

# **Project Management Plan**

*Phase 1*

## **Theia: Navigation App for Blind & Visually Impaired People**

**Prepared by GO BEARS**

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**Washington State University: CPTS 484**

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## Revision History

Name	Date	Reason for Changes	Version
	9/4/2025	initial draft	1.0 draft 1
All Members	9/14/2025	Completed preliminary plan	1.0 draft 2

# 1. Overview

## 1.1. Project Purpose, Objectives, and Success Criteria

The goal of this project is to create Theia, a smart phone application for blind and visually impaired people to be able to navigate from one location to another. There are no mainstream applications that assist with indoor navigation. Thus, we aim to develop an application which can assist blind and visually impaired users to be able to navigate safely from one location to another within a single building.

Using this app, our target users will be able to enter an indoor destination, and the app will provide real-time verbal directions while avoiding obstacles on the way. Additionally, the app will be adapted for the use of visually impaired people, having features such as voice recognition and audible feedback. For additional safety, another feature of this application is emergency contact to caregivers.

## 1.2. Project Deliverables

Deliverable	Delivery Date	Delivery Method	Comments
Presentation		In-Person/Canvas	<ul style="list-style-type: none"><li>- Includes 3 pairs of AS-IS and TO-BE scenarios</li><li>- Creeping rate using Function Points calculations</li><li>- Project Pitch</li></ul>
WRS document	Oct 12	Canvas	<ul style="list-style-type: none"><li>- Analysis of informal requirements (recognize ambiguity &amp; incompleteness)</li><li>- Clarified version of the preliminary definition of our app</li></ul>
Prototype		Canvas	<ul style="list-style-type: none"><li>- Design concept</li></ul>
User Manual		Canvas	<ul style="list-style-type: none"><li>- Preliminary user manual</li></ul>
Project Plan		Canvas	<ul style="list-style-type: none"><li>- This current document, which will be maintained throughout and updated as required</li></ul>
Meeting Records	After each meeting	Discord Channel	<ul style="list-style-type: none"><li>- Meeting notes describing time, roles, activities, outputs</li><li>- Will later be complied in the WRS document</li></ul>

### **1.3. Assumptions, Dependencies, and Constraints**

#### *Assumptions*

AS-1: Users own a smartphone with accessibility features and are familiar with the operation of that smartphone.

AS-2: Users are able to navigate the building and are able to operate an elevator.

AS-3: Users are able to operate the app concurrently with other accessibility tools such as canes and guide dogs.

AS-4: The application is only used in an indoor environment, to navigate between one room to another.

AS-5: Obstacles are assumed to be static, as such the app is unable to detect moving objects.

AS-6: Each room is equipped with Beacons (sensors) which the app can detect to estimate the users location.

#### *Dependencies*

DE-1: Core functionality is dependent on the Beacons equipped in each room of the building.

DE-2: Application is dependent on the hardware and software features of an average smartphone.

#### *Constraints*

CO-1: Navigation can only be used from one room to another but is unable to navigate within a room.

CO-2: The application will only be developed in English, requiring users to be fluent enough to be able to navigate the app and understand instructions.

CO-3: The application is bound by the limitations of commercially available smartphones since no custom hardware or software will be developed.

CO-4: This application is designed for blind and visually-impaired users who are able to hear and speak, and so is not suitable for users with other disabilities.

### **1.4. References**

Cpt\_S 484 Team Project Specification Phase I,

[https://wsu.instructure.com/courses/1844402/pages/team-project-phase-i-documents?module\\_item\\_id=24039396](https://wsu.instructure.com/courses/1844402/pages/team-project-phase-i-documents?module_item_id=24039396)

GitHub Project Repository, <https://github.com/hkgarcia/484-project-theia.git>

Google Indoor Maps, <https://www.google.com/maps/about/partners/indoormaps/>

Google Maps Platform, <https://developers.google.com/maps/?hl=en>

Microsoft Soundscape, <https://www.microsoft.com/en-us/research/product/soundscape/>

Microsoft Soundscape GitHub, <https://github.com/microsoft/soundscape>

SwiftUI - Apple Developer, <https://developer.apple.com/swiftui/>

World Assumptions Masterlist,

[https://wsu.instructure.com/courses/1844402/pages/team-project-phase-i-documents?module\\_item\\_id=24039396](https://wsu.instructure.com/courses/1844402/pages/team-project-phase-i-documents?module_item_id=24039396)

## 2. Project Organization

### 2.1. Process Model

Our team will be using the spiral model to develop our project. Through its iterative nature, it places an emphasis on reducing risks as requirements are evaluated for future iterations. This makes this model a great option, as our team estimates software requirements and handles risks throughout development.

### 2.2. Organizational Structure

The members in our team are Trisha Teredesai, Hannah Garcia, Akalya Sridharan, Giri Vignesh, and Ishaan Joshi. Our Communication Liaison will be Trisha Teredesai. All of our members will be both Developers and Documentation Authors throughout the project.

