find the resources they need through a donor without contacting other people. Without a platform like this one an affected person may have to make a lot of calls or ask to spread his needs in the community, technology solves this problem.

▪ Management and organization

- Management: The handling of the products to provide them to our users is an essential part of our platform. The implementation of donations and requests allow us to properly receive what the user needs in order for us to provide it. Without this essential aspect operations could either become messy or not as efficient. Since handling large amounts of users going through a moment of need is quite chaotic. Our priority is to provide a seamless and easy to do experience for those in need.
- Organization: The platforms allows the operation run to properly by managing the request and donations made through our it. The platform allows us to be aware of our resources, to understand our audience and statistics for future prediction. To provide those in need knowing what we have and what we might need in the future allow us to provide excellence.

▪ Rules and regulation

- Rule: Maintenance Staff or any member with access to user information cannot spread any personal information or the history of request and donations made by users without their consent.
- Regulation: Failing to comply with this rule leads to termination of employment.
- Rule: Support Staff or any member with the authority cannot decide without the consent of the user. Their full purpose is to help, and answer questions not to act without the user knowledge.
- Regulation: Failing to comply with this rule will lead to a fine and potentially termination of employment.
- Human behavior
 - Desirable Behaviors:
 - ◆ Donors: Make resources for donation public in the platform. Look through the application for request of items they are going to donate. Accept or reject a request from an affected user. Whenever the donor accepts a request it must update their inventory of resources. Locate the area in need and deliver the donations to them.
 - ◆ Victims: Create request of donations they need now. They can edit their request before it has been accepted by a donor. They can see all the request they have made. Make public their location.
 - Undesirable Behavior:
 - a. Donors: Once the order is accepted it cannot be cancelled. They must not forget to update their inventories.
 - b. Victims: They must avoid to over request resources, only request what is needed at the time. Cannot edit requests after the donor has accepted them.

▪ Scripting

➤ Domain Requirements

▪ Projection

From domain terminology we can see different terms such as, donor victim, donations, locations, resource, and request, but for domain prescription some of these can be excluded. The only terminology needed for domain requirements is users and this include donors and requestees, request and donation. The rest fall under these as instance variables or are completely useless.

▪ Determination

One example of removing nondeterminism in the domain is that request functions have been designed to only be able to be created if there is an

existing donation. This way, the implemented version of a request cannot be confused with requesting a supply that does not exist. This design decision demonstrates how the program was determined to function and should clear up doubts as to operation.

- **Instantiation**

Users using several underlying characteristics such as, uid, firstName, lastName, email, phone, dateOfBirth, address, city,zipCode, country, requests, donations, username and password.

Donations using several underlying characteristics such as did, supplyName, quantity, createdAt, uni and uid.

Requests using several underlying characteristics such as rid supplyName, time, status, description, uid and did

- **Extension**

Given that our domain requirements are rather short domain requirement list extension is highly probable if the idea is liked and used. Different suggestions are being considered such as big company involvement and delivery of donations facilitated. These new features will need new requirements such as better location data storage better security of provided goods and even warehousing for goods.

- **Interface requirements**

- **Shared phenomena and concepts identification**

Users, with the parameters stored on a table with the following columns and relationship:

- uid = Column (Integer)
 - firstName = Column (String)
 - lastName = Column (String)
 - email = Column (String)
 - phone = Column (String)
 - dateOfBirth = Column (Date)
 - address = Column (String)
 - city = Column (String)
 - zipCode = Column (String)
 - country = Column (String)
 - requests = relationship ('Request', Referenced to **Request**)
 - donations = relationship ('Donation', Referenced to **Donation**)
 - username = Column (String)
 - password = Column (String)

Donations: with the parameters stored on a table with the following columns and relationship:

```
did = Column(Integer)
supplyName = Column(String)
quantity = Column(Integer)
createdAt = Column(DateTime)
unit = Column(String)
uid = Column(Integer)
requests = relationship('Request', Referenced to Request)
```

Requests: with the parameters stored on a table with the following columns and relationship:

```
rid = Column(Integer)
supplyName = Column(String)
time = Column(DateTime)
status = Column(String)
description = Column(String)
uid = Column(Integer)
did = Column(Integer)
```

▪ Shared data initialization

Reducing the complexity of data sharing we can work with two interfaces on our platform. The two interfaces are Angular/Flask and Flask/SQLAlchemy ORM. Starting with Angular client-side code it does not matter what technology is used for building REST API if the resources can be accessed via HTTP commands continuing with Flask server-side data initialization and instantiation transfer via parameters and json format. Finally, database logic and relationships maintain and stores the data using the format described above.

