Washington State University

Theia Navigation App for the Visually Impaired Vision and Scope

Version <1.0>

Revision History

Date	Version	Description	Author
08/11/19	1.0		<name>
12/5/19	2.0		
12/8/19	3.0		

Table of Contents

Vision

1.   Introduction

The purpose of this document is to collect, analyze, and define high-level needs and features of Theia. It focuses on the capabilities needed by the stakeholders and the target users, and why these needs exist. The details of how Theia fulfills these needs are detailed in the use-case and supplementary specifications.

1.1   Purpose

The purpose of this document is to compile, evaluate, and define high-level needs and features of the Theia Navigation App. It explains the needed capabilities from the stakeholders and target users and why they need to exist in the project. Within the use-case and supplementary specifications, the details of what the Theia Navigation App fulfills and how they need to be fulfilled are explained.

1.2   Scope

This Vision Document applies Theia Navigation App, which will be developed by Dream Team. Dream Team will develop the system needed to parse building maps for navigation purposes and the specific interface needed for the visually impaired users. The system includes voice commands and an AI to help guide the visually impaired, a map parser for indoor buildings, a GPS in order to calculate the best route, and gyro sensors to detect if the user has fallen and is injured.

1.3   Definitions, Acronyms, and Abbreviations

Unified Modeling Language (UML) - A diagram with the purpose of visually representing a system along with its main actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system.
Internet Operating System (iOS) - An operating system used for mobile devices manufactured by Apple Inc.
Xamarin - An IDE that allows for the development of cross-platform mobile applications using C#.
Android - An open-source operating system used for smartphones and tablet computers.
Theia - Greek Titan Goddess of sight (Thea) and shining ether of the bright, blue sky.
C# - An object-oriented programming language made by Microsoft.
Use Case - Is a list of actions or event steps that typically defines the interactions between a role and a system to achieve a goal.
Alexa - Is Amazon's cloud based voice service that is available on many devices.
Siri - Is Apple's intelligent assistant that offers a fast and easy way to get things done and to ask questions on any Apple device.
Bixby - Bixby is a virtual assistant developed by Samsung Electronics
WatchOS - watchOS is the operating system of the Apple Watch
Fitbit OS - Fitbit OS is the operating system of the Fitbit.
WearOS - Wear OS is a version of Google's Android operating system designed for smartwatches and other wearables
IPadOS - iPadOS is a mobile operating system created and developed by Apple Inc. for their iPad line of tablet computers

1.4   References

Austin, K. (2019). *White Cane vs. Guide Dog*. [online] Second Sense. Available at:
https://www.second-sense.org/2016/09/white-cane-vs-guide-dog-why-or-why-not/ [Accessed 6 Dec. 2019].

Davidbritch, "Part 5. From Data Bindings to MVVM - Xamarin," *Xamarin | Microsoft Docs*. [Online]. Available:
https://docs.microsoft.com/en-us/xamarin/xamarin-forms/xaml/xaml-basics/data-bindings-to-mvvm. [Accessed:
06-Dec-2019].

Davidortinau, "Permissions In Xamarin.Android - Xamarin," *Xamarin | Microsoft Docs*. [Online]. Available:
https://docs.microsoft.com/en-us/xamarin/android/app-fundamentals/permissions?tabs=windows. [Accessed:
06-Dec-2019].

Sugiyama, W. (2019). *Voice guidance in Maps, built for people with impaired vision*. [online] Google. Available at:
https://www.blog.google/products/maps/better-maps-for-people-with-vision-impairments/ [Accessed 6 Dec. 2019].

1.5   Overview

The vision document offers and overview of our team's vision for the product being developed. It is used as a tool to
provide team members and stakeholders with the information required to get on the same page about the direction of
the Theia application. The document starts by discussing the problem statement, position in the industry, stakeholder
and user profiles, then goes into a description of the product and the technical features and constraints we will focus
on during development. At the end will be the product and documentation requirements for the Theia RE process.

2.   Positioning

2.1   Business Opportunity

Offering a reliable way to navigate indoors is important to the visually impaired community. This can involve
having an obstacle detection system to help users avoid any possible danger or hindrance, a GPS for safe and
reliable guidance, a map parser to allow user to navigate specifically to whatever room building they want, and
verbal instructions for user-friendliness. In addition, there could be an AI bot like Alexa, Siri, or Bixby to help guide
users through settings and make it easier for them to utilize the app. The app can utilize all of the phone's sensors in
order to make sure the user is safe and for added reliability. This system will provide these functions and possibly
more to satisfy people who are visually impaired. This system is designed to be compatible for both Androids and
iPhones.

2.2   Problem Statement

The problem of	Visually impaired people may have difficulties safely traveling from destination to destination inside a building.
Affects	Blind individuals Near-sightedness
The impact of which is	Increased chance of danger and lack of effective guidance for visually impaired people who want to be able to travel reliably and often.
A successful solution would be	A flexible and easy navigation system to use for the visually impaired. The product would have a safe, optimized, and reliable navigation system through the GPS while also helping users avoid danger through obstacle detection. In addition, in case the user does get injured, it'll have an emergency contact it'll call for immediate help. The system will also have a map input for whatever indoor building the user wants to navigate to.

