



# CARDINAL: PROJECT PLAN

SWE 3313 | Group #1

## Team members:

Andujar Brutus | Pamir Ahmad | Audrey Allen | El Arbi Belfarsi | Thomas Breitung

Andujar Brutus

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## Introduction

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Cardinal is aimed to be a desktop application for setting up communication between blood donation centers, donors, and medical professionals in order to ensure more efficient distribution of resources.

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## Business Needs/Requirements

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People in less-developed parts of the world lack the resources that countries in the First World are privileged to have. This issue unfortunately extends to medical facilities, including blood banks. Facilities are unable to communicate with each other or update their information in real time, and they also experience a shortage of donations. Because of these issues, people who need blood transplants for medical emergencies cannot get the help they need with a reasonable amount of ease.

In order to solve this problem, the Cardinal will allow blood bank administrators, donors, and medical professionals to create accounts with different privileges within the application. Administrators will be able to log their incoming and outgoing resources, and these updates will show in real time. Medical professionals will have the ability to view this information, which will allow them to acquire resources with greater ease. The application will also provide estimations of the best options for donors, based on their location and needs. Keeping people informed on where they can give donations will encourage them to help their community.

The medical field is and will always be one of the most essential aspects of society, so any application that will help it work more efficiently will always have a market.

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## Solution Overview & Major Features

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Cardinal is intended to respond to the urgent need for optimization of blood banks. Patients and donors are often expected to look for facilities on their own, which can be very dangerous in critical situations. Creating an application that will allow one to easily access information will allow the medical process to move along much more efficiently. By optimizing management of the resources held by blood banks, this application can also work to combat the effects of low donation rates while also encouraging more people to donate by providing information on the area's facilities.

### **Features:**

- Real-time updates on the resources of registered facilities
- Ability for medical professionals to request resources
- Banks selected by the application to fulfill a request are prioritized by expiration date of their resources to ensure donations are not wasted
- Users can input their information (ex. location, resources needed/donated) and the application will provide them with the information of the bank that best fits their needs
- Banks with low reserves are visible to potential donors to encourage them to donate to less fortunate facilities

### **Future updates:**

- Ability to view data within a map
- Migration from desktop to web and mobile platforms

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## Project Processes

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The issues present in blood donation centers has already been established as our problem statement. Moving forward, our team can proceed with the software development life cycle as shown in the waterfall model, as it aligns closely with our deliverables throughout the semester. After completing the requirements and initial design, it is highly likely that our team will have to go back and rework multiple aspects of the product as we move forward into implementation, testing, and maintenance as the life cycle does not often end up being linear.

Our team has discussed using C#, Java, Python, Django, Microsoft Azure, and .net as tentative tools and methodology for our final product. Our team members are very flexible and are willing to learn new languages and tools if necessary for the development of this project.

### **Find donation center:**

Cardinal will contain a map API with relevant donation centers within a selected distance range. The map will contain necessary information such as the nearest locations of donation centers, phone numbers, hours of operation, and blood volumes available. The map will allow users to navigate freely as any map system should. Ideally, users will be able to sort through the available information and prioritize data in ascending or descending order. Center data will be updated periodically in case new hours or information is needed.

Entrance criteria: The inputs needed for this activity are the user's current location or the zip code in which the user is looking to donate.

Exit criteria: The output produced by this activity is a map that dynamically updates to show the donation centers in a particular area. The indicator of success for this activity is a map that updates to display the area code or the user's general area with the nearest donation centers to them.

### **Identify blood availability per location:**

Cardinal will have a feature that may be updated by participating donation centers that allows users and centers alike to know the blood availability of any participating center. This activity may be sortable by blood type and a center's total blood availability. Ideally, the data used to determine availability will vary between what the end user sees and what data a center may choose to provide. All necessary precautions and industry privacy acts will be adhered to the best of the development cycles abilities.

Entrance criteria: The input needed for this activity is the data provided by a participating donation center on a backend-oriented database. On the frontend, the input needed to view the data will be the specific center the user is searching for which could be as simple as a pre-determined list or as complex as a query input box.

Exit criteria: The output will be understood as functional once the correct data is displayed on an easy-to-read page. The output may be more or less detailed depending on the individual or organization looking.

### **Prioritization of blood centers**

Cardinal will do its best to implement blood center prioritization features that will help individual users or organizations find the centers that require more donations of a specific type. Participating centers may even communicate more effectively with other centers to provide a more unified medical agenda. Hospitals and other places that require the blood donations can easily see where to go to drop off excess blood or find centers with excess donations of a certain type. Centers with expiring samples will be able to move the blood around more confidently knowing the correct people will have a better use for their stock.

Entrance criteria: The input required for this activity will be solely provided by the participating donation center's database inputs.

Exit criteria: The output will be known to be functional once the information can be properly displayed on an easy-to-read page by both organizations and individual users with more or less detail depending on medical authority.

### **Optimize resources for efficiency:**

Cardinal can also be used to optimize blood resources for efficiency. For the countries in which donations hover around 1 to 3 percent, Cardinal can be used as an organizing agent. Rather than needing more people to donate blood in a developing country, the country can use Cardinal to map out and distribute the proper medical resources collected and stored within the software. The 1 to 3 percent of donations can then be sufficient for the necessary uses.

Entrance criteria: The inputs needed for this activity are the backend inputs by participating centers: blood availabilities, population density, and area's donation frequency.

Exit criteria: The output will be understood to be functional once the data can be extracted from the database and turned into a functioning formula to calculate an area's need.

### **Organize current resources:**

Cardinal can be used to organize a donation center's current resources. Cardinal will implement a backend service visible only to participating medical organizations that can be used to communicate freely between involved organizations. This network of professional organizations can then better allocate resources to mitigate an area's supply deficit. This database should be able to connect seamless to the rest of the Cardinal infrastructure to streamline incoming and outgoing data to both organizations and individual users.

Entrance criteria: The inputs required for this activity will be any information the organizations deem crucial. From there, these will be organized for further use.

Exit criteria: The output produced for this activity should be a webpage or data sets for participating centers to view and interact with. These pages can be hold information that the centers would like to be viewable to other centers.

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## Project Schedule

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Date (YYYY-MM-DD)	Milestone/Event	Entry Deliverable/Criteria	Exit/Notes
2021-10-03	Project Plan due	Project timeline and structure to be discussed and agreed upon	In progress
2021-10-24	Requirements Document due	Determine requirements and constraints for the application	Process begins 2021-10-04
2021-11-07	Design Document due	Create and structure a workable design for the application	Process begins 2021-10-25
2021-11-21	Test Document due	Determine how tests will be conducted on the product; begin conducting tests and debugging	Process begins 2021-11-08
2021-12-06	Final Product due	Complete the application and optimize for submission	Process begins 2021-11-22

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## Project Work & Product Estimates

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Estimate for total hours worked: 264 hours

Estimate for total lines of completed source code: 500-1000 lines



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## Team

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### **Andujar Brutus**

Role(s): Team leader/organizer

Critical skills: Coding

### **Pamir Ahmad**

Role(s): Research lead

Critical skills: Coding

### **Audrey Allen**

Role(s): Documentation lead

Critical skills: Technical writing, coding

### **El Arbi Belfarsi**

Role(s): Project originator

Critical skills: Coding

### **Thomas Breitung**

Role(s): Debugger, optimizer

Critical skills: Coding

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## Scope & Limitations

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Cardinal's finished product will include all of the features listed above, though it should be stated that its capabilities will be used only to track and manage resources for blood banks, not other types of medical facilities. If given more time, we could expand the application to work with other medical structures, but those capabilities will not be included in this product.