▪ Shared data refreshment

This system has certain restrictions for data refreshment starting with data created on the back end to reference or create relationships between datasets, this data can only be refreshed by an admin and might require extensive changes on the codebase. The other data refreshed is done by the users after they have been validated and stored on the database, this user can alter his status create and delete donations as well as requests to donations already created. This object will be created updated and maintained throughout the web application.

▪ Man-machine dialogue

Man-machine dialogue in this case involves the man sending of requests and input data to the machine. This input and output are displayed as premade structures and are processed by the machine as JSON.

▪ Physiological interface

The man-machine physiological interface is composed of a keyboard and mouse as input and a screen as output. The keyboard and mouse will be used to make requests of the system as well as input data while the screen will show feedback and said data.

➤ Machine requirements

▪ Performance

- Storage

The database must support the 2.4 million users, which is the approximate of adults in Puerto Rico.

The data stored in the database should not exceed 1000 MB.

- Time

The site must have a load time between pages of 2 seconds or less.

The submission of a request must take 3 seconds or less.

- Software size

The application size must be less than 100 MB.

▪ Dependencies

- Accessibility

At a minimum, the system will be viewed on most internet browsing platforms to include Google Chrome, Firefox, Edge. Furthermore, the system will be reactive and capable of display on different sized devices which include laptops, phones, tablets, among others.

- Availability

The system shall be available on most devices that have internet connectivity and shall be free to use. Accounts will be needed to become a provider or a requester.

- Reliability

Our system will be down an average of four hours out of every 100 hours of operation, producing an availability average of 96%.

- **Robustness**

The system shall be very robust, as there will be little opportunity for erroneous inputs, and the system itself will go along a strong series of functionality and quality tests.

- **Security**

Users that register into the system will have their personal information encrypted and securely stored into a database. Login features will require users to identify with a username and email address to prevent spam.

- **Maintenance**

- **Adaptive**

There may not be many adaptive maintenance measures to be taken since different operating systems need only be able to run Python and database compatibility should not be much of an issue due to the use of an ORM, which only needs different database connectors to function properly.

- **Corrective**

Corrective maintenance shall be done remotely: from a developer site, using corresponding credentials and equipment, and via a secure Internet connection.

- **Perfective**

Perfective maintenance shall be done using backups and monitoring and testing techniques to measure the feasibility of the system.

- **Preventive**

Preventive maintenance will involve documenting the code, including any changes, and optimizing it for better performance. Code restructuring may be possible but not necessary, since the code is simple enough as it is.

- **Platform**

- **Development platform**

Web application based on modern architecture using angular for SPA that allows users to add and remove donation and donation requests. This user when authenticated will be able to donate and receive donations from other users. When a user submits a donation

or a request the back-end logic will determine the availability and the relationship between them and then everything will be stored using SQL-Alchemy ORM.

- **Demonstration platform**

This is a self-starter nonprofit project and for this reason there is no need for demonstration platform since there will be no marketing involved for money gathering.

- **Execution platform**

This program can run on a computer that supports the download and running of Python and AngularJS as well as the other dependencies of the program. An internet connection is also necessary.

- **Maintenance platform**

Our maintenance platform will consist of technology and platform changes if it is needed, scalability and bug fixing when usability testing comes into play. Third party libraries may need updating or direct changes to the code base because of these changes, higher usability may require better developments and code changes to improve performance, but this is highly unlikely due to the choice of stack.