2.3   Product Position Statement

For	Blind individuals Near-sightedness
Who	Have a need for a way to safely and efficiently travel to different buildings and rooms for work, studying, business-related reasons, etc.
The Theia Application	Is a Software product
That	Provides the ability for people who are visually impared to travel safely and reliably through accurate and simple instructions. It will have voice output to guide users through the system and allows users to input maps of buildings or rooms they want to travel through. In addition, there is also an emergency contact that the phone will call in case the user gets injured during their navigation.
Unlike	Current available navigation tools for the visually impaired do not have the same utility as the Theia Navigation App. The most important one would be not having the utility to guide the users to their desired location. Unlike most navigation apps, this app has specific buildings loaded in to give pinpoint directions while inside.
Our product	Detects objects to avoid any possible danger, reliably navigates indoors using GPS connected to building map parsers, verbal commands for user-friendliness. In the case of danger detection, it will call emergency contacts when the user has fallen. In addition, there will also be voice output to guide users through setup and any other questions The system will be compatible with operating systems, specifically Android and iOS.

3. Stakeholder and User Descriptions

3.1 Market Demographics

The target audience is people looking for alternative methods to navigate buildings that can overcome their lack of vision. The users would be required to already own and use a cellphone that is able to access the application store (App Store, Google Play) of their specified device. Most of the visually impared community already have options for solving their navigation problems, but this app will stand above the rest due to its non-existent setup and maintenance cost from the user. Currently we have no name in this industry, but by sticking to our low-cost model people will not have any risks when trying our new technology.

3.2 Stakeholder Summary

Name	Description	Responsibilities
System Analyst	Works with other stakeholders to identify and compile their needs.	Leads and coordinates requirements elicitation and use-case modeling by outlining the system's functionality and delimiting the system; for example, identifying what actors exist and what use cases they will require when interacting with the system.
Requirements Specifier	This is a stakeholder that works with the Analysts to correctly translate requests/needs into requirements to be used for design.	Specifies the details of one or more parts of the system's functionality by describing one or the aspects of the requirements, this will include functional and non-functional.
Technical Reviewer	This is a stakeholder that must be involved regularly to maintain the development cycle.	Responsible for contributing feedback to the review process. This role is involved in the category of review that deals with the technical review of project artifacts. This role is responsible for providing timely, appropriate feedback on the project artifacts being reviewed.
Software Architect	This is a stakeholder that is primary for leading the system development.	Responsible for the software architecture, which includes the key technical decisions that constrain the overall design and implementation for the project.
Project Manager	This is a stakeholder that is primary for leading the system development.	Plans, manages and allocates resources, shapes priorities, coordinates interactions with customers and users, and keeps the project team focused. Also establishes a set of practices that ensure the integrity and quality of project artifacts.
Maintainer	This is a stakeholder that will modify and improve upon the given public version of the application.	Responsible for modifying current code for better optimization and efficiency, as well as addressing feedback and bugs from users and test cases.
Market Analyst	This is a stakeholder that will assist our abilities to position our product successfully.	Ensures that there is going to be a market demand for the product's features and for the new service.

3.3 User Summary

Name	Description	Responsibilities	Stakeholder
Visually Impared (Blind, Near-Sighted)	Primary end user of the system	Input map buildings, volume settings, emergency contact, start and end destination, starting navigation, pausing navigation, and ending navigation.	Self
Caregiver	Secondary end user of the system	Input map buildings, volume settings, emergency contact, start and end destination, starting navigation.	Self
Emergency Contacts	Indirect user of the system	Receives notification of emergency call to them in addition to user's coordinates, can provide additional help to the user.	Self

3.4 User Environment

The users will access Theia indoors from their handheld device, there is no way of accessing this app remotely. They will interact using the touchscreen, or the hardware buttons found on the device. The primary user will collaborate with the caretaker to setup and complete usage of the app.

Task cycles will be dependent on the distance of the user to their destination. Setting up the application to start navigation should take roughly 5 minutes to input room names, meanwhile starting up the actual navigation process will take roughly 25-30 seconds so the user may input their start and final destinations, while the application verbally repeats the inputs as confirmation, each process being roughly 5-7 seconds.

Most cellular devices have apps that run in the background. The only app that will need to be integrated with Theia will be any sort of music app. Theia will temporarily mute the music whenever Theia needs to alert the user. Additionally, if there is an incoming call or text message, our application will continuously run since incoming calls and messages will appear above the application.

The operating systems supported are: iOS and Android.
Future operating systems: Windows 10+, IPadOs, WearOS, WatchOS, FitBitOS.

