

# SE 4351 Requirements Engineering, Fall 2025

## Project Phase I: Requirements Elicitation: Initial Understanding

- Interim submission (PPT) & presentation: September 30 (Tuesday)/October 2 (Tuesday)
- Final submission of the deliverable: October 9 (Thursday)

*The hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements, including all the interfaces to people, to machines, and to other software systems. No part of the work so cripples the resulting system if done wrong. No other part is more difficult to rectify later. [Brooks, 1987]*

### I. Summary

Un sighted (i.e., blind) people should be able to navigate indoors, from one location in a building to another location in the same building or a different building. For example, a blind student or a blind visitor may need to go from one classroom to another classroom, from one office to a lab, from a lab to a classroom or a washroom, etc. For reaching the destination location, a blind person may need to figure out what the source (starting) location is, walk in the hallway, turn at the right place, continue to walk, and stop at the destination location. Safety would be an importance concern, which implies, for example, detecting obstacles and avoiding collisions. The time that it takes to reach the destination might also be a concern, especially if there isn't much time available to reach the destination. Familiarity with the route to be taken may also be a concern, among other things.

Blind people traditionally have used a dog, a cane, possibly with the help of braille indicators on the wall – often times beside doors. These aids may be used together, since they could be complementary to each other. There seems to be a great need for blind people to have some aid that can think, see, hear and speak.

Your team is to build a smartphone app for helping blind people navigate indoors. Here, the primary task is to come up with requirements models and a specification for the app, accompanied by a prototype implementation (The generic name for this app is Theia – the Greek goddess of vision, but your team can come up with your own).

### II. Theia: Preliminary Definition

#### II.1 The Domain, Stakeholders, Functional and Non-Functional Objectives

For this smartphone app, the *domain* will be indoors, which can consist of multiple floors, each floor possibly hosting classrooms, offices, washrooms, lounges, elevators, etc..

The primary stakeholder would be a blind person who needs to navigate indoors. Secondary stakeholders might involve a caretaker (an assistive person) – e.g., a family member - who sets the configuration of the smartphone app and come to aid the blind person in case the blind person is lost or injured. Secondary stakeholders might also include people at the accessibility department and the police, this especially in an emergency situation.

Functional objectives would include foremost navigating indoors, primarily going from one location to another location in the same or different buildings that are connected to each other.

Non-functional objectives would include safe navigation, fast navigation, and comfortable navigation. Since the app is for blind people, usability or user-friendliness would also be an important objective, since a blind person cannot read the screen of a smartphone app, especially concerning the capability of voice recognition.

For both functional and non-functional objectives, use of as many sensors that are available on an advanced smartphone would likely lead to a more helpful smartphone app.

## II.2 Software System Requirements: Functional Requirements

Your smartphone app shall assist blind people by offering multiple features, including:

- Accepting from the user the destination location to go (The system might even suggest or confirm a possible destination location, utilizing the user's routine schedule or habit),
- Figuring out and telling the user which routes can reach the destination location, and accepting the user's preference,
- Telling the user to walk a distance (e.g., 2 minutes to reach a turning point, 30 steps to take),
- Telling the user to stop at the right place to turn,
- Detecting obstacles and telling the user what to do in order to avoid collision,
- Placing emergency calls and messages, possibly after detecting a fall or when the system cannot figure out the current location,
- Figuring out what would be the next action(s), based on the user's schedule or habit, and suggesting and accepting the user's choice).
- .....
- 

## II.3 Software System Non-Functional Requirements

For blind people, non-functional requirements may be more important to achieve than functional requirements. NFRs would include:

- The system shall help the user *safely* navigate indoors;
- The system shall lead the user through the *fastest* route;
- The system shall lead the user through the route the user would feel the *most comfortable* with;
- The system shall be *usable*;
- The system shall be ubiquitous;
- The system should be *customizable* to every user (e.g., the volume, the interval at which the system says something, the order whereby different things the system says, etc.)
- The system should be easily *extensible* to accommodate the following typical variations: variations in interface, language, definitive needs of the user, new features, new sensors and hardware etc.

### III. The Deliverable

Your description should be elegant and comprehensible. Your deliverable should be available as both on-line (one URL per team member) and offline specifications (submission of one copy per team). You are to use the [WRS template](#) for your deliverable, and also for the primary organization of your presentation (plus AS-IS and TO-BE scenarios – both shall be visual or even a video clip!).

#### 1. Issues

Describe any issues (e.g., incompleteness, inconsistency, ambiguity, redundancy, unsoundness) that you encounter in the informal preliminary definition. Also describe how you have resolved such issues.

Describe what your choice is and why you have made that particular choice (i.e., because that particular choice is good with respect to some *reasons - design rationale*).

For another example, system extensibility can be enhanced additionally by allowing a participant to add a partial category. This is an example of requirements incompleteness.

In order to resolve the issues, you might need to use your own “creative imagination”, but based on your teamwork.

#### 2. Improved Understanding

Prepare a clarified definition of the preliminary definition given as much as possible, while discovering and resolving any possible defects per your discussion in 1. Try to clarify both the domain description and the system description, while establishing the traceability between the two.

#### 3. A Prototype

Build a prototype for your smartphone app (a **mockup** will do for this phase, you could use a mockup tool -e.g., [figma](#)).

A (preliminary) **user manual** should be developed, which should become more complete and consistent at the end of the 2nd phase of the project.

#### 4. Questionnaire

##### **N.B:**

- *(The prototype/user manual can be described separately from your team’s WRS document, if your team so wishes.)*
- *Your team should submit an updated Project Plan too;*
- *Your team’s presentation slides should include:*
  - *the title page, revision history, visual or video as-is scenarios and to-be scenarios, stakeholders, the items in the WRS template, questionnaire, etc., plus*

- *The 2<sup>nd</sup> last slide/page should describe the **requirements creeping rate** your team expects to be able to handle;*
- *The last slide/page should describe why your team's product is believed to be the best*