Section 3: Analytics Documentation

I. Requirements analysis and concept formation

a. Inconsistencies

- i. Some victims might need the same donation. The system should be capable of splitting a donation (in the cases that the donor allows it) thus allowing a donation to reach more people and potentially become better distributed.
- ii. A donor might post a donation in a location but might also be able to deliver it to different locations. The system should be capable of allowing the donor to select an area (or areas) that he might be able to deliver the donations.
- iii. A donor might use a word to describe their product that might be different from the ones the victim uses to search for the donation. The system shall provide a list of keywords that gives consistency to the donations posted by the donors, thus making it easier for the victims to find it. The same situation might apply when the victims request a donation.

b. Conflicts

- i. Most of the donors might select the same or nearby locations for their donations. This will cause that victims in other locations and in need of the donations to be unavailable to receive them.
 - ii. Donors might also be victims. There is the special case in which a person might have not only overstock of certain supplies (that can provide to others, therefore becoming a donor) but also the need for certain supplies (thus becoming a victim). This case should be allowed by the system by allowing a user to be a donor and a victim, depending on their situation.
- c. Incompleteness
 - i. There is no requirement prescription for what happens when a posted donation (already accepted to be delivered) cannot be delivered because unexpected circumstances.
 - ii. There is no requirement prescription for what happens when a donation is wrongly delivered to another person.
 - iii. There is no imposed restrictions or guidelines that prevent a false victim to use the platform for other benefits.
 - iv. There is no distinction between a victim and an organization that helps victims, thus it might be seen that a victim is over benefiting from the donations, but in reality, it is being redistributed.
- d. Resolutions
 - i. The system should allow the victim (in some cases) to select the amount from a posted donation. This refers that a donation that is in bulk and able to be spitted between victims, can be divided depending on the needs of the victim requesting it.
 - ii. The system should identify and block the victims that are misusing the platform for other benefits.
 - iii. The system should distinguish between victims and donations distribution center and provide the latest a priority because their potential reach to more victims.

II. Requirement validation

- a. Walkthroughs: As the project is divided into separate teams, so will be conducted validation walk-throughs. A full report is to be drawn up for the stakeholders for documentation posterity and to conduct proper validation. The report will encompass each team's contribution to the application as well as highlight requirements relevant to specific stakeholder groups. Walkthroughs are to be primarily conducted through the application's front-end; certain back-end requirements are expected to be seen through the front-end. Tools such as Postman will allow developers to then validate the application's back-end properly while accompanied by the stakeholders.
- b. Resolutions: In the case of stakeholder dissatisfaction, the requirements in contention are to be redistributed to the team or teams associated with its implementation. The team is expected to keep in contact with the unsatisfied stakeholders and work to achieve validation before the next stakeholder meeting.

A requirement is to be considered resolved when the unsatisfied stakeholder accepts changes made to the project to satisfy the requirement.

III. Requirement verification:

a. Model checking

i. Using Basic Temporal Operators

1. $F_p \Rightarrow$ where p is equal to a request

a. This refers that a request will hold sometime in the future until it is accepted.

2. $pUq \Rightarrow$ where p is a request and q is a user who accepted the request

a. This refers that a request in progress holds as long as a user\supplier keeps supplying it.

b. Theorem proofs

- i. Undersupplied Areas will receive supplies from over-supplied areas -> this axiom is completed because through our system we can make sure that supplies can get to places where they are needed. All thanks to the request-supplier system.
- ii. System provided general knowledge of areas with higher need of supplies -> this axiom is completed because we have access to the location of the requesters, this way we can determine which towns or cities need more attention.
- iii. The system will serve as a supply optimization system -> this axiom is completed because the system shall ensure that there will be better communication and organization in the distribution of product during times of great emergency.

c. Test cases and tests

- i. In terms of Testing and Test Cases in this project; most testing was done by mostly by hand. The backend was tested using Postman , the GET, POST and UPDATE were also tested using Postman. For the backend team we also used a json test case in order to prove if the routes were working correctly.

IV. Satisfaction and feasibility studies

a. Satisfaction

- i. **Correctness:** This document has been validated to contain all or most stakeholders where each know or accept the purpose for this project.
- ii. **Unambiguity and Consistent:** There appears to be no inconsistencies, the document goes straight to the point and it explains its purpose thoroughly throughout the same.
- iii. **Completeness:** Everything needed to be able to completely be developed and worked on is stated in this document. No “holes” have been found through revision.