3.5 Stakeholder Profiles

3.5.1 Visually Impaired User

Representative	Development Team
Description	An individual who will use the system to navigate the buildings they visit.
Type	A common user, has knowledge of the struggles they face. Might or might not have used any similar technology.
Responsibilities	Ensure that the proper utilities are implemented that allow them to use the system without being able to see the visual aspects. Ensure that their needs are being met to safely navigate throughout a building.
Success Criteria	Success is that the app is usable and will show this through continued use of our app.
Involvement	The stakeholder will be evaluating our system though iterations to confirm our implementations are satisfactory.
Deliverables	Final product
Comments / Issues	N/A

3.5.2 Sponsor

Representative	Bolong Zeng
Description	A non-user that will be evaluating the final product against the requirements and processes outlined in various project documentation.
Type	This is an expert who will know what is required to evaluate the final product.
Responsibilities	Ensure the product fits the specified system documentation. Evaluate final product for completeness and functionality.
Success Criteria	The stakeholder will view the project as a success if all requirements are met and the system functions as specified.
Involvement	Will be evaluating each iteration of the project and providing help along the development lifecycle.
Deliverables	Project Deliverable Phase 1 & Phase 2
Comments / Issues	N/A

3.5.3 Caregivers

Representative	Development Team
Description	A private individual that configures the app for use.
Type	This is a casual user who has no knowledge of the underlying system, but is an expert on the primary user allowing them to set up the app for the user correctly.
Responsibilities	Ensure that the proper settings are implemented that allow the user to operate without additional help.
Success Criteria	One time setup that provides all the necessary configuration possibilities needed by the user.
Involvement	The development team will simulate setting up the app as a caregiver.
Deliverables	Settings page.
Comments / Issues	Might have specific needs for their client.

3.6   User Profiles

See previous section (3.3 , 3.5). No extra users are provided here.

3.7   Key Stakeholder or User Needs

Need	Priority	Concerns	Current Solution	Proposed Solutions
User-friendly interface	High	Ability to provide accurate verbal instructions to the user and to allow the user to use the app through verbal commands.	None	Have an Alexa like bot to handle any verbal commands. Have each inquiry and instructions to also have a verbal counterpart.
Safe and reliable GPS	High	Ability to provide a navigation system that allows the user to travel safely and quickly to their desired location.	None	Provide object detection to avoid any possible danger, the ability for the GPS to connect to building map parsers for reliable and quick navigation, and small beeps to signal if the user is going in the wrong direction.
Emergency contact	High	Ability to provide a contact number for the app/user to use in case of danger.	None	There will be a clearly labelled section in the settings for an emergency contact number. If no number is put in, 911 will be used as default.
Easy setup	Moderate	Ability to provide a simple verbal and non-verbal setup for the user and the caretaker.	None	Everything that needs to be inputted will be in the settings area. Everything will be clearly labeled and will only require the simple step of inputting the required info.
Injury detection	High	Ability to detect whether the user has fallen to the ground and is unable to use the app/phone for help.	None	Utilize the gyro-sensors to detect if the user has fallen to the ground. In addition, the app will the user of their status immediately after it happens.

Object Detection	Moderate - High	Ability to detect whether or not any sort of object will be in the user's walking path. It will alert the user if there is any obstacle in their way.	None	Utilize the phone rear-facing camera to detect if there are any objects that could be in the way of the user.
Easy to Use	High	The user will have minimal queues as to what is happening on screen. The app will need to have a lightweight interface with hardware interactions available.	None	Hardware buttons for pause and stop navigation. Voice input for start and end destinations.
Responsiveness	High	Ability to respond within at most 2 seconds to commands or quickly provide navigation instructions. In addition, there will also be the ability app to immediately call the emergency contact once it detects user is injured and is in need of help (user has fallen and there is either no response or a call for help response).	None	It not relying on Wi-fi would decrease lag time
Configurable	Moderate	Ability to configure room definitions and emergency contact information.	None	Settings page to provide room dictionary and contact list.

3.8   Alternatives and Competition

3.8.1   Cane

A cane is an easily accessible alternative to our app. However, a cane can be lost or even break and become unusable yet it is easily replaceable. Additionally if lost, this cheaper alternative can become costly, especially if the person wants to buy a reliable cane. With a cane, the person does not have to rely on technology in any way. When coming into contact with an object, a cane can alert the person when it is bumped into someone. Does not provide any additional information than the users current immediate surroundings.

3.8.2   Guide Dog

A guide dog is an expensive alternative to our app. The dog is able to alert and communicate with the person in real-time, however there are certain communication abilities a dog cannot do. Additionally, the dog can tell the person when to stop and help assist in many different ways most of the other alternatives cannot do. Plus, there is a companionship between the visually impaired and the guide dog.

3.8.3   Caregiver

A caregiver is an alternative but it requires another human to take time out of their day to guide the user to the desired destination. With this alternative, it can become very costly depending on what the user's needs are. A caregiver can give great assistance to the user and is probably one of the best alternatives since the user can easily communicate with the caregiver.

3.8.4   Google Maps

Google maps is a free alternative to our app. Google maps does not provide as fine tuned directions but is robust and has many of the same features as our app. This cannot navigate inside buildings. There is no way for Google Maps to alert the user if there are obstacles or staircase in their path.