### 2.3. Roles and Responsibilities

- ***Project Manager - Trisha Teredesai:*** The Project Manager will lead the team by assigning tasks and providing guidance throughout the software development process. They will additionally plan projects in detail and serve as the communication liaison.
- ***Product Manager - Giri Vignesh:*** The product manager is responsible for overseeing the schedule and duties, deciding which features take priority, and tracking risks to ensure steady project progress. They will also organize user testing and direct improvements to enhance both safety and usability. In the end, the product manager's role is to guarantee that the app is functional, dependable, and truly supportive for blind users.
- ***Requirements Analyst - Hannah Garcia:*** The Requirements Analyst acts as the liaison between the software engineers and the client, ensuring that the project being developed fits the client's specific, highlighted needs.
- ***Software Engineer - Ishaan Joshi:*** The Software Engineer is in charge of designing, developing, testing, deploying, and maintaining software applications. In our project, the Software Engineer will be contributing to the development of the mobile application and its unique features.
- ***Software Architect - Akalya Sridharan:*** The Software Architect is responsible for designing the high-level organization and overall structure of Theia.

- ***Quality Assurance Manager - Trisha Teredesai, Hannah Garcia:*** The Quality Assurance Manager(s) will oversee the activities of quality assurance in our project. They will develop, implement, and maintain a system that tests the quality and reliability of our product.

As Phase I focuses primarily on documentation over development, our team will split up our responsibilities accordingly to conduct preliminary research and deeper analysis of the project requirements. For each document, each team member will be assigned as the following:

Document	Responsibility	Team Member
<b>Presentation</b>	Create slides of AS-IS and TO-BE scenarios	Trisha
	Calculate creeping rate using Function Points calculations	Giri
	Pitching and presenting the project (in-person or online)	All members
<b>WRS Document</b>	Analyze informal requirements, recognizing and documenting ambiguity & incompleteness	Hannah
<b>Prototype</b>	Design and create a simple prototype, or mock-up, of the smartphone app.	All members
<b>User Manual</b>	Create and maintain a preliminary user manual of the smartphone app.	Ishaan
<b>Project Plan</b>	Maintain and update the project plan (this document) throughout the project life cycle.	Akalya
<b>Meeting Minutes</b>	Create meeting notes to describe time, roles, activities, and outputs.	Hannah

### **3. Managerial Process Plans**

#### **3.1. Management objectives and priorities -**

The primary objective of this project is to develop a mobile application that enables blind individuals to safely and efficiently navigate indoor environments by detecting obstacles and providing real-time guidance. From a management standpoint, the team's work will prioritize user-centered design by engaging with blind users throughout development to ensure accessibility and ease of use. Responsibilities will be divided across sub-teams focusing on mobile app development, obstacle detection through sensors or computer vision, UI/UX design with voice and haptic feedback, and rigorous testing for safety and reliability.

#### **3.2. Assumptions, dependencies, and constraints**

A key assumption guiding this project is that the end users are visually impaired and therefore unable to rely on traditional screen-based interaction or typing, which necessitates designing the application around voice recognition, audio feedback, and continuous active listening. The project also depends on the availability and reliability of mobile device sensors, camera systems, and voice-processing APIs to enable accurate obstacle detection and seamless communication with the user. Constraints include the need to ensure the app operates in real time with minimal latency, functions effectively in varying indoor environments with different lighting or noise levels, and complies with accessibility standards while remaining lightweight enough for mobile devices.

#### **3.3. Risk management**

<b>Number</b>	<b>Risk</b>	<b>Type</b>	<b>Likelihood</b>	<b>Description</b>
1	Mobile app malfunction through failed detection	Technical/Safety	Medium	If the app fails to detect obstacles or crashes during use, it could result in harmful injuries to the user. <b>To monitor and control this risk</b> , we can conduct regular testing and contingency plans are needed.
2	Wrong directions given to users	Technical/Safety	Medium	Incorrect navigation instructions could cause users to collide with obstacles, leading to serious injuries. <b>To monitor and control this risk</b> , we can provide backup instructions and user support.

3	Potential lawsuits due to user injuries	Legal/Financial	Low-Medium	Injuries caused by app errors could result in legal action against the developers. <b>To monitor and control this risk</b> , we can ensure compliance, thorough testing, and clear disclaimers are required.
4	Unidentified risks during development	Project/Process	Medium	New risks may arise during development. <b>To monitor and control this risk</b> , we can conduct continuous testing, monitoring feedback, and risk tracking by the project manager.