- iv. **Stability:** Requirements were divided accordingly with respect to the importance of each for the development of the project and were worked on according to the same.
- v. **Verifiability:** Requirements were tested every moment available to ensure it was met accordingly and fulfil its expectations. Those that were not able to be tested were role played and studied further to ensure they were verified.
- vi. **Modifiability:** The domain description was carefully selected and remained the same through all the project. Requirements didn't change constantly since they were established pertaining to the same domain from the start. Some other requirements did arise later, but the existing ones did not change with respect to the domain making the acquisition of requirements a stable and organized process.
- vii. **Traceability:** Requirements were divided by their source which helped with development where each source was divided into groups to work on. Each requirement was documented and worked on respectively; they could be easily traced to their source which helped identify if any additional requirement was needed to be implemented to reach the projects goal.

b. Feasibility

- i. With the goal of being able to help people by delivering any supplies or medical aid, this project was completely feasible from the start. This project had no economical cost any of the team members since open source mediums were used to develop and create the application which is now Disaster Aid. Answering some basic questions: Yes, this project was developed with certain requirements needed which were worth attending. The gains are worth more than the cost since nothing was economically required. We went from nothing to something which could save lives without the hurdle of having to invest economically, concluding this project to be completely and totally feasible.

Section 4: Additional Documentation

I. User Stories

- a. An unregistered user can visit and browse the home page.
- b. An unregistered user can register into the app as:
 - i. Victim
 - ii. Donor
- c. A registered user can:
 - i. Create a profile.
 - ii. Log in with a username and password.
 - iii. Make their donations available.

- iv. Accept or denied a request.
- v. Make a request for the available donations.
- vi. Get status about the requested donations.
- vii. Search for specific donated articles by using specific parameters.

II. Personas

Hector Sanchez



Age: 44

Marital status: Married

Children: None

Undergraduate study: Political Science

Occupation: Senator

Location: Guaynabo, PR

Income: \$70,000

Bio

Hector is a second-term Senator in Puerto Rico.

Concerns about Disaster Aid Distribution

- The government should be responsible for the aid distribution.
- Donors are causing chaos distributing aid without a centralized distribution system.

Technology & Information Sources

- Multiple phones.
- Uses social media only to boost his image, especially in election years.

Luis Alvarado



Age: 54

Marital status: Married

Children: 4

Undergraduate study: Culinary Arts

Occupation: Chef/Restaurant Owner

Location: San Juan, PR

Income: \$50,000

Bio

Luis works as the Executive Chef in his restaurant in San Juan, PR. He and his wife opened the restaurant over 20 years ago. During the aftermath of Hurricane Maria, Luis served free food to thousands of people, even delivering it himself to people outside the metropolitan area. His restaurant also served as a hub for the collection of donations

He works alongside his wife, and two other sons, in his restaurant. Luis and his family are also known for their involvement with charity organizations.

Concerns about Disaster Aid Distribution

- Luis wants to help those affected but finds himself unaware of their needs.
- He is questioning the efficiency of the government in the aid distribution.
- Prefers to deliver aid without third parties.

Technology & Information Sources

- Has been using the same phone forever.
- Only uses social media to keep in touch with old friends and share pictures of his grandchildren.
- Gets his news from the local news channel.

Julia Rodriguez



Age: 25

Marital status: Single

Children: None

Undergraduate study: Arts and Education

Occupation: Elementary School Teacher

Location: Ponce, PR

Income: \$20,000

Bio

Julia is an Arts teacher in Ponce. She lives with her mom and 2 younger brothers. Her house suffered structural damages due to the earthquakes and was forced to sleep in her car before going to a local refugee. Julia was not prepared with the necessary supplies and needs donations. Her place of work also suffered major damages and is threatening her savings account.

Julia also organized a local camping area where fellow citizens affected by the earthquakes could gather and sleep during the aftermath of the earthquakes. Also, she admits being psychologically and emotionally affected by the earthquakes; has trouble sleeping.

Concerns about Disaster Aid Distribution

- Resources are not being distributed to isolated areas.
- Does not believe the government is doing a good job in the distribution of resources.
- Donors are not reaching isolated areas.

Technology & Information Sources

- Multiple Apple devices.
- Uses an iMac at home and spends around 3 hours per day actively browsing the internet.
- Mostly browses on her iPad at home.