4. Product Overview

4.1 Product Perspective
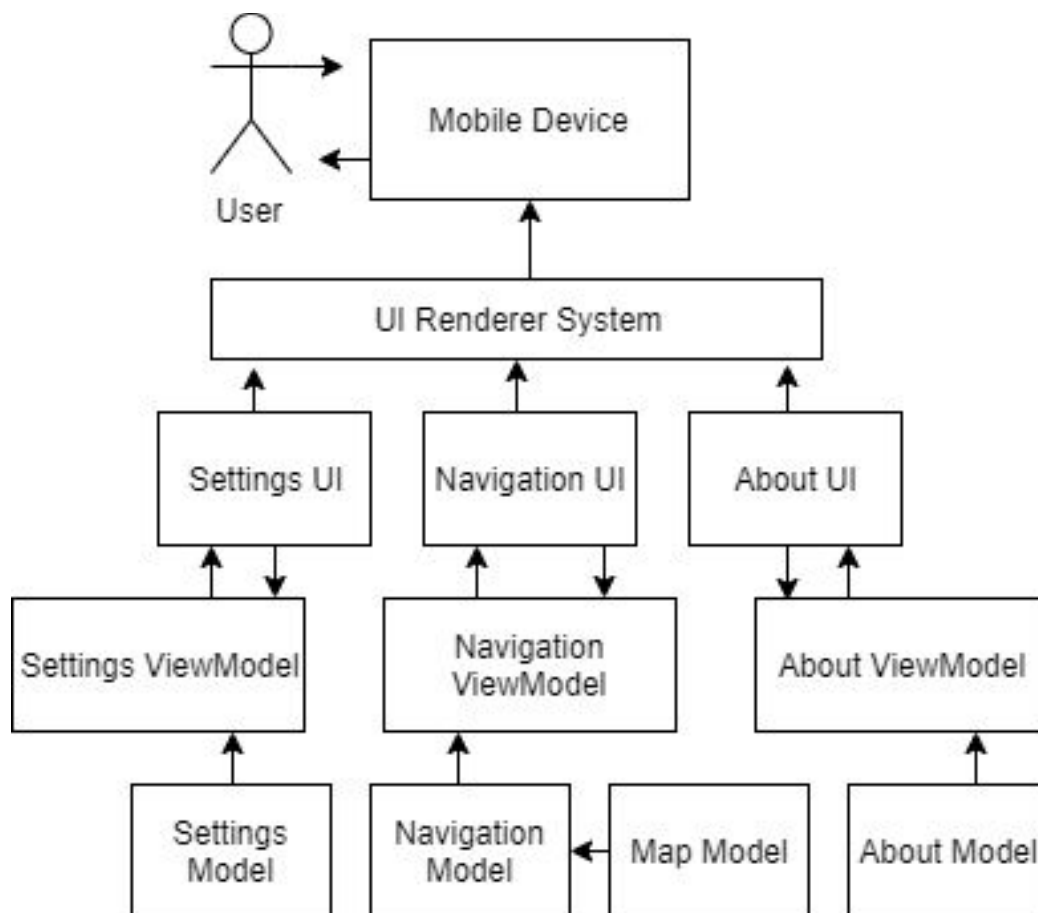
Figure 1. Overview of the Theia Architecture

4.2   Summary of Capabilities

Table 4-1   Customer Support System

Customer Benefit	Supporting Features
Access to Application	App store hosted application.
User-friendly interface	Verbal instructions, an AI bot that relies on verbal commands, provide a way to complete the setup verbally.
Ability to provide a safe and reliable navigation	GPS and map parser for a safe and reliable navigation for indoor buildings, object detection to avoid any possible obstacles in the way.
Injury detection	Gyro-sensors to detect the status of the user. In case of injuries, the app will also call the emergency contact number.
System responds quickly	The application responds directions and voice output in an efficient runtime manner.
Navigate through building	Map parser and GPS for indoor navigation.
Accessible settings	Changing the volume of the voice output, setting room name profiles, making the settings straight forward on one page.
Accessible color scheme	Colors on screen are compliant with the ADA specifications for color schemes in applications.
Hearing spoken directions	Speech output throughout navigation alerting user on current direction they should be travelling in.
Easily start and stop navigation	Hardware buttons used to start or stop navigation which allows for the user to feel the buttons they need to press.
Offline usage	The app will not need to have an internet connection during navigation.
Can change destination mid-navigation	The user can pause mid-navigation in order to access the 'Change Destination' option if they need to use it.
Room Profiles	During setup, the user can input their own set of maps and customized setting for their daily travels. Each new user has their own Room Profile.

4.3   Assumptions and Dependencies

Latest Android and IOS version will continue to support xamarin applications

Users will have additional help setting up application

Buildings will not change room locations

User will be in the correct building

Device hardware buttons are functional

The user has the ability to speak commands

The user has the ability to hear application alerts

Emergency contacts are in service numbers

App will be able to successfully call the emergency contact number and 911

Device has cell service provider

Device will have enough battery life

Device supports gyroscoping

User will be able to read the user manual

User will not exit the app during navigation

Navigation will not stop suddenly

4.4   Cost and Pricing

This app will be on Apple App Store and Google Play for $5.00

4.5   Licensing and Installation

Installation will be done through the Apple App Store or Google Play. It will require an active account on one of those. Someone will need to assist the visually impared user with configuring settings.

5.   Product Features

The following features relate to the system running.