## 4. Technical Process Plans

### 4.1. Methods, tools, and techniques

For the smartphone app, we can use Apple's SwiftUI to build apps across Apple platforms with the help of their tools and APIs. SwiftUI has several resources to reference, including tutorials, documentation, and integration using the Xcode IDE for Apple platforms. SwiftUI is a great option for establishing the basic foundation of our project. Additionally, SwiftUI can be integrated with other frameworks and tools, allowing users to add more features to our base foundation. This can include tools we need to assist with detecting obstacles, collisions, or even falls and lost connections. As our team learns more about SwiftUI, we will continue to refine the tools that are available to us.

Microsoft Soundscape “explores the use of innovative audio-based technology to enable people to build a richer awareness of their surroundings, thus becoming more confident and empowered to get around” (Microsoft Soundscape). Through its 3D audio cues, Soundscape aids users in building a mental map and routes to get around, even in unfamiliar environments. Soundscape contains several helpful features, including audio-based guided routes, street previews, head tracking, and more. A subset of Soundscape is available on GitHub as an open-source project, allowing for future utilization that we can use in our project to address all of our audio needs.

For the navigation and mapping portion of our smartphone app, we can integrate Google Maps into Theia through the Google Maps API. As Google Maps offers an indoor map feature, users can use in-app maps to easily navigate to their destination. This will fulfill requirements related to navigation, such as finding the best route to reach the user’s destination.

For communication, our team will be using Discord. We will have our code and team information stored on GitHub. Lastly, we will use Google Drive to collaborate on documentation throughout the project phases.

## 4.2. Software documentation

For Project Phase I, we are mainly expected to complete and refine software documentation to aid the development of our app. This includes the following documents, listed in the table:

Document	Template or Standard	Created By	Reviewed By	Target Date	Distribution
<b>App Prototype</b> <i>A simple prototype, or mock-up, of the smartphone app. Can be a concept drawing, a GUI demonstration on phone, etc.</i>	Custom/ Created by the team. More info will be added as we work on the project.	N/A	N/A	Oct 12	N/A
<b>User Manual</b> <i>A preliminary user manual of the smartphone app is expected for Phase I. By the end of Phase II, it is expected to be complete and consistent at the end of Phase II.</i>	Custom/ Created by the team. More info will be added as we work on the project.	N/A	N/A	Oct 12	N/A
<b>Project Plan</b> <i>This current document is the preliminary submission. Throughout Phase I, we are expected to update our plan</i>	The Preliminary Project Plan Template (via Canvas) will be used	N/A	N/A	Oct 12	N/A

<i>consistently, ensuring it stays timely and accurate.</i>	and refined over time.				
<b>WRS Document</b> <i>Analysis of informal requirements, recognizing ambiguity &amp; incompleteness.</i>	The WRS Document Template (via Canvas) will be used and refined over time.	N/A	N/A	Oct 12	N/A
<b>Presentation</b> <i>Slideshow of three pairs of AS-IS and TO-BE scenarios, the creeping rate the team can handle, and why our team's product would be the best.</i>	The Presentation Slides Template (via Canvas) will be used and refined over time.	N/A	N/A	Oct 12	N/A

Note that other expected deliverables include meeting records. However, as they are not directly connected to the software development of the app, it is not listed in this section.

Additionally, note that the “Created By” and “Reviewed By” columns are marked as “N/A” for now. As we first approach and learn more for our project, we will collaborate together when completing each document. We will later decide whether or not we will be leaving specific documents to each member.

## 5. Work elements and schedule

This project is scheduled to be completed by Week 15: December 1st to December 7th. Project Phase I will be completed by the due date, October 12th. Project Phase II will be completed before the final demo in Week 15.

The roadmap of the project is highlighted below:

- **Planning (2 weeks):** 9/15 - 9/28

- Component, Software, & Tool Research (9/15 - 9/21)
- Problem & WRS Analysis (9/22 - 9/28)
- **Development (6 weeks): 9/29 - 11/9**
  - Infrastructure & Documentation
    - Prototype Development (9/29 - 10/5)
    - Presentation Slides Creation (10/6 - 10/12)
      - *End of Phase I.*
  - Smartphone UI Development
    - SwiftUI (10/13 - 10/19)
    - Google Maps Integration (10/20 - 10/26)
    - Microsoft Soundscape Features (10/27 - 11/2)
    - Other Features: Camera/Motion Detection, etc. (11/3 - 11/9)
- **Component Testing (1 week): 11/10 - 11/16**
  - Unit Testing (11/10 - 11/16)
  - Requirement Validation (11/10 - 11/16)
- **Deployment, Integration, & Systems Testing (1 week): 11/17 - 11/23**
  - Test Smartphone UI Flow (11/17 - 11/23)
  - Test Navigation & Audio Flow (11/17 - 11/23)
  - Accessibility Testing (11/17 - 11/23)
  - UI/UX Refinement (11/17 - 11/23)
    - **Thanksgiving Break: 11/24 - 11/30**
- **Prototype Presentation & Demo: 12/1 - 12/7**
  - *End of Phase II.*