5.1   Start System

Both the user and the caretaker need to be able to start and set up easily, whether by themselves or with each other.

5.2   Shutdown System

Both the user and the caretaker need to be able to exit out of the app, whether by themselves or with each other.

The following features relate to the process of configuring the settings, such as default rooms and emergency contacts.

5.3   View Settings

Settings will ask for a starting location and destination. Additionally, there is a voice volume, import map, room profiles, recalibrate GPS, recalibrate step-length, and emergency contacts.

5.4   Add Room Definition

5.5   Modify Room Definition

5.6   Delete Room Definition

5.7   Add Emergency Contact

5.8   Modify Emergency Contact

5.9   Delete Emergency Contact

5.10   Add Map

5.11   Delete Map

The following features relate to the process of navigating.

5.12   Enter Starting Location

5.13   Modify Starting Location

5.14   Enter End Location

5.15   Modify End Location

5.16   Start Navigation

5.17   Pause Navigation

5.18   Display Navigation Arrow

5.19   Display Navigation Text

5.20   Output Navigation Direction Speech

5.21   Volume up to start navigation

5.22   Volume down to end navigation

The following features relate to the process of viewing the navigation

5.23   View Navigation

5.24   View Upcoming Direction

5.25   View Navigation Screen

5.26   View Settings Button

5.27   View Progress of Navigation

6. Constraints

6.1 Security

Secure GPS connection
Application permission requests
Secure HTTP requests to obtain online maps
Secure map database
Secure data storage
Encrypted contact numbers

6.2 Usability

Easy-to-use (especially for navigation and setup)
Every instruction, inquiry, or setup will also have a verbal counterpart.
There will be an AI bot that responds to verbal commands and asks questions if needed.
Saving setting configuration

6.3 Responsiveness

System does not need to rely on Wi-fi for it to work.
System responds within 2 seconds to user commands, whether verbal or on screen commands.

6.4 Capacity

Maximum number of emergency contact is 5 (with one number being the primary contact).
Maximum number of starting location is 1.
Maximum number of end location is 1.
Maximum number of people for profile is 1.
Maximum number of room definitions is 10.

7. Quality Ranges

Traits	Quality Range
Performance	The quality range for performance ranges from having little lag/ no lag in performance to having a good amount of lag each time the app is used.
Fault tolerance	The quality range for fault tolerance ranges from being able to work without interruption when multiple components fail to inability to work without interruption when multiple components fail.
Usability	The quality range for usability ranges from being able to successfully use the app on the first try to needing online help and multiple unsuccessful attempts.
Reliability	The quality ranges from getting the user to their desired destination 9/10 times to occasionally getting the user to their desired destination.

8.   Precedence and Priority

1. The setting features for the Start System is the most important. This is because it includes the emergency contact and the main tools for the navigation. With the emergency contact, it'll help increase the user's overall safety while using the app. With the Map Parser and Room Profile, it'll help set up the navigation for indoor buildings while taking into consideration the user's habits/schedule.
2. The navigation features for the Navigation System is the second most important. Without the navigation features, there is no app. As such, after completing the setup needed for the navigation, the features for the main part is the second most essential. The features include the GPS for the indoor navigation, verbal,written, and drawn instructions, the ability to pause, resume, cancel, or view the navigation, and being able to modify different destinations.
3. The main system features that take the least priority is the Shutdown System features. This is mainly because the features for every other system outweighs the features for this system in priority due to not being needed for navigation.

9.   Other Product Requirements

9.1   Applicable Standards

The applicable standards that apply to the product are: **FDA, UCC, TCP/IP, the FFIEC, ISO, HIPAA, Windows, Apple, ADA, and UL**.

9.2   System Requirements

The user must have a cellular device that either supports Android or Apple's IOS. Additionally, the cellular device must have enough GB on their device in order to download the application from Google Playstore or Apple's AppStore. Functional GPS and accelerometer hardware in phone. Active cellular plan to make phone calls to emergency contacts.

9.3   Performance Requirements

The user must be able to keep their location on and have cellular service in order for the app to function properly. If the user is using Wi-Fi, the app should run properly without any issues. The user should give the app permission and access to the phone's microphone, camera, and gps. The application will be able to support one current map. The tick rate of the application will be less than 150 milliseconds to update step count and load the updated direction to the directions. Speech will be output every two ticks or on direction updates. The speech volume will be able to be scaled from the settings menu. The accuracy of the directions will be broad and turns will require the user to make their path wide enough to not run into any walls parallel to them. In addition, each new instructions will come within ~1-2 seconds of each previous insruction's completion. During times of emergency, the app will wait up to five seconds for a response before calling the emergency contact and 911. This is to ensure the user's safety. Afterwards, the app will immediately, within ~1-2 seconds, send a request for help, the user's name and coordinates to the emergency contact and 911. This will be sent properly without any issues.

9.4   Environmental Requirements

For hardware-based systems, the environmental requirements will need to include:

- Water-proof phones, as user may travel during rainy days. In addition, the user may accidentally drop their phone in a puddle of water while walking.
- Decent shock absorption, in order to withstand the possible falls both the user and the phone might take.
- Be able to withstand decently high temperature - while the app does not need Wifi, it is still good to have some leeway in case the phone does reach a high temperature while using the app.
- Reliable battery life as the app is vital for traveling. It would not be good if the battery life drained quickly

while using the app.
- Be able to withstand high enough temperatures in case the user utilizes the app often due to reasons such as work.

For software application, the environmental requirements will need to include:

- GPS availability for navigation purposes
- Storage space (Application, map, settings) for both the app's and user's needs
- Good error handling and recovery in case an error happens during navigation.

10.   Documentation Requirements

10.1   User Manual

1.A.   Purpose of the User Manual

The purpose of the user manual is to be able to understand what the application is, its purpose, and how to utilize it in an easy-to-understand way. The contents will contain a variety of vital information, from an introduction to what the app is and its purpose, to a section explaining its features and how to use it, to a tutorial on the app, and then a section containing various questions the user might ask. The detail needs to be at a decent level - the user should have some information on how the app and its features work as it is going to be used as an important tool for travel. There is a need for index and glossary of terms for ease of use and in case the user does not know a certain term. Length will most likely be medium sized, as it is crucial to include as much information as possible so that the user understands the app well.

For the user manual, a tutorial will be included as opposed to reference manual strategy. A tutorial will be more straightforward and quicker way for people who want to simply learn how to use the app. A reference manual strategy might take more time and may be more difficult for younger users to use.

For formatting constraints, the user manual needs to have a specific structure. For example, Frequently Asked Questions should be at the end and not at the beginning, where the user is just starting to learn about the app. The format should follow this sort of structure:

- App Introduction
  - Welcome
  - Overview
  - Features
- Getting Started
  - System Requirements
  - Tutorial
  - Getting Help
- Frequently Asked Questions
- Warnings

For printing constraints, the user manual needs to have bigger font than usual, most likely 14 size. The font will also have to be something that is easy to read, such as Times New Romans. In

addition, there also needs to be a braille section as our primary audience are people who are visually impaired.

1.B.   Warnings

Because the app is for the visually impaired, it is important that we ensure that they are able to travel the route safely and accurately. Thus, we will be utilizing two different vibration/sounds as safeguards: One to tell the user that they have reached the right stop in their navigation and another to signal that they are too far-off from their route.

In addition, in cases of emergencies, the app will contact the emergency contact first, then 911. This is to ensure the user's safety no matter what happens. The app will send the user's name and coordinates when calling both the contact and 911 so that both parties have all the required information.

1.C.   Diagram of the interface
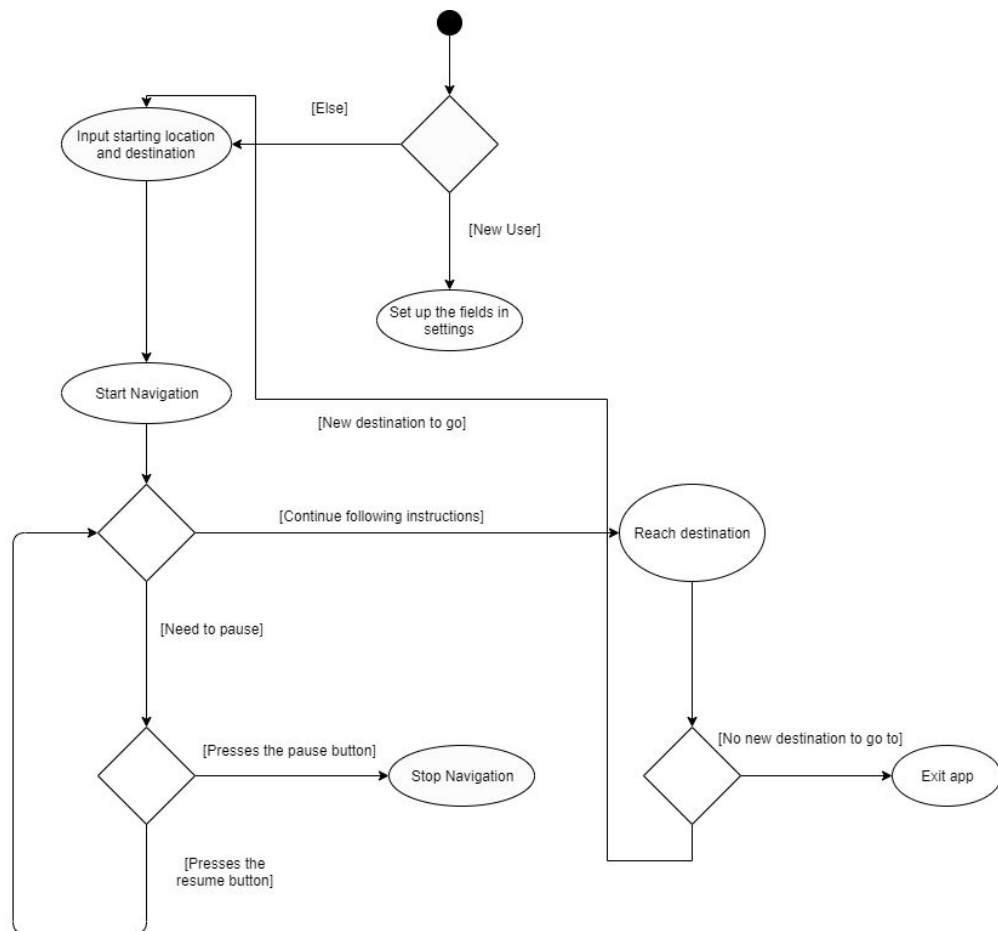
1.D.   Instructions

1. In order to get started, first go to settings.
2. Input the maps you want to use, room profiles, and emergency contacts.
3. Input the Starting Location and Destination.
4. Adjust Voice volume and recalibrate when needed.
5. Follow voice commands/commands on screen.
6. Press Start Navigation to start your journey
7. Press Pause Navigation to pause your journey
8. Press stop in order to fully stop your journey or resume to go back to it
9. Once the destination is reached, the app will ask if the user wants to travel to a different location
10. Press yes to insert a new destination or no to cancel.

10.2   Online Help

Online help system for this project will include these features:

- Improve user-friendliness of the app
- Increase customer satisfaction
- Decrease confusion and ambiguity on the customer's end

The system will be much like the user manual. It will include an overview, a list of features with brief explanations, and a tutorial on how to get started and how to use the app. In addition, it'll include a Frequently Asked Questions section in order to help the user with any common questions they might have. It'll also include the user manual for people who want more specific details about the app and a diagram and labels for each part of the app's interface. In addition, there will also be a Features section that has explanations for each feature and how to access/use them.
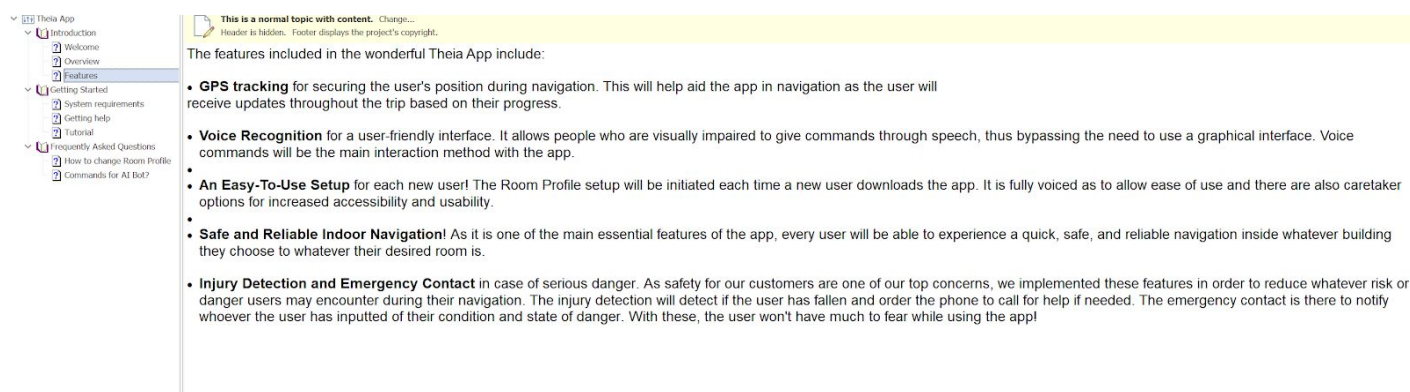
There will also be a list of contacts that the user can use if they have any further questions. The contacts include the official team support email and the official phone number. In addition, there will be a list of updates that'll help let user know what has been changed/improved/updated. The app will notify the user verbally and through a pop-up message after each update.

The user manual will also come in braille for the users and will also have a voiced counterpart that will be included in the settings page.

10.3 Installation Guides, Configuration, and ReadMe File

In order to install the app, one must have a working system that is compatible with it. This includes Androids and iPhones. In addition, the app only works on Android 6.0 and iPhone and iOS 10.The app can be found either in the Apple App Store or Google Play Store. After downloading the app, the user will go through a setup - inputting their user profile for the app and customizing their own settings. After that, the user is ready to start using the app by imputing start and end locations, navigating back to the home page and pressing the start button or the volume up hardware button.

ReadMe file

To control the Prototype of Theia, the user will need a caregiver to navigate to the settings page by selecting the three lines in the top left of the landing navigation page. The settings page has a functional 'Building' entry field that will need to be entered with "Test map" to run the loaded map for the prototype.

The navigation 'Start' button now will run the preloaded map and navigate the user through the premade path. The 'Navigation' will tell the user to go face in a Primary InterCardinal direction, then direct them to continue to move until a turn comes up in which they are expected to round their turn until the app tells them to resume moving straight until they have come to their destination.

At any time the user can click the stop button and it will pause the navigation until start is then clicked to resume from the paused direction.

The app at this version runs off time instead of user steps. GPS is not currently implemented.

- Compatibility issues:
    - The Theia App is not compatible with old smartphones that do not have specified system requirements.
    - Not all screen sizes correctly scale.
- What's New With This Release:
- The known bugs included in the app are:
    - Non-functional room entry.
    - Directions not tracked by GPS.

10.4 Labeling and Packaging

The app should include industry standard menu systems with standard symbology and written language used in order to be as intuitive as possible. When the user starts the app for the first time they will be asked to input some basic information such as emergency contact information for example. After the correct information has been input and the user wants to use the app in order to get around, the app allows for easy navigation with large symbols and buttons that are easy for the user to press.

A   Feature Attributes

A.1   Status

Proposed	Object Detection, navigation rerouting, multiple buildings, map database, variations on speech output voice, support for other languages.
Approved	Emergency contact, reliable and safe GPS, map parser, user-friendly interface/instructions, user emergency detection, easy user-setup.
Incorporated	Easy-user setup, reliable and safe GPS, user-friendly interface/instructions, user emergency detection

A.2   Benefit

Critical	Critical features include: GPS tracking, room profiles, user-friendly interface for the visually impaired, injury detection, emergency contact in critical scenarios, and reliable and safe indoor navigation.
Important	Caretaker options, object detection, AI bot for guidance, GPS taking into consideration the user's daily habits.
Useful	Being able to change the route mid-navigation

A.3   Effort

Features	Time Spent	Team Members Assigned
Settings	One week	Chris Young
Navigation Page	Two weeks	Chris Young, Cole Trinh
GPS	A week	Chris Young, Cole Trinh, Taryn Burns, Sean Luchessa, Anne Lin
Voice Commands	N/A	N/A
Documents	Three-Two Weeks	Chris Young, Cole Trinh, Taryn Burns, Sean Luchessa, Anne Lin

A.4   Risk

Possible risks to the successful implementation of the project includes:

1. New requirements added. There may be new requirements we need to add due to unforeseen scenarios. (**risk: medium**)
2. Changing baseline requirements. The chance of this happening is low but like the first risk, there may be stakeholders who want a different design or a change in one of the baseline requirements. (**risk: low**)
3. Uncertain goals. The chances of this happening is low due to everything laid out in the Requirements Plan and Specification documents. However, some requirements may be broad and ambiguous, such as *User-friendly app.* **(risk: low)**
4. Schedule delays. Unexpected project/real life obstacles make the chance of this risk rather high. Even if one plans out everything perfectly, there'll always be a chance that something unexpected

might happen. **(risk: high)**

A.5   Stability

Our project is relatively stable. However, the calculated creep rate is 20.5%. The features most likely to change are: user-friendly settings and interface and how directions are given. However, the changes will most likely be small and not include anything that changes the features too much from their intended purposes. Because of this, our priority will be focused on getting those features finished and thus, out of the way first instead of saving them for last. After we finish those specific features, we will move onto the tools/requirements that support those features. Additional elicitation may be needed for the settings, interface, and for how the directions are given. It is crucial that we securely define what is needed for those features so that time and effort are not wasted.

A.6   Target Release

The product is a phone app specifically designed to help the visually impaired navigate their way indoors. For the release, the app will include all of these features:

1. GPS navigation for a safe and reliable travel indoors. **Status: Incorporated | Target Release: Initial launch date**
2. Voice commands and verbal instructions for a user-friendly interface **Status: Incorporated | Target Release: Initial launch date**
3. A 'Room Profile' for each user so they can have their own customized routes for their daily schedules. **Status: Not yet incorporated | Target Release: First app software update**
4. An emergency contact that the app will call in case the user is in a dangerous situation. **Status: Incorporated | Target Release: Initial launch date**
5. The ability to change directions mid-navigation in case the user needs to go somewhere else. **Status: Not yet incorporated | Target Release: First app software update**

A.7   Assigned To

Name	Project Role	Responsibilities	Area Presented
Christopher Young	Team Leader	App development, Documentation, Tasking	Navigation, Settings
Taryn Burns	Developer	App development, Documentation	Advantages and Disadvantages of App, Settings, Navigation
Cong Trinh	Developer	App development, Documentation	UI, Navigation
Sean Luchessa	Developer	App development, Documentation	UI, Phone dialing
Ann Lin	Developer	App development, Documentation, Scheduling	Phone dialing, Software requirements

A.8 Reason

Requirement	Reason(s)
Efficient Directions through GPS	Essential feature of the app. Without it, there would be no app. Is needed for the safe and reliable indoor navigation for the visually impaired users.
User-friendly interface	Since the primary audience is people who are visually impaired, it is crucial to have an interface and app that they can use without any difficulties.
Emergency Contact/Reporting	Important for the user's safety. Because they will be using our app, we need to ensure that in case of dangerous scenarios/injuries, we can help guarantee the user's safety and reduce whatever risk or harm that might befall them.
Map Parser	A tool to add the GPS tracking function of the app. With the map parser, users can navigate indoors of any building they want. As long as the building map is provided, the GPS can utilize that map to provide the safest and reliable route indoors.
Caretaker Options	Due to caretakers being one of the stakeholders and possibly a secondary user, it is important to have these options in case it is needed for a user with a caretaker.
Easy Setup	Through the use of verbal commands and caretaker options, the user will be able to easily set up the app in order to use it right away. This is a feature that will add to the user-friendliness